Access and Utilization of Eye Care in Rural Arkansas

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Background

- Nearly half of Arkansas residents live in rural areas.[1]
- 11% of rural families in Arkansas have income levels below poverty.[1]
- Rural residents across the U.S. are more likely to be uninsured or underinsured.[2,3]
- Adults with low education and no health insurance are least likely to utilize eye care services.[4]

Objectives

- Compare rural and urban residents of Arkansas on the following risk factors:
  - Insurance coverage for eye care services
  - Dilated eye exam in the past year

Methods

- Arkansas Behavioral Risk Factor Surveillance System (BRFSS).
- Visual Impairment and Access to Eye Care Module.
  - Do you have any kind of health insurance coverage for eye care?
  - When was the last time you had an eye exam in which the pupils were dilated? This would have made you temporarily sensitive to bright light.
- Adults ages 40 years and older were included (n=4,289).
- Rural status is defined by the Metropolitan Status Code (MSCODE).
- Results are weighted according to BRFSS protocol.[5]
- The Cochran-Mantel-Haenszel test was used to assess statistically significant differences between rural and urban residents.
- Logistic regression was used to account for confounding variables.
  - Potential confounders included age (categorical), sex, race, diabetes status, employment status, marital status, and education. All two-way interactions were tested for significance in the model.
  - Final models include only variables and interactions that made a significant contribution to the model.
  - The Hosmer-Lemeshow test was used to assess goodness of fit.
  - The Wald F test was used to assess statistical significance of odds ratios.

Results

Table 1.
Percent of Adults Age 40 and Over with Insurance Coverage for Eye Care Services in Arkansas

	Total	Rural		Urban	
	Sample Size	Weighted Percent	Standard Error	Weighted Percent	Standard Error
State total	3,906	44.9***	1.3	55.1	1.2
Age in years					
40-54	1,426	42.7***	2.3	58.9	1.9
55-64	1,049	41.7***	2.5	54.1	2.4
65+	1,431	50.3	2.1	51.0	2.0
Diabetes					
Yes	487	58.8	3.6	62.7	3.3
No	3,417	42.9***	1.4	54.4	1.3
Employment status					
Employed for wages	1,442	51.4***	2.4	66.2	1.8
Self-employed	347	25.4**	3.9	44.5	4.4
Out of work	114	N/A†	7.2	N/A†	7.4
A homemaker or student	329	37.7**	4.3	55.6	4.1
Retired or unable to work	1,663	46.6	1.9	48.6	1.9
Marital status					
Married	2,249	46.1***	1.7	58.9	1.5
Not married	1,644	42.6	2.0	46.7	2.0
Education					
< High School	533	41.2	3.4	33.1	3.5
High School	1,412	43.4**	2.1	51.4	2.2
> High School	1,959	47.8***	2.1	61.6	1.6

*p < 0.05 **p < 0.01 ***p < 0.001
†Estimate not available (N/A) if the standard error is greater than 5.

- Rural residents are statistically significantly less likely to have insurance coverage for eye care services.
- Statistically significant differences exist between rural and urban residents who are:
  - aged 40-64
  - non-diabetic
  - employed for wages, self-employed, or are homemakers/students
  - married
  - have at least a high school education

Table 2.
Percent of Adults Age 40 and Over with a Dilated Eye Exam in the Past Year in Arkansas

	Total	Rural		Urban	
	Sample Size	Weighted Percent	Standard Error	Weighted Percent	Standard Error
State total	3,965	44.5**	1.3	49.4	1.2
Age in years					
40-54	1,427	32.1*	2.1	39.0	1.9
55-64	1,044	42.3	2.5	49.0	2.4
65+	1,462	62.6	2.0	67.0	1.8
Diabetes					
Yes	562	66.8	3.4	59.2	3.5
No	3,400	40.8***	1.4	47.7	1.3
Employment status					
Employed for wages	1,456	37.3**	2.2	45.2	1.9
Self-employed	349	31.8	4.0	42.9	4.3
Out of work	106	N/A†	6.4	N/A†	7.1
A homemaker or student	337	47.5	4.4	54.3	4.1
Retired or unable to work	1,708	55.1	1.9	56.9	1.9
Marital status					
Married	2,281	44.6*	1.7	49.9	1.5
Not married	1,673	44.6	2.0	48.1	2.0
Education					
< High School	538	40.6	3.3	39.2	3.7
High School	1,438	42.3	2.0	45.3	2.2
> High School	1,987	48.5	2.0	53.4	1.6
Insurance coverage for eye care					
Yes	1,905	54.6	2.0	57.6	1.7
No	1,895	36.4*	1.7	41.6	1.8

*p < 0.05 **p < 0.01 ***p < 0.001
†Estimate not available (N/A) if the standard error is greater than 5.

- Rural residents are statistically significantly less likely to have had a dilated eye exam in the past year.
- Statistically significant differences exist between rural and urban residents who are:
  - aged 40-54
  - non-diabetic
  - employed for wages
  - married
  - have no insurance coverage for eye care services

Table 3.
Logistic Regression Results for Access and Utilization of Eye Care Services for Adults Age 40 and Over in Arkansas: Comparing Rural and Urban Residents

	Weighted OR (Urban ref.)	95% CI
Odds of having no eye care insurance coverage		
Unadjusted	1.53***	1.32-1.76
Age-adjusted	1.52***	1.31-1.75
Final model (adjusted for age, diabetes status, employment status, marital status, and education)	1.39***	1.20-1.62
Odds of having no dilated eye exam in past year		
Unadjusted	1.21**	1.05-1.40
Age-adjusted	1.29***	1.11-1.50
Final model (adjusted for age, diabetes status, eye care insurance status, education, and an interaction term for eye care insurance status and education)	1.19*	1.02-1.39

*p < 0.05 **p < 0.01 ***p < 0.001

Final Models

- $\text{Logit}(p_A) = \beta_0+\beta_1(\text{rural status})+\beta_2(\text{age})+\beta_3(\text{diabetes status})+\beta_4(\text{employment status})+\beta_5(\text{marital status})+\beta_6(\text{education})$
- $\text{Logit}(p_B) = \beta_0+\beta_1(\text{rural status})+\beta_2(\text{age})+\beta_3(\text{diabetes status})+\beta_4(\text{eye care insurance status})+\beta_6(\text{education})+\beta_5(\text{eye care insurance status*education})$

  where p_A = probability of having no health insurance for eye care services
  and p_B = probability of having no dilated eye exam in the past year
  and β_i = coefficients for the predictor
- Both models satisfy the Hosmer-Lemeshow goodness of fit test.

Conclusions

- Despite lower rates of eye care insurance coverage for rural residents (OR=1.5), utilization of eye care services differ only slightly between rural and urban residents (OR=1.2).
- When compared to urban residents:
  - Both employed and self-employed residents in rural areas were less likely to have eye care insurance.
  - Rural residents with at least a high school education have decreased access to insurance coverage, but utilization is similar.
- Limitations
  - Phone coverage and response rates may differ between rural and urban areas.
  - Self-report of insurance coverage and frequency of eye exams is subject to recall bias.
- Further studies
  - Examine reasons why respondents did not have a recent eye exam.
  - Compare eye care costs for rural residents to urban residents in Arkansas.
- Considerations
  - Determine what barriers to utilization of eye care services exist for rural residents.
  - Determine if rural residents have greater eye care costs due to lack of insurance coverage.
  - Explore options for providing employer incentives for offering insurance coverage in rural areas and for providing assistance for self-employed workers.

References

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5. CDC. Behavioral Risk Factor Surveillance System operational and user's guide, Version 3.0. Atlanta, GA: US Department of Health and Human Services, CDC; 2005.

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