



2015

# Correlates of Depression and Poor Respiratory Health: A Cohort Study in a Rural County

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## Recommended Citation

Courtney, Stephanie, "Correlates of Depression and Poor Respiratory Health: A Cohort Study in a Rural County" (2015). *Theses and Dissertations--Public Health (M.P.H. & Dr.P.H.)*. 57.  
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Stephanie Courtney, Student

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Linda Alexander, EdD, Director of Graduate Studies

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**CORRELATES OF DEPRESSION AND POOR RESPIRATORY  
HEALTH: A COHORT STUDY IN A RURAL COUNTY**

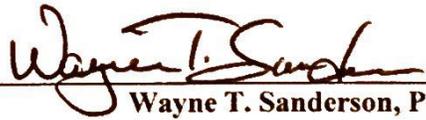
**CAPSTONE PROJECT PAPER**

**A paper submitted in partial fulfillment of the  
requirements for the degree of  
Master of Public Health  
in the  
University of Kentucky College of Public Health**

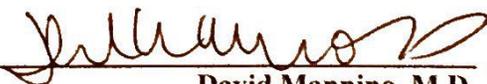
**Stephanie Courtney**

**Lexington, Kentucky**

**July 15, 2015**

  
Wayne T. Sanderson, Ph.D  
Chair

  
Erin Abner, Ph.D

  
David Mannino, M.D.

## **Objective**

High rates of depression are widespread globally and are among the leading causes of disability. To better understand the effects of depression on health outcomes, more research is necessary. This study examines the associations between depression and adverse respiratory outcomes among a cohort of Iowa residents living in a rural county. This study also investigates differences in the reporting of chronic and incident respiratory outcomes.

## **Methods**

Data were obtained from the Keokuk County Rural Health Study (1994-2004) for individuals 18 years of age or older (N=1012). The primary outcome, poor respiratory health (PRH), was based on self-reported diagnoses for emphysema, bronchitis, asthma, a clinical spirometry test, and self-reported persistent cough, phlegm, or wheezing. Covariates included depression, age, gender, education, employment status, marital status, farming status, residence location, smoking status, alcohol use, and stressful events. The associations between reporting PRH and these covariates were determined by performing logistic regressions.

## **Results**

This study showed that 31.9% of individuals in Round 1 and 33.9% of individuals in Round 2 reported depression, and 37.3% of individuals in Round 1 and 39.9% of individuals in Round 2 reported PRH. Significant predictors ( $p < 0.05$ ) of incident PRH in our model were gender, age, employment, and smoking. Significant predictors of chronic PRH in our model were age, education, and residence.

## **Conclusions**

The prevalence of depression and PRH among participants is considerably higher than what has been found previously among adults in the United States. We found depression to be significantly lower among current farmers at baseline compared to individuals who had never farmed. Rural residence was associated with increased odds of chronic PRH. Further studies should examine the temporal relationship between depression and PRH in the context of employment status and occupational exposures.

## **Introduction**

Depression is a mental condition characterized by feelings of severe despondency, dejection, and guilt that can affect a person's thoughts, behaviors, and sense of safety<sup>1</sup>. Psychiatric conditions such as depression, anxiety syndromes, and post-traumatic stress disorders frequently follow incidents such as severe infections, traumatic brain injuries, and workplace injuries. According to the World Health Organization, more than 350 million people of all ages suffer from depression globally<sup>2</sup>. In the United States (U.S.), depression is reported more frequently among women across every age group, among individuals aged 40-59, and among individuals living below the poverty line<sup>3</sup>. The National Institute of Mental Health estimates that in 2012, 16 million adults aged 18 or older, representing 6.9% of all adults in the U.S., had at least one depressive episode in the past year<sup>4</sup>.

Although many studies have documented depressive symptoms as an outcome of diagnosed respiratory diseases, depression has seldom been examined as a risk factor for negative respiratory outcomes, though mechanisms occur that would support this relationship, including changes in the subsets of T lymphocytes, reduced natural killer cell activity, as well as elevated levels of peripheral inflammatory biomarkers, even in the absence of any known medical illness. Especially if it is long lasting and with moderate to severe intensity, depression can lead to serious health conditions, and continues to top the list of leading causes of disability<sup>2,5</sup>. Depression should continue to be studied in order to better inform treatment and prevention programs, and to reduce the associated health burden that stems from these consequential health conditions.

In 2011, in the U.S. 15 million individuals reported that they have been diagnosed with Chronic Obstructive Pulmonary Disease (COPD), and chronic lower respiratory disease, primarily COPD, was the third leading cause of death<sup>6,7</sup>. These numbers may be higher in reality, as one study demonstrated that more than 50% of adults with low pulmonary function were not aware that they had COPD<sup>8</sup>. In the U.S., COPD is more frequently reported among people aged 65-74, women, individuals who are retired or unable to work, individuals with less than a high school education, people with lower incomes, current or former smokers, individuals who are divorced, separated, or widowed, and those with a history of asthma<sup>6</sup>. In the U.S., tobacco smoke is a key factor in the progress of COPD, however exposure to air pollutants in the home and workplace, genetic factors, and respiratory infections can also have an effect<sup>9</sup>.

The purpose of this study was to evaluate the association between poor respiratory health and depression including a series of possible confounding factors (age, gender, educational attainment, marriage status, employment status, farming status, residence location, smoking status, alcohol usage, and exposure to stressful events) in a longitudinal sample of Iowa residents living in a rural county (Keokuk County). Poor respiratory health can be defined as any pathological condition that affects the organs and tissues that make gas exchange possible<sup>10</sup>. Our study examines outcomes related to Chronic Obstructive Pulmonary Disorder (COPD) including emphysema, chronic bronchitis, asthma, and major respiratory symptoms such as coughing, wheezing, and phlegm outside the presence of a cold.

Distinct considerations surround the investigation of the association between depression and poor respiratory health in this study. By studying geographically defined

communities, understanding of chronic disease has improved and provided a basis on which community prevention programs can be built<sup>11</sup>. All households studied are defined as rural, and the large percentage of farmers (>65%) in each round of this study allowed us to examine the association within a targeted population.

There are several reasons it is important to study the health of rural populations. According to the 2010 U.S. Census, almost a fifth of the population lives in rural areas<sup>12</sup>. Also, a higher proportion of older individuals and people living in poverty live in rural areas<sup>13,14</sup>. These people often have less access to education, social services, and health care than their nonrural counterparts<sup>15</sup>. Further, it has been demonstrated that depression, especially among women, is more prevalent in rural communities<sup>16</sup>. COPD has a similar distribution. In a recent study by the American Thoracic Society, the prevalence of COPD in rural communities was 11.9%, compared to an overall prevalence of 7.2%<sup>17</sup>.

Although COPD is generally attributable to smoking, growing evidence suggests that another possible cause is chronic exposure to inhalable particles through occupational exposure<sup>18,19</sup>. This is particularly true for farmers, where exposure to inhalable dusts and particles comes in various forms. Also, although there seems to be growing evidence that those involved in farming are at a higher risk of developing depression and other mental health problems, conclusive data have not been published<sup>20</sup>. Farming is a notoriously dangerous and stressful job that may explain the elevated rates of depression in some studies. Daily encounters with heavy machinery, a variety of tools, and large, unpredictable animals by farmers and their spouses can create a stressful environment. Other factors commonly cited as important farming-related stressors include: time pressures, machinery failures, weather patterns, government policies, death or disability

of a loved one, divorce, loss of crops due to pests or disease, and foreclosure on a mortgage or a loan<sup>21</sup>. In addition, exposure to pesticides has recently been demonstrated as predisposing farmers to higher risks associated with mental health disorders, including depression<sup>22</sup>.

This study fills an important gap in understanding the development of COPD and other respiratory problems over time by examining potential risk factors including presence of depression, age, gender, educational attainment, marriage status, employment status, farming status, residence location, smoking status, alcohol usage, and exposure to stressful events. Few published studies have examined the relationship between depression and the adverse respiratory outcomes associated with COPD<sup>26,27,28</sup>. In addition, to our knowledge no studies to date have examined this relationship with data including important covariates at the individual level such as farming status and residence location. In this study, we aimed (1) to identify and characterize the regional levels of depression and poor respiratory health among the residents of Keokuk County, Iowa; (2) to determine the predictors of reported poor respiratory health, the relationship between depression and poor respiratory health, and the differences in risk factors between persistent and incident cases of poor respiratory health.

## **Methods**

This study is a cross sectional and longitudinal analysis of Round 1 (1994-1997) and Round 2 (1999-2004) data from the Keokuk County Rural Health Study (KCRHS). The University of Iowa and the Great Plains Center for Agricultural Health provided de-

identified data for this analysis. The Institutional Review Boards at the University of Kentucky and the University of Iowa approved this study.

### *Data*

The KCRHS was designed as a 20-year prospective cohort study analyzing chronic disease and injury in a southeastern Iowa county. Methods of data collection include in-person interviews, medical screenings, and environmental assessments<sup>11</sup>. The population in this study is a large stratified random sample of residents in one rural Iowa county.

For our purposes, the sample in this study consisted of individuals who participated in both Round 1 and Round 2 of the KCRHS. All individuals less than 18 years of age at Round 1 were excluded due to differences in mental development and lack of exposure time necessary to develop the chronic conditions associated with COPD. In addition, any individuals who were missing responses for questions and medical screenings related to depression and respiratory health were also excluded. A total of 1,012 individuals were available after these exclusions (Figure 1).

### *Study Variables*

#### *Poor Respiratory Health (PRH)*

Respiratory health status was assessed based on known or diagnosed respiratory diseases (emphysema, bronchitis, asthma), or history of respiratory symptoms (cough, phlegm, and wheezing outside of a cold), or the presence of at least moderate obstruction of airways determined by a clinical spirometry test. Subjects were considered to have PRH if they met any of these conditions.

### *Depression*

The 11-item Center for Epidemiologic Studies Depression Scale (CES-D) was used to assess depression symptoms in this study<sup>23</sup>. We chose a cut point, or a score of nine or higher, for high frequency of depression symptoms representing the 80<sup>th</sup> percentile of our participants' score, which reflects the upper quintile of scores for patient populations on which the National Institute of Mental Health validated the original CES-D instrument<sup>24</sup>.

Additionally, psychotropic medication data were examined from prescription medications. Participants were asked to bring all medications to their clinic interview. Medications included in this analysis were selective serotonin reuptake inhibitors (SSRIs), tricyclic antidepressants (TCAs), heterocyclic antidepressants, and monoamine oxidase inhibitors (MAOIs)<sup>25</sup>. Participants were considered to have depression if their total CES-D score was greater than or equal to nine, or if they were currently taking psychotropic medications.

### *Other Covariates*

Gender was categorized as either male or female. Age was collected on a continuous scale, and for the purpose of analysis, was categorized into three groups (18-44, 45-64, and 65+)<sup>25</sup>. Education was reduced from twelve categories to three (less than high school completion, completed high school, and any completion more than high school). Marital status was reduced from six categories to three (married, divorced/separated/widowed, and never married). Employment status was reduced from eight categories to three (employed, unemployed, and retired). Farming status was categorized into three groups (current, former, and never). Residence location was

categorized as farm, rural non-farm, and town households. Smoking status was categorized into three groups (current, former, and never). Subjects were considered current smokers if they answered “Yes” to “Do you now smoke cigarettes (as of 1 month ago)” or if they responded with “Still smoking pipe” or “Still smoking cigars.” Alcohol use was categorized based on responses to the CAGE (an acronym based on its four questions) questionnaire. Two or more “Yes” responses were categorized as high alcohol use and one or zero as normal alcohol use. Individuals who indicated they never drink were categorized as never. High exposure to stressful events was categorized as having two or more of the following events happen in the past year: lost something of sentimental value, had a close friend die, divorced or separated, had trouble with in-laws, had a spouse/partner die, had a close family member die, had a substantial decrease in income, gone deeply in debt, had legal problems, or had been assaulted.

### *Statistical Analysis*

Exploratory analyses included the use of descriptive statistics. Specifically, counts and percentages were examined for the population distribution, as well as stratified by the main exposure and outcome variables during each round of the study. Logistic regression analyses were performed to determine the association between PRH and depression, which included covariates of age, gender, education, marital status, employment status, farming status, residence location, smoking status, alcohol use, stressful events, and time since Round 1 (categorized as short (1-3 years), medium (4-5 years), and long (6-8 years)). A fully adjusted main effects logistic regression was performed limited to subjects who were free of PRH at baseline in Round 1 to determine predictive factors of incident PRH. A second fully adjusted main effects logistic regression was performed

limited to subjects reporting PRH at baseline in Round 1 to determine predictive factors of chronic PRH. A third fully adjusted main effects logistic regression was performed limited to subjects who were free of depression at baseline in Round 1 to determine predictive factors of incident depression. Finally, a fourth fully adjusted main effects logistic regression was performed limited to subjects reporting depression at baseline in Round 1 to determine predictive factors of chronic depression. These four logistic regressions were also performed to assess effect modification and confounding on the exposure effect estimates. All logistic regression models included time since Round 1 in the model. Backwards elimination and forward selection were used to determine significant covariates. Two-way interactions between the exposure variables and all other variables in each model were examined using logistic regression analyses and significant interactions were reported in the final adjusted interaction models. Finally, four logistic regressions were performed with Round 1 covariate responses to predict reporting incident PRH or depression, as well as, chronic PRH or depression. For all analyses, a two-tailed test with a  $p < 0.05$  was considered statistically significant. All statistical analyses were completed using SAS 9.3 (SAS Institute Inc., Cary, NC).

## **Results**

### *Demographics & Descriptive Statistics*

Demographic information and descriptive statistics about the sample population of 1,012 individuals are presented in Table 1a (Round 1) and Table 1b (Round 2). For participants in Round 1 (Table 1a), the largest proportion were 45-64 years old (39.43%), female (56.32%), high school graduates (54.31%), married (82.08%), employed (70.95%),

current farmers (37.72%), located in town (43.08%), had never smoked (62.87%), used alcohol normally (73.10%), and had low exposure to stressful events (74.51%).

Compared to Round 1 demographic statistics, very little variation can be seen in marital status, residence location, alcohol use, and exposure to stressful events in Round 2.

However, the population did age slightly with an average of 4.8 years ( $SD \pm 1.02$ ) between Round 1 and Round 2. More individuals pursued post-secondary education (38.06% in Round 1, 45.75% in Round 2), retired (19.07% in Round 1, 22.53% in Round 2), formerly farmed (33.17% in Round 1, 43.08% in Round 2), and formerly smoked (23.96% in Round 1, 26.28% in Round 2).

Descriptive statistics of the study subjects who reported PRH in Round 1 or Round 2 are presented in Tables 1a and 1b, respectively. PRH increased in those reporting depression from 47.7% in Round 1 to 49.1% in Round 2. PRH was reported in a higher proportion of individuals who were 65 years or older (46.51% in Round 1, 48.86% in Round 2), male (40.72% in Round 1, 43.44% in Round 2), did not complete high school (55.84% in Round 1, 53.57% in Round 2), retired (47.15% in Round 1, 50.00% in Round 2), never farmed (40.82% in Round 1, 42.02% in Round 2), current smokers (61.65% in Round 1, 60.91% in Round 2), high alcohol users (51.75% in Round 1, 50.47% in Round 2), and experiencing high stress (44.19% in Round 1, 49.12% in Round 2). None of these differences were significant.

Descriptive statistics of the study subjects who reported depression in Round 1 or Round 2 are presented in Tables 1a and 1b, respectively. Depression increased in those reporting PRH from 40.9% in Round 1 to 41.8% in Round 2. Depression was reported in a higher proportion of individuals who were 65 years or older (35.27% in Round 1, 42.90% in

Round 2), female (37.02% in Round 1, 38.60% in Round 2), did not complete high school (36.36% in Round 1, 48.81% in Round 2), divorced/separated/widowed (47.89% in Round 1, 51.30% in Round 2), unemployed (53.47% in Round 1, 53.54% in Round 2), never farmed (36.73% in Round 1, 35.85% in Round 2), lived in town (34.40% in Round 1, 37.80% in Round 2), and experiencing high stress (44.19% in Round 1, 49.12% in Round 2). None of these differences were significant.

Incident PRH was reported by 17.8% of subjects (N=132), and of those, 18.2% (N=39) reported depression at baseline. Among the 37.3% (N=377) subjects who reported PRH in Round 1, 72.14% (N=272) subjects reported chronic PRH in Round 2, and of those, 70.8% (N=109) reported depression at baseline. Incident depression was reported by 17.0% of subjects (N=137), and of those, 20.0% (N=55) reported PRH at baseline.

Among the 31.9% (N=323) subjects who reported depression in Round 1, 64.1% (N=207) subjects reported chronic depression in Round 2, and of those, 66.2% (N=102) reported PRH at baseline.

#### *Bivariate Analysis and Multivariate Regression*

The results of the unadjusted and adjusted logistic regressions limited to subjects who were free from PRH at baseline (N = 740) are presented in Table 2a and Table 3a, respectively. These models were used to determine predictive factors of incident PRH. Significant variables ( $p < 0.05$ ) in the unadjusted bivariate analysis include: age, gender, employment status, and smoking status. Significant covariates ( $p < 0.05$ ) in the adjusted model include gender, farming status, and smoking status.

The results of the unadjusted and adjusted logistic regressions limited to subjects who reported PRH at baseline (N = 377) are presented in Table 2b and Table 3b, respectively. These models were used to determine predictive factors of chronic PRH. The only significant covariate ( $p < 0.05$ ) in the unadjusted bivariate model was age. There were no significant covariates in the adjusted model.

The results of the unadjusted and adjusted logistic regressions limited to subjects who were free from depression at baseline (N = 805) are presented in Table 2c and Table 3c, respectively. These models were used to determine predictive factors of incident depression. Significant covariates ( $p < 0.05$ ) in the unadjusted bivariate model include age, gender, education, employment status, and marital status. Significant covariates ( $p < 0.05$ ) in the adjusted model include age and gender.

The results of the unadjusted and adjusted logistic regressions limited to subjects who reported depression in both rounds (N = 323) are presented in Table 2d and Table 3d, respectively. These models were used to determine predictive factors of chronic depression. Significant covariates ( $p < 0.05$ ) in the unadjusted bivariate model include: age and education. Significant covariates ( $p < 0.05$ ) in the adjusted model include: age and education.

#### *Final Multivariable Regression Models*

Table 4a-d presents results from our final multiple logistic regression models. Here, we fit reduced main effects models as well as an additional set of models where we assessed effect modification of our primary exposure variable. Results from our final main effects model for incident PRH show that there is not a statistically significant effect of

depression ( $p=0.87$ ). However, the variables found to be associated with incident PRH were female vs. male gender (OR 0.61, 95% CI: 0.40 – 0.92), unemployed vs. employed (OR 2.21, 95% CI: 1.11 – 4.39), and current smoker vs. never smoker (OR 1.98, 95% CI: 1.07 – 3.63)(Table 4a). In addition, in a separate analysis, we found that there was a marginally significant age by depression interaction such that depression increased the risk of PRH for the youngest and oldest participants, but protected against PRH for middle-aged participants (Table 4a).

Results from our final main effects model for chronic PRH show that there is not a statistically significant effect of depression ( $p=0.43$ ). In addition, there were no variables found to be associated with chronic PRH. However, in a separate analysis, there was a significant education by depression interaction such that depression protected against chronic PRH for individuals with less than a high school education (Table 4a).

Results from our final main effects model for incident depression show that there is not a statistically significant effect of PRH on depression ( $p=0.16$ ). However, the variables found to be associated with incident depression were female vs. male gender (OR 1.60, 95% CI: 1.09 – 2.35) and 65 years of age or older vs. 18-44 years (OR 1.75, 95% CI: 1.11 – 2.77). Interaction effects between the covariates were also analyzed in a separate model; however, no statistically significant associations were found.

Results from our final main effects model for chronic depression show that there is not a statistically significant effect of PRH on depression ( $p=0.71$ ). However, the variables found to be associated with chronic depression were 65 years of age or older vs. 18-44 years (OR 1.80, 95% CI: 1.24 – 2.62) and high school graduate or more than a high

school education vs. less than high school (OR 0.24, 95% CI: 0.06 - 0.83; OR.18, 95% CI: 0.05 – 0.66, respectively).

## **Discussion**

This study was done to characterize and identify regional levels of depression and PRH among the residents of an entirely rural county. In addition, we wanted to determine the relationship between depression and PRH, while accounting for the differences in risk factors between incident and chronic PRH.

Depression was reported among 31.9% of individuals in Round 1 and 33.9% of individuals in Round 2, and 37.3% of individuals in Round 1 and 39.9% of individuals in Round 2 reported PRH. The prevalence of both depression and PRH among the study participants is considerably higher than what has been found in previous studies, which has been estimated to be between 5-8% for both conditions among adults in the U.S.<sup>4,16,17</sup>. One reason this may be is that our measure for each included multiple levels of criteria, including the CESD instrument and medication data for depression, and a spirometry test, reported symptomology, and reported diagnosed diseases for PRH. Depression was reported in a higher proportion of women and individuals receiving less than a high school education in both rounds, which is consistent with other findings<sup>3</sup>. However, depression was found more frequently among participants age 65 years or older unlike in previous studies. PRH was reported in a higher proportion of individuals aged 65 years or older, retired or unable to work, receiving less than a high school education, and currently or formerly smokers, which is similar to other studies<sup>6</sup>. However, PRH was reported more commonly among men within this cohort.

The strongest predictors of incident PRH in our model were gender, age, employment, and smoking. Individuals aged 45-64 years who reported depression at baseline were protected from incident PRH compared to younger and older age groups who reported depression. However, the small number of individuals with incident PRH who reported depression at baseline makes it difficult to determine any true association. The strongest predictors of chronic PRH in our model were age, education, and residence. Individuals who had less than a high school education who reported depression at baseline were protected from chronic PRH compared to participants with higher education who reported depression. However, again the small sample number of individuals in this stratum make interpretation challenging. Age and gender were important covariates for both incident and chronic PRH models. The strongest predictors of incident depression were gender and age, and the strongest predictors of chronic depression were age and education. These predictors for depression are consistent with previous findings<sup>3</sup>.

Although the study participants were from an entirely rural county, rurality was also based on residence location. Study participants who responded with town for residence more frequently reported depression and PRH in both rounds than those who responded with nonfarm rural. In our final model, we found rurality to be associated with chronic PRH. However, these data were not compared to other more metropolitan counties or to counties with more robust stratification. In addition, other studies have found rurality to be associated with lower socioeconomic status and difficulties accessing healthcare, which may reduce reported diagnoses or medications<sup>15,16</sup>.

Although other research has found an increased prevalence of depression among farmers, we found depression to be significantly lower ( $p=0.01$ ) among current farmers when

compared to non-farmers at baseline<sup>20</sup>. In addition, we found that depression was significantly higher ( $p=0.01$ ) for individuals living in a town residence when compared to a farm residence in Round 2. However, these data are likely biased based on the healthy worker effect and the fact that farming status was defined by self-reported employment history. It has been shown that depression often causes disabilities that prevent individuals from working, and we found a significant difference ( $p<.001$ ) in prevalence of depression between unemployed and employed individuals in both rounds<sup>5</sup>. In addition, farming status and farm residence were not associated with PRH or depression in any model.

### *Limitations*

This study has some limitations. The relatively small sample size, especially after stratification into incident and chronic outcome groups, made analysis of effects difficult. In addition, the short follow-up time from Round 1 to Round 2 may not have allowed the effects of depression on PRH to be fully realized. Many of the variables within the models were defined by responses by participants, which could have introduced response bias. This is especially important as issues with mental health tend to have a stigma associated with them, and may prevent participants from answering truthfully. Finally, although the distribution of exposure and outcome variables, as well as important covariates within the group lost to follow-up were not statistically different than the study sample, the effects of eliminating them from the study cannot be determined.

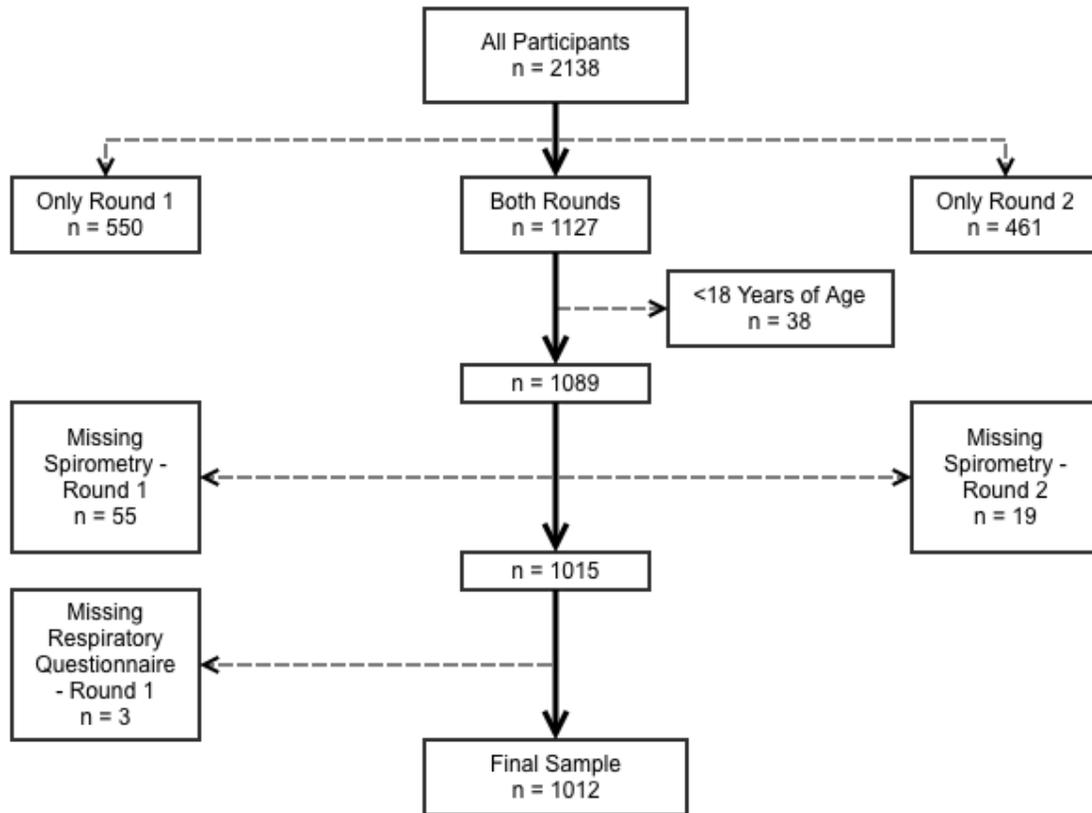
### *Recommendations*

Based on our findings, further study is necessary to determine the effect of depression on COPD and PRH over time. This study contributes to the exploration of depression and COPD within a rural county, and provides an opportunity for better understanding the relationship between depression and PRH. Gender, age, education, employment status, smoking status, and residence were shown to be associated with PRH. Additional examination of these variables would be beneficial. A cohort based on disability data or unemployment data may be valuable in determining a temporal relationship between depression and PRH. In addition, our findings that rural residence increased the odds of chronic PRH should be studied more in order to provide knowledge about the effect of rurality on health over a period of time, especially in the context of occupational health. Data from large farming cohorts could be used to examine the effects of occupational stress and exposure to chemicals and other pathogens on mental health and respiratory disease.

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**Figure 1.** Exclusion Criteria and Selection of Final Sample Size

**Table 1a.** Cross Sectional Distribution for participants in Round 1 of KCRHS

Variables	Population Distribution*	No Depression <sup>†</sup>	Depression <sup>†</sup>	No PRH <sup>†</sup>	PRH <sup>†</sup>
	n = 1012 (100.00%)	n = 689 (68.08%)	n = 323 (31.92%)	n = 635 (62.75%)	n = 377 (37.25%)
<b>Age (Years)</b>					
18-44	355 (35.08)	239 (67.32)	116 (32.68)	244 (68.73)	111 (31.27)
45-64	399 (39.43)	283 (70.93)	116 (29.07)	253 (63.41)	146 (36.59)
65+	258 (25.49)	167 (64.73)	91 (35.27)	138 (53.49)	120 (46.51)
<b>Gender</b>					
Male	442 (43.68)	330 (74.66)	112 (25.34)	262 (59.28)	180 (40.72)
Female	570 (56.32)	359 (62.98)	211 (37.02)	373 (65.44)	197 (34.56)
<b>Education</b>					
Less than high school	77 (7.63)	49 (63.64)	28 (36.36)	34 (44.16)	43 (55.84)
High school graduate	548 (54.31)	368 (67.15)	180 (32.85)	332 (60.58)	216 (39.42)
More than high school	384 (38.06)	269 (70.05)	115 (29.95)	267 (69.53)	117 (30.47)
<b>Marital Status</b>					
Married	829 (82.08)	588 (70.93)	241 (29.07)	523 (63.09)	306 (36.91)
Divorced/Separated/Widowed	142 (14.06)	74 (52.11)	68 (47.89)	83 (58.45)	59 (41.55)
Never Married	39 (3.86)	25 (64.10)	14 (35.90)	27 (69.23)	12 (30.77)
<b>Employment Status</b>					
Employed	718 (70.95)	514 (71.59)	204 (28.41)	478 (66.57)	240 (33.43)
Retired	193 (19.07)	128 (66.32)	65 (33.68)	102 (52.85)	91 (47.15)
Unemployed	101 (9.98)	47 (46.53)	54 (53.47)	55 (54.46)	46 (45.54)
<b>Farming Status</b>					
Current	381 (37.72)	276 (72.44)	105 (27.56)	248 (65.09)	133 (34.91)
Former	335 (33.17)	225 (67.16)	110 (32.84)	211 (62.99)	124 (37.01)
Never	294 (29.11)	186 (63.27)	108 (36.73)	174 (59.18)	120 (40.82)
<b>Residence Location</b>					
Town	436 (43.08)	286 (65.60)	150 (34.40)	262 (60.09)	174 (39.91)
Farm	385 (38.04)	273 (70.91)	112 (29.09)	262 (68.05)	123 (31.95)
Rural	191 (18.87)	130 (68.06)	61 (31.94)	111 (58.12)	80 (41.88)
<b>Smoking Status</b>					
Current	133 (13.17)	82 (61.65)	51 (38.35)	51 (38.35)	82 (61.65)
Former	242 (23.96)	158 (65.29)	84 (34.71)	146 (60.33)	96 (39.67)
Never	635 (62.87)	449 (70.71)	186 (29.29)	437 (68.82)	198 (31.18)
<b>Alcohol Use</b>					
High	114 (11.28)	62 (54.39)	52 (45.61)	55 (48.25)	59 (51.75)
Normal	739 (73.10)	522 (70.64)	217 (29.36)	469 (63.46)	270 (36.54)
Never	158 (15.63)	105 (66.46)	53 (33.54)	111 (70.25)	47 (29.75)
<b>Stressful Events</b>					
High	258 (25.49)	142 (55.04)	116 (44.96)	144 (55.81)	114 (44.19)
Low	754 (74.51)	547 (72.55)	207 (27.45)	491 (65.12)	263 (34.88)
<b>Depression</b>					
Yes	323 (31.92)			169 (52.32)	154 (47.68)
No	689 (68.08)			466 (67.63)	223 (32.37)
<b>PRH</b>					
Yes	377 (37.25)	223 (59.15)	154 (40.85)		
No	635 (62.75)	466 (73.39)	169 (26.61)		

\* Column percentage

† Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 1b.** Cross Sectional Distribution for participants in Round 2 of KCRHS

Variables	Population Distribution*	No Depression <sup>†</sup>	Depression <sup>†</sup>	No PRH <sup>†</sup>	PRH <sup>†</sup>
	n = 1012 (100.00%)	n = 668 (66.01%)	n = 344 (33.99%)	n = 608 (60.08%)	n = 404 (39.92%)
<b>Age (Years)</b>					
18-44	245 (24.21)	167 (68.16)	78 (31.84)	174 (71.02)	71 (28.98)
45-64	415 (41.01)	300 (72.29)	115 (27.71)	254 (61.20)	161 (38.80)
65+	352 (34.78)	201 (57.10)	151 (42.90)	180 (29.61)	172 (48.86)
<b>Gender</b>					
Male	442 (43.68)	318 (71.95)	124 (28.05)	250 (56.56)	192 (43.44)
Female	570 (56.32)	350 (61.40)	220 (38.60)	358 (62.81)	212 (37.19)
<b>Education</b>					
Less than high school	84 (8.30)	43 (51.19)	41 (48.81)	39 (46.43)	45 (53.57)
High school graduate	465 (45.95)	304 (65.38)	161 (34.62)	264 (56.77)	201 (43.23)
More than high school	463 (45.75)	321 (69.33)	142 (30.67)	305 (65.87)	158 (34.13)
<b>Marital Status</b>					
Married	831 (82.11)	578 (69.55)	253 (30.45)	505 (60.77)	326 (39.23)
Divorced/Separated/Widowed	154 (15.22)	75 (48.70)	79 (51.30)	89 (57.79)	65 (42.21)
Never Married	27 (2.67)	15 (55.56)	12 (44.44)	14 (51.85)	13 (48.15)
<b>Employment Status</b>					
Employed	657 (64.92)	475 (72.30)	182 (27.70)	430 (65.45)	227 (34.55)
Retired	228 (22.53)	134 (58.77)	94 (41.23)	114 (50.00)	114 (50.00)
Unemployed	127 (12.55)	59 (46.46)	68 (53.54)	64 (50.39)	63 (49.61)
<b>Farming Status</b>					
Current	219 (21.64)	153 (69.86)	66 (30.14)	135 (61.64)	84 (38.36)
Former	436 (43.08)	286 (65.60)	150 (34.40)	266 (61.01)	170 (38.99)
Never	357 (35.28)	229 (64.15)	128 (35.85)	207 (57.98)	150 (42.02)
<b>Residence Location</b>					
Town	463 (45.75)	288 (62.20)	175 (37.80)	268 (57.88)	195 (42.12)
Farm	405 (40.02)	284 (70.12)	121 (29.88)	254 (62.72)	151 (37.28)
Rural	144 (14.23)	96 (66.67)	48 (33.33)	86 (59.72)	58 (40.28)
<b>Smoking Status</b>					
Current	110 (10.87)	71 (64.55)	39 (35.45)	43 (39.09)	67 (60.91)
Former	266 (26.28)	171 (64.29)	95 (35.71)	149 (56.02)	117 (43.98)
Never	636 (62.85)	426 (66.98)	210 (33.02)	416 (65.41)	220 (34.59)
<b>Alcohol Use</b>					
High	107 (10.57)	70 (65.42)	37 (34.58)	53 (49.53)	54 (50.47)
Normal	699 (69.07)	471 (67.38)	228 (32.62)	434 (62.09)	265 (37.91)
Never	206 (20.36)	127 (61.65)	79 (38.35)	121 (58.74)	85 (41.26)
<b>Stressful Events</b>					
High	228 (22.53)	123 (53.95)	105 (46.05)	116 (50.88)	112 (49.12)
Low	784 (77.47)	545 (69.52)	239 (30.48)	492 (62.76)	292 (37.24)
<b>Depression</b>					
Yes	344 (33.99)			175 (50.87)	169 (49.13)
No	668 (66.01)			433 (64.82)	235 (35.18)
<b>PRH</b>					
Yes	404 (39.92)	235 (58.17)	169 (41.83)		
No	608 (60.08)	433 (71.22)	175 (28.78)		

\* Column percentage

† Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 2a.** Unadjusted Bivariate Analysis for Incident PRH (N=740)

Variables	No Incident PRH <sup>†</sup>	Incident PRH <sup>†</sup>	OR (CI)	P Value
	n = 608 (82.16%)	n = 132* (17.84%)		
<b>Depression</b>				
Yes	175 (81.78)	39 (18.22)	1.04 (0.69 – 1.57)	0.860
No	433 (82.32)	93 (17.68)	Reference	
<b>Age (Years)</b>				
18-44	242 (85.82)	40 (14.18)	Reference	
45-64	237 (82.29)	51 (17.71)	1.30 (0.83 – 2.04)	0.524
65+	129 (75.88)	41 (24.12)	1.92 (1.18 – 3.12)	0.008
<b>Gender</b>				
Male	250 (78.86)	67 (21.14)	Reference	
Female	358 (84.63)	65 (15.37)	0.68 (0.46 – 0.99)	0.043
<b>Education</b>				
Less than high school	35 (79.55)	9 (20.45)	Reference	
High school graduate	313 (80.05)	78 (19.95)	0.97 (0.45 – 2.10)	0.937
More than high school	259 (85.48)	44 (14.52)	0.66 (0.30 – 1.47)	0.310
<b>Marital Status</b>				
Married	508 (83.01)	104 (16.99)	Reference	
Divorced/Separated/Widowed	77 (78.57)	21 (21.43)	1.33 (0.53 – 3.37)	0.286
Never Married	22 (78.57)	6 (21.43)	1.33 (0.79 – 2.26)	0.544
<b>Employment Status</b>				
Employed	467 (84.91)	83 (15.09)	Reference	
Retired	90 (73.77)	32 (26.23)	2.00 (1.26 – 3.19)	0.004
Unemployed	51 (75.00)	17 (25.00)	1.88 (1.03 – 3.41)	0.038
<b>Farming Status</b>				
Current	248 (85.22)	43 (14.78)	0.68 (0.43 – 1.09)	0.108
Former	194 (80.83)	46 (19.17)	0.93 (0.58 – 1.49)	0.766
Never	165 (79.71)	42 (20.29)	Reference	
<b>Residence Location</b>				
Town	251 (82.03)	55 (17.97)	Reference	
Farm	245 (83.05)	50 (16.95)	0.93 (0.61 – 1.42)	0.741
Rural	112 (80.58)	27 (19.42)	1.10 (0.66 – 1.84)	0.715
<b>Smoking Status</b>				
Current	50 (73.53)	18 (26.47)	1.85 (1.03 – 3.34)	0.040
Former	145 (81.01)	34 (18.99)	1.21 (0.78 – 1.88)	0.405
Never	412 (83.74)	80 (16.26)	Reference	
<b>Alcohol Use</b>				
High	59 (79.73)	15 (20.27)	1.11 (0.54 – 2.28)	0.787
Normal	449 (82.69)	94 (17.31)	0.91 (0.55 – 1.51)	0.715
Never	100 (81.30)	23 (18.70)	Reference	
<b>Stressful Events</b>				
High	146 (81.11)	34 (18.89)	1.10 (0.71 – 1.69)	0.672
Low	462 (82.50)	98 (17.50)	Reference	

\* Includes all subjects who did not report PRH at baseline

† Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 2b.** Unadjusted Bivariate Analysis for Chronic PRH (N=377)

Variables	No Chronic PRH <sup>†</sup>	Chronic PRH <sup>†</sup>	OR (CI)	P Value
	n = 105 (27.85%)	n = 272* (72.14%)		
<b>Depression</b>				
Yes	45 (29.22)	109 (70.78)	0.89 (0.57 – 1.41)	0.622
No	60 (26.91)	163 (73.09)	Reference	
<b>Age (Years)</b>				
18-44	38 (34.24)	73 (65.77)	Reference	
45-64	35 (23.97)	111 (76.03)	1.65 (0.96 – 2.85)	0.072
65+	32 (26.67)	88 (73.33)	1.43 (0.82 – 2.52)	0.212
<b>Gender</b>				
Male	55 (30.56)	125 (69.44)	Reference	
Female	50 (25.38)	147 (74.62)	1.29 (0.82 – 2.03)	0.263
<b>Education</b>				
Less than high school	10 (23.26)	33 (76.74)	Reference	
High school graduate	59 (27.31)	157 (72.69)	0.81 (0.37 – 1.74)	0.583
More than high school	36 (30.77)	81 (69.23)	0.68 (0.30 – 1.53)	0.354
<b>Marital Status</b>				
Married	89 (29.08)	217 (70.92)	Reference	
Divorced/Separated/Widowed	15 (25.42)	44 (74.58)	1.20 (0.64 – 2.72)	0.569
Never Married	1 (8.33)	11 (91.67)	4.51 (0.57 – 35.47)	0.152
<b>Employment Status</b>				
Employed	72 (30.00)	168 (70.00)	Reference	
Retired	20 (21.98)	71 (78.02)	1.52 (0.86 – 2.68)	0.148
Unemployed	13 (28.26)	33 (71.74)	1.09 (0.54 – 2.19)	0.813
<b>Farming Status</b>				
Current	43 (32.33)	90 (67.67)	0.79 (0.46 – 1.36)	0.403
Former	29 (23.39)	95 (76.61)	1.24 (0.70 – 2.21)	0.461
Never	33 (27.50)	87 (72.50)	Reference	
<b>Residence Location</b>				
Town	44 (25.29)	130 (74.71)	Reference	
Farm	33 (26.83)	90 (73.17)	0.92 (0.55 – 1.56)	0.765
Rural	28 (35.00)	52 (65.00)	0.63 (0.36 – 1.11)	0.112
<b>Smoking Status</b>				
Current	17 (20.73)	65 (79.27)	1.47 (0.79 – 2.73)	0.222
Former	33 (34.38)	63 (65.63)	0.73 (0.44 – 1.24)	0.247
Never	55 (27.78)	143 (72.22)	Reference	
<b>Alcohol Use</b>				
High	19 (32.20)	40 (67.80)	0.72 (0.31 – 1.69)	0.454
Normal	74 (27.41)	196 (72.59)	0.91 (0.45 – 1.84)	0.790
Never	12 (25.53)	35 (74.47)	Reference	
<b>Stressful Events</b>				
High	36 (31.58)	78 (68.42)	0.77 (0.48 – 1.25)	0.288
Low	69 (26.24)	194 (73.76)	Reference	

\*Includes only subjects who reported PRH at baseline and in Round 2

<sup>†</sup> Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 2c.** Unadjusted Bivariate Analysis for Incident Depression (N=805)

Variables	No Incident Depression <sup>†</sup>	Incident Depression <sup>†</sup>	OR (CI)	P Value
	n = 668 (82.98%)	n = 137* (17.02%)		
<b>PRH</b>				
Yes	220 (80.00)	55 (20.00)	1.37 (0.94 – 1.99)	0.106
No	448 (84.53)	82 (15.47)	Reference	
<b>Age (Years)</b>				
18-44	239 (83.28)	48 (16.72)	Reference	
45-64	290 (88.15)	39 (11.85)	0.67 (0.42 – 1.06)	0.085
65+	139 (73.54)	50 (26.46)	1.79 (1.14 – 2.80)	0.011
<b>Gender</b>				
Male	318 (86.18)	51 (13.82)	Reference	
Female	350 (80.28)	86 (19.72)	1.53 (1.05 – 2.24)	0.027
<b>Education</b>				
Less than high school	38 (73.08)	14 (26.92)	Reference	
High school graduate	359 (83.10)	73 (16.90)	0.55 (0.29 – 1.07)	0.079
More than high school	269 (84.59)	49 (15.41)	0.49 (0.25 – 0.98)	0.044
<b>Marital Status</b>				
Married	567 (84.38)	105 (15.63)	Reference	
Divorced/Separated/Widowed	76 (75.25)	25 (24.75)	1.78 (1.08 – 2.92)	0.024
Never Married	23 (76.67)	7 (23.33)	1.64 (0.69 – 3.93)	0.264
<b>Employment Status</b>				
Employed	511 (85.59)	86 (14.41)	Reference	
Retired	106 (72.60)	40 (27.40)	2.24 (1.46 – 3.45)	0.0002
Unemployed	51 (82.26)	11 (17.74)	1.28 (0.64 – 2.56)	0.481
<b>Farming Status</b>				
Current	275 (85.94)	45 (14.06)	0.67 (0.42 – 1.06)	0.085
Former	211 (81.47)	48 (18.53)	0.93 (0.59 – 1.47)	0.757
Never	180 (80.36)	44 (19.64)	Reference	
<b>Residence Location</b>				
Town	271 (80.65)	65 (19.35)	Reference	
Farm	275 (85.67)	46 (14.33)	0.70 (0.46 – 1.05)	0.087
Rural	122 (82.43)	26 (17.57)	0.89 (0.54 – 1.47)	0.645
<b>Smoking Status</b>				
Current	79 (81.44)	18 (18.56)	1.10 (0.63 – 1.93)	0.737
Former	158 (84.04)	30 (15.96)	0.92 (0.58 – 1.44)	0.709
Never	430 (82.85)	89 (17.15)	Reference	
<b>Alcohol Use</b>				
High	68 (83.95)	13 (16.05)	0.68 (0.32 – 1.41)	0.123
Normal	508 (83.83)	98 (16.17)	0.68 (0.42 – 1.11)	0.297
Never	92 (77.97)	26 (22.03)	Reference	
<b>Stressful Events</b>				
High	150 (82.87)	31 (17.13)	1.01 (0.65 – 1.57)	0.965
Low	518 (83.01)	106 (16.99)	Reference	

\*Includes all subjects who did not report depression at baseline

<sup>†</sup> Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 2d.** Unadjusted Bivariate Analysis for Chronic Depression (N=323)

Variables	No Chronic Depression <sup>†</sup> n = 116 (35.91%)	Chronic Depression <sup>†</sup> n = 207* (64.09%)	OR (CI)	P Value
<b>PRH</b>				
Yes	52 (33.77)	102 (66.23)	1.20 (0.76 – 1.89)	0.443
No	64 (37.87)	105 (62.13)	Reference	
<b>Age (Years)</b>				
18-44	48 (41.38)	68 (58.62)	Reference	
45-64	46 (39.66)	70 (60.34)	1.07 (0.64 – 1.82)	0.789
65+	22 (24.18)	69 (75.82)	2.21 (1.21 – 4.06)	0.010
<b>Gender</b>				
Male	39 (34.82)	73 (65.18)	Reference	
Female	77 (36.49)	134 (63.51)	0.93 (0.58 – 1.50)	0.766
<b>Education</b>				
Less than high school	3 (10.71)	25 (89.29)	Reference	
High school graduate	64 (35.56)	116 (64.44)	0.22 (0.06 – 0.75)	0.016
More than high school	49 (42.61)	66 (57.39)	0.16 (0.05 – 0.57)	0.004
<b>Marital Status</b>				
Married	84 (34.85)	157 (65.15)	Reference	
Divorced/Separated/Widowed	27 (39.71)	41 (60.29)	0.81 (0.47 – 1.41)	0.462
Never Married	5 (35.71)	9 (64.29)	0.96 (0.31 – 2.97)	0.948
<b>Employment Status</b>				
Employed	83 (40.69)	121 (59.31)	Reference	
Retired	18 (27.69)	47 (72.31)	1.79 (0.97 – 3.30)	0.062
Unemployed	15 (27.78)	39 (72.22)	1.78 (0.92 – 3.44)	0.085
<b>Farming Status</b>				
Current	44 (41.90)	61 (58.10)	0.75 (0.43 – 1.31)	0.314
Former	34 (30.91)	76 (69.09)	1.21 (0.69 – 2.14)	0.502
Never	38 (35.19)	70 (64.81)	Reference	
<b>Residence Location</b>				
Town	50 (33.33)	100 (66.67)	Reference	
Farm	48 (42.86)	64 (57.14)	0.67 (0.40 – 1.11)	0.116
Rural	18 (29.51)	43 (70.49)	1.19 (0.63 – 2.28)	0.590
<b>Smoking Status</b>				
Current	15 (29.41)	36 (70.59)	1.45 (0.74 – 2.83)	0.280
Former	30 (35.71)	54 (64.29)	1.09 (0.64 – 1.86)	0.762
Never	70 (37.63)	116 (62.37)	Reference	
<b>Alcohol Use</b>				
High	19 (36.54)	33 (63.46)	0.56 (0.24 – 1.31)	0.184
Normal	84 (38.71)	133 (61.29)	0.52 (0.26 – 1.02)	0.057
Never	13 (24.53)	40 (75.47)	Reference	
<b>Stressful Events</b>				
High	39 (33.62)	77 (66.38)	1.17 (0.73 – 1.89)	0.520
Low	77 (37.20)	130 (62.80)	Reference	

\*Includes all subjects who reported depression at baseline and in Round 2

<sup>†</sup> Row percentage

\*\*Not all variables add up to total subject number due to missing values

**Table 3a.** Adjusted Multivariate Analysis for Incident PRH (N=740\*)

<b>Variables</b>	<b>OR (CI)</b>	<b>P Value</b>
<b>Depression</b>		
Yes	1.01 (0.65 – 1.58)	0.965
No	Reference	
<b>Age (Years)</b>		
18-44	Reference	
45-64	1.30 (0.80 – 2.14)	0.533
65+	1.29 (0.61 – 2.72)	0.715
<b>Gender</b>		
Male	Reference	
Female	0.51 (0.32 – 0.81)	0.005
<b>Education</b>		
Less than high school	Reference	
High school graduate	1.28 (0.56 – 2.91)	0.285
More than high school	0.94 (0.40 – 2.22)	0.513
<b>Marital Status</b>		
Married	Reference	
Divorced/Separated/Widowed	1.34 (0.76 – 2.35)	0.965
Never Married	1.85 (0.70 – 4.89)	0.351
<b>Employment Status</b>		
Employed	Reference	
Retired	1.86 (0.92 – 3.74)	0.336
Unemployed	1.86 (0.91 – 3.80)	0.350
<b>Farming Status</b>		
Current	0.44 (0.22 – 0.85)	0.024
Former	0.74 (0.45 – 1.23)	0.604
Never	Reference	
<b>Residence Location</b>		
Town	Reference	
Farm	1.71 (0.95 – 3.06)	0.206
Rural	1.49 (0.86 – 2.57)	0.615
<b>Smoking Status</b>		
Current	1.90 (1.00 – 3.60)	0.027
Former	0.88 (0.53 – 1.47)	0.097
Never	Reference	
<b>Alcohol Use</b>		
High	1.09 (0.47 – 2.55)	0.806
Normal	1.00 (0.56 – 1.76)	0.839
Never	Reference	
<b>Stressful Events</b>		
High	1.03 (0.65 – 1.64)	0.893
Low	Reference	

\* Includes all subjects who did not reports PRH at baseline

**Table 3b.** Adjusted Multivariate Analysis for Chronic PRH (N=377\*)

<b>Variables</b>	<b>OR (CI)</b>	<b>P Value</b>
<b>Depression</b>		
Yes	0.81 (0.49 – 1.33)	0.399
No	Reference	
<b>Age (Years)</b>		
18-44	Reference	
45-64	1.80 (0.98 – 3.32)	0.058
65+	1.17 (0.48 – 2.88)	0.726
<b>Gender</b>		
Male	Reference	
Female	1.25 (0.72 – 2.18)	0.432
<b>Education</b>		
Less than high school	Reference	
High school graduate	0.85 (0.37 – 1.95)	0.707
More than high school	0.72 (0.30 – 1.77)	0.475
<b>Marital Status</b>		
Married	Reference	
Divorced/Separated/Widowed	1.24 (0.61 – 2.51)	0.553
Never Married	6.71 (0.79 – 57.11)	0.082
<b>Employment Status</b>		
Employed	Reference	
Retired	1.70 (0.72 – 4.01)	0.227
Unemployed	0.78 (0.33 – 1.85)	0.568
<b>Farming Status</b>		
Current	0.54 (0.24 – 1.24)	0.147
Former	1.04 (0.55 – 1.99)	0.900
Never	Reference	
<b>Residence Location</b>		
Town	Reference	
Farm	1.62 (0.75 – 3.48)	0.221
Rural	0.67 (0.36 – 1.24)	0.202
<b>Smoking Status</b>		
Current	1.92 (0.95 – 3.89)	0.070
Former	0.75 (0.41 – 1.38)	0.355
Never	Reference	
<b>Alcohol Use</b>		
High	0.75 (0.27 – 2.07)	0.577
Normal	1.06 (0.48 – 2.37)	0.882
Never	Reference	
<b>Stressful Events</b>		
High	0.94 (0.56 – 1.59)	0.827
Low	Reference	

\*Includes all subjects who reported PRH at baseline and in Round 2

**Table 3c.** Adjusted Multivariate Analysis for Incident Depression (N=805\*)

<b>Variables</b>	<b>OR (CI)</b>	<b>P Value</b>
<b>PRH</b>		
Yes	1.25 (0.84 – 1.88)	0.272
No	Reference	
<b>Age (Years)</b>		
18-44	Reference	
45-64	0.59 (0.35 – 0.99)	0.018
65+	1.03 (0.48 – 2.17)	0.385
<b>Gender</b>		
Male	Reference	
Female	1.68 (1.07 – 2.63)	0.024
<b>Education</b>		
Less than high school	Reference	
High school graduate	0.72 (0.35 – 1.49)	0.766
More than high school	0.60 (0.28 – 1.29)	0.166
<b>Marital Status</b>		
Married	Reference	
Divorced/Separated/Widowed	1.25 (0.72 – 2.15)	0.657
Never Married	2.13 (0.84 – 5.43)	0.186
<b>Employment Status</b>		
Employed	Reference	
Retired	1.65 (0.85 – 3.20)	0.084
Unemployed	2.13 (0.84 – 5.43)	0.336
<b>Farming Status</b>		
Current	1.00 (0.52 – 1.90)	0.866
Former	0.90 (0.55 – 1.48)	0.644
Never	Reference	
<b>Residence Location</b>		
Town	Reference	
Farm	0.79 (0.44 – 1.42)	0.536
Rural	0.88 (0.51 – 1.50)	0.959
<b>Smoking Status</b>		
Current	1.22 (0.66 – 2.26)	0.502
Former	0.99 (0.59 – 1.66)	0.674
Never	Reference	
<b>Alcohol Use</b>		
High	0.86 (0.36 – 2.03)	0.893
Normal	0.81 (0.46 – 1.42)	0.547
Never	Reference	
<b>Stressful Events</b>		
High	1.03 (0.65 – 1.63)	0.897
Low	Reference	

\* Includes all subjects did not report depression at baseline

**Table 3d.** Adjusted Multivariate Analysis for Chronic Depression (N=323\*)

<b>Variables</b>	<b>OR (CI)</b>	<b>P Value</b>
<b>PRH</b>		
Yes	1.00 (0.61 – 1.67)	0.982
No	Reference	
<b>Age (Years)</b>		
18-44	Reference	
45-64	0.98 (0.54 – 1.77)	0.948
65+	2.08 (0.80 – 5.40)	0.132
<b>Gender</b>		
Male	Reference	
Female	0.84 (0.46 – 1.52)	0.560
<b>Education</b>		
Less than high school	Reference	
High school graduate	0.28 (0.08 – 1.01)	0.051
More than high school	0.21 (0.06 – 0.77)	0.018
<b>Marital Status</b>		
Married	Reference	
Divorced/Separated/Widowed	0.57 (0.31 – 1.06)	0.078
Never Married	1.04 (0.32 – 3.43)	0.947
<b>Employment Status</b>		
Employed	Reference	
Retired	0.87 (0.33 – 2.26)	0.773
Unemployed	1.26 (0.57 – 2.81)	0.573
<b>Farming Status</b>		
Current	1.11 (0.49 – 2.51)	0.810
Former	1.22 (0.65 – 2.29)	0.541
Never	Reference	
<b>Residence Location</b>		
Town	Reference	
Farm	0.65 (0.32 – 1.30)	0.223
Rural	1.12 (0.55 – 2.28)	0.748
<b>Smoking Status</b>		
Current	1.21 (0.56 – 2.61)	0.624
Former	1.11 (0.61 – 2.03)	0.730
Never	Reference	
<b>Alcohol Use</b>		
High	0.69 (0.25 – 1.90)	0.471
Normal	0.56 (0.26 – 1.22)	0.142
Never	Reference	
<b>Stressful Events</b>		
High	1.26 (0.75 – 2.10)	0.379
Low	Reference	

\*Includes all subjects who reported depression at baseline and in Round 2

**Table 4a.** Final Model Results for Incident PRH (N = 740)

<b>Variables</b>	<b>Main Effects Model OR (CI)</b>	<b>P Value</b>	<b>Interaction Model OR (CI)</b>	<b>P Value</b>
<b>Depression</b>				
Yes	1.04 (0.67 – 1.60)	0.870		
No	Reference			
<b>Gender</b>				
Male	Reference		Reference	
Female	0.61 (0.40 – 0.92)	0.019	0.61 (0.40 – 0.92)	0.019
<b>Age (Years)</b>				
18-44	Reference			
45-64	1.26 (0.78 – 2.03)	0.343		
65+	1.28 (0.64 – 2.55)	0.489		
<b>Depression vs. none (Age = 18-44)</b>			1.73 (0.85 – 3.53)	0.133
<b>Depression vs. none (Age = 45-64)</b>			0.45 (0.20 – 1.03)	0.058
<b>Depression vs. none (Age = 65+)</b>			1.38 (0.66 – 2.92)	0.396
<b>Employment Status</b>				
Employed	Reference		Reference	
Retired	1.90 (0.96 – 3.74)	0.064	1.90 (0.96 – 3.76)	0.066
Unemployed	2.21 (1.11 – 4.39)	0.024	2.36 (1.17 – 4.73)	0.016
<b>Smoking Status</b>				
Current	1.98 (1.07 – 3.63)	0.029	1.96 (1.06 – 3.62)	0.033
Former	0.87 (0.53 – 1.41)	0.563	0.87 (0.53 – 1.42)	0.577
Never	Reference		Reference	

**Table 4b.** Final Model Results for Chronic PRH (N = 377)

Variables	Main Effects Model OR (CI)	P Value	Interaction Model OR (CI)	P Value
<b>Depression</b>				
Yes	0.83 (0.51 – 1.33)	0.434		
No	Reference			
<b>Gender</b>				
Male	Reference		Reference	
Female	1.29 (0.78 – 2.13)	0.318	1.35 (0.81 – 2.24)	0.312
<b>Age (Years)</b>				
18-44	Reference		Reference	
45-64	1.69 (0.96 – 3.00)	0.071	1.76 (0.99 – 3.14)	0.054
65+	1.58 (0.85 – 2.94)	0.153	1.49 (0.80 – 2.79)	0.212
<b>Education</b>				
Less than high school	Reference			
High school graduate	0.85 (0.38 – 1.90)	0.688		
More than high school	0.76 (0.32 – 1.80)	0.530		
<b>Depression vs. none (Education = Less than HS)</b>			0.11 (0.02 – 0.54)	0.007
<b>Depression vs. none (Education = HS graduate)</b>			0.83 (0.44 – 1.54)	0.549
<b>Depression vs. none (Education = More than HS)</b>			1.49 (0.64 – 3.49)	0.359
<b>Residence Location</b>				
Town	Reference		Reference	
Farm	0.96 (0.54 – 1.69)	0.874	0.87 (0.49 – 1.55)	0.636
Rural	0.57 (0.31 – 1.04)	0.066	0.54 (0.29 – 0.99)	0.047
<b>Smoking Status</b>				
Current	1.69 (0.87 – 3.28)	0.120	1.75 (0.89 – 3.43)	0.102
Former	0.74 (0.42 – 1.32)	0.310	0.68 (0.38 – 1.22)	0.196
Never	Reference		Reference	

**Table 4c.** Final Model Results for Incident Depression (N = 805)

Variables	Main Effects Model OR (CI)	P Value
<b>PRH</b>		
Yes	1.32 (0.89 – 1.95)	0.164
No	Reference	
<b>Gender</b>		
Male	Reference	0.017
Female	1.60 (1.09 – 2.35)	
<b>Age (Years)</b>		
18-44	Reference	0.079
45-64	0.66 (0.42 – 1.05)	
65+	1.75 (1.11 – 2.77)	

**Table 4d.** Final Model Results for Chronic Depression (N = 323)

Variables	OR (CI)	P Value
<b>PRH</b>		
Yes	1.09 (0.68 – 1.76)	0.711
No	Reference	
<b>Age (Years)</b>		
18-44	Reference	0.842
45-64	0.95 (0.55 – 1.62)	
65+	1.92 (1.03 – 3.57)	
<b>Gender</b>		
Male	Reference	0.747
Female	0.92 (0.56 – 1.52)	
<b>Education</b>		
Less than high school	Reference	0.024
High school graduate	0.24 (0.06 – 0.83)	
More than high school	0.18 (0.05 – 0.66)	

**Acknowledgements**

I would like to thank Dr. Wayne Sanderson for allowing me to use the data that he took part in collecting. I would also like to extend my gratitude to my capstone committee Dr. Erin Abner and Dr. David Mannino for their assistance and support. Finally, I would like to thank my friends and family for their encouragement and support.

There are no financial or material disclosures.