Holly Raffle, Lezlee Ware, Anirudh Ruhil, Jane Hamel-Lambert, and Sharon Denham
APHA Annual Meeting and Expo * Rural and Frontier Health
Wednesday, November 10, 2010; 8:30-10:00am
Colorado Convention Center, Room 405

Predictors of Successful Diabetes Self-Management in Appalachia

Acknowledgements
This project was funded by the U.S. Department of Health and Human Services, Health Resources and Services Administration, Office of Rural Health Policy.

We acknowledge the support of our research partners from the Voinovich School of Leadership and Public Affairs at Ohio University, Ohio University Scripps Survey Research Center, and the Appalachian Rural Health Institute at Ohio University.

Learning Objectives
1. Describe the importance of a regional assessment of disease prevalence
2. Identify at least two key predictors of successful diabetes self-management in the Appalachian region
3. Describe strategies for increasing diabetes self-management in the Appalachian region

Research Question
What factors predict successful diabetes self-management in Ohio's Appalachian region – after controlling for age, gender, educational attainment, and insurance status?

Purpose
1. Investigate factors that contribute to successful diabetes self-management
2. Examine diabetes self-management from a regional lens

Defining Region
- The *Appalachian Region* is a 205,000-square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and parts of 12 other states. Forty-two percent of the Region's population is rural, compared with 20 percent of the national population.[1]
- The *Appalachia Ohio* region covers a vast portion of the state. The 32 Appalachian counties stretch south along the Ohio River and as far north as Lake Erie. The 32 Appalachian counties are designated as Appalachian by the U.S. Congress in the Appalachian Regional Development Act of 1965.[2]
- The *study region* contained nine of Ohio's Appalachian counties: Belmont, Columbiana, Gallia, Harrison, Jefferson, Lawrence, Monroe, Muskingum, and Noble.

Contextualizing the Project
- This project is the third in a series of projects examining the health status of Appalachians. The first survey was conducted in 2003 (Athens, Hocking, Pike, and Vinton Counties) and the second was conducted in 2006 (Jackson, Meigs, Morgan, Perry, Ross, Scioto, and Washington Counties). To date, 20 of Ohio's 32 Appalachian counties have been surveyed.
- For more information on the Appalachian Rural Health Institute Health Needs Assessment Surveys, including copies of all of the reports and briefs, please visit: http://www.voinovichschool.ohio.edu/ARHINeedsAssessmentSurveyIII.aspx

Data
- Telephone survey of 3,481 adults. The survey instrument comprised the same questions as the 2007 BRFSS, including the BRFSS diabetes module, in addition to other items. The survey was conducted between November 2008 and February 2009.
- The survey response rate was 10%, with a 20% cooperation rate and a 37% refusal rate (AAPOR guidelines).

[1] As defined in the Appalachian Regional Commission's authorizing legislation: http://www.arc.gov/appalachian_region/TheAppalachianRegion.asp
[2] As defined by the Governor's Office of Appalachia: http://www.development.ohio.gov/Appalachia/About.htm

- A stratified sample was attempted and supplemented by post-stratification. The survey was weighted based upon aggregate composites of gender and age as reported for each county in the 2000 Census. Ethnicity was not included as a weighting category because the population within the nine counties is predominately Caucasian (over 95%).
- Our analysis limited the sample to individuals reporting that they had been told by a health care professional that they had diabetes. Similar to the BRFSS, females reporting only gestational diabetes were excluded. A total of 529 individuals met our selection criteria.

Variables

- **Outcome Variable:** Monitoring blood-glucose levels at least once daily (Adams et al., 2003; Karter, Ferrara, Darbinian, Ackerson, & Selby, 2000)
- **Covariates:** Demographic Variables (Gender, Age, Insurance Status, Educational Attainment, Annual Household Income), Health and Lifestyle Variables (BMI, Moderate Exercise, Vigorous Exercise, Smoking Status, Self-Reported Depressed Mood, Comorbidity, Self-Reported Health Status), Diabetes Care Variables (Cost Restrictions on Diabetes Care, Diabetes Self-Management [DSME] Class Attendance)

Method

- Descriptives, correlations, and interactions to investigate the relationships between blood-glucose monitoring and the covariates.
- Multivariate logistic regression model: backwards step-wise procedure
- Model Assessment Techniques: Adjusted-Wald test for design-based analyses of weighted survey data and utilized the unweighted model to determine goodness of fit (Hosmer & Lemeshow, 2000)

Final Model

Predicted logit of (DM-MANAGEMENT) = 0.021 + (-0.32)*AGE_2 + (-0.07) * AGE_3 + (0.20) * GENDER + (0.19) * EDUCATION + (0.74) * INSURANCE + (1.16) * DEPRESSED-MOOD† + (-0.58) *HEALTH-STATUS† + (0.61) * DSME-CLASS†

$^{\dagger}P < .05$

Results

- Three covariates with significant relationships to successful diabetes self-management.
    - *Prior attendance of a DSME class* was found to be related to daily blood-glucose monitoring, $P < .05$. Individuals who attended a DSME class were more likely (OR=1.832, 95% CI: 1.0332-3.250) to check their blood-sugar levels daily.
    - *Self-reported health status* was found to be related to successful self-management, $P < .05$. Individuals with better self-reported health were less likely to check their blood glucose daily (OR=.562, 95% CI: .321-.984).
    - *Self-reported depressed mood* was found to be related to successful self-management, $P < .05$. Individuals with higher depressed mood were more likely to check their blood glucose daily (OR=3.192, 95% CI: 1.130-9.010).

Implications

- Our findings suggest that an individual's financial situation does not impede successful diabetes self-management.
- DSME is one of the more consistent predictors of successful diabetes self-management.
- With respect to service delivery, chronic disease management is largely overseen by primary physicians (Bodenheimer, Lorig, Holman, & Grumbach, 2002) and this is especially true within rural areas (Siminerio, Piatt, & Zgibor, 2005). Primary care physicians need to be trained to provide DSME to patients.
- Good self-reported health status was found to have a negative relationship with self-management behaviors. This underscores the importance of DSME, which encourages individuals to appropriately manage their diabetes using objective measures (i.e., blood-glucose monitoring) rather than more subjective measures related to perceptions of health.
- The lack of a more structured measure of depression, as well as a very large confidence interval, indicates that the relationship between depressed mood and successful self-management in this region should be interpreted with caution.

Limitations

- We are unable to distinguish between respondents with Type I or Type II diabetes.
- As is common in survey data, distributions of some variables are less than ideal.
- Lack a comparative urban subsample which limits the extent we can directly compare urban-rural disparities.