Summer 7-2015

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Recommended Citation
Newsome MA, Hazelett T, Sawhney M. Differences in health-related behaviors and attitudes between urban, rural, and isolated households in western West Virginia. West Virginia Medical Journal. 2015;111(4):30-38.

Differences in Health-related Behaviors and Attitudes between Urban, Rural, and Isolated Households in Western West Virginia

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Acknowledgements

Cabell-Huntington Health Department Medical Director Dr. Harry Tweel, Epidemiologist Debbie Ellison, and Program Manager Stan Mills provided technical advice concerning public health issues, clarified organizational data needs, and helped develop survey questions. Dr. Stephanie Frost and Dr. Lucas Moore of the West Virginia University Health Research Center provided background information about related research, grants, and surveys. Student co-investigators from the spring 2013 econometrics class at Marshall University conducted the survey, and entered data.

Abstract

This study uses data from a 2013 survey of 275 randomly sampled households across nine counties in western West Virginia to examine the significant differences between the health behaviors and attitudes of rural and isolated populations. The results show that age, education, and income are significant factors in explaining differences in health-related behaviors and attitudes for all urban, rural and isolated respondents. However, after controlling for socio-demographic differences, isolation is found to have only a few significant effects, and some of the effects run counter to stereotypes of isolated populations. Rural respondents are significantly more likely than isolated respondents to be obese and to have ever been diagnosed with hypertension. Rural Respondents are significantly less likely than isolated respondents to have annual dental or medical checkups, to engage in physical activity during the spring months, and to raise their own chickens and cattle for food.

Introduction

Many rural and isolated communities across the United States face the constant challenge of meeting their healthcare needs. Healthcare challenges are more severe in states like West Virginia, particularly in the sparsely populated rural parts of the state where two-thirds of its 1.8 million inhabitants reside. The fact that West Virginia has been ranked 8th across the nation in terms of the lack of basic healthcare services makes access to healthcare and health status disparity important issues.[1]

Researchers and policy makers have long been interested in identifying barriers to healthcare access in rural areas.[2,3,4] Focus group research finds transportation difficulties, social isolation, and financial constraints are some of the perceived barriers to healthcare access among older rural adults.[5] Research concerning Appalachian populations indicates historical, social, and cultural factors have a large impact on healthcare access and utilization.[6,7]

Much still needs to be understood regarding factors affecting the health of individuals in rural and isolated populations. In the current study, isolated areas are defined as post code areas having smaller population densities and lower urban-area commuting levels than do rural post code areas. Populations living in isolated areas might be expected to exhibit different health-related behaviors and attitudes than those exhibited by populations living in rural areas. In West Virginia, 17.28% of the population lives in isolated areas and 34.05% live in rural areas.[8] The primary purpose of the current research is to determine the health-related behavior and attitudinal effects of living in rural and isolated areas, holding important socio-demographic characteristics constant.

Methods

Design and Purpose

In the spring of 2013 the Marshall University Econometrics Survey was conducted to provide general baseline information for epidemiological and program management strategic planning for two administrative entities within the West Virginia Bureau of Public Health: the Division of Infectious Disease Epidemiology (DIDE) Region II and Change the Future West Virginia (CTFWV) Region 4. The door-to-door survey consisted of 88 questions in seven sections and took each participant approximately 35 minutes to complete.

Participants and Sampling

Twenty four interviewers were divided into nine groups, each of which interviewed residents of one of the nine counties in the sample frame. Interviewers followed a script. A pro-rated population sample was projected based on population maps and a random sample of households was drawn. Each respondent had to be at least 18 years old and signed a consent form.

Data Analysis

During interviews responses were recorded by the interviewers on paper survey questionnaires. Each respondent was identified by a unique number indicating county, surveyor, and time of survey.

Table 1: Observations by County, Post Codes, and RUCA

County	Observations (n)	Post Code (n)	RUCA Classification (%)		
			U	R	I
Boone	20	9	55.0	30.0	15.0
Cabell	52	12	100.0	0.0	0.0
Jackson	33	7	0.0	57.6	42.4
Lincoln	15	6	73.3	0.0	26.7
Logan	33	9	0.0	45.5	54.5
Mason	20	8	0.0	20.0	80.0
Mingo	20	6	0.0	15.0	85.0
Putnam	50	15	100.0	0.0	0.0
Wayne	32	5	100.0	0.0	0.0
Totals	275	77	56.7	17.2	26.2

RUCA, Rural Urban Commuting Area. U, Urban. R, Rural. I, Isolated.

Table 2: Comparison of Population and Sample Socio-demographic Characteristics

Characteristic (n=275)	**Sample Values (Survey Respondents)†**	**Population Estimates (US Census Bureau)¶**
Male (%)	43.64*	49.02
Median Age (Years)	38.00	41.00
White (%)	91.27*	95.99
Married (%)	49.27*	55.55
Home Ownership (%)	64.37*	74.58
Over 25 Years Old with:		
High School Degree or Higher	95.48*	80.75
Baccalaureate or Higher	27.15*	16.15
Median Household Income ($)	52,500.00*	39,246.00

† *The sample values are calculated using data elicited in the surveys. Respondents are 18 years of age or older.* The symbol "*" designates a sample value which is significantly different than the population estimate at the 0.05 level.
¶ *All population values are from the US Census Bureau's American Community Survey 5 Year Estimates (2007-2011) by county. Individual county values are weighted by population to obtain population estimates.*

Confidentiality was maintained and respondents are not identifiable. The data was later entered into Microsoft Excel and double-checked for accuracy. Later the data was imported into STATA Data Analysis and Statistical Software v12 (http://www.stata.com). All data was renamed and labeled upon import.

Ethics Approval

The survey was approved by the Marshall University ORI on March 19, 2013 (#439926). All respondents participated voluntarily and signed consent forms. The first respondents were interviewed on March 25, 2013.

Results

Survey Responses

Twenty-three approached individuals refused to answer the survey. There were 275 complete useable surveys. Table 1 shows the observations by county. The number of post codes interviewed within each county indicates the geographic diversity of the sample. Using post codes, each respondent was identified as living in a particular Rural Urban Commuting Area (RUCA).

Rural Urban Commuting Areas (RUCAs)

Each census tract and post code in the United States has been classified by type of urban or rural status, using US Bureau of Census defined Urbanized Area and Urban Cluster definitions in combination with work commuting pattern information.[9] Table 1 reports the percentage of respondents from each county who live in Urban, Rural and Isolated RUCAs, as defined by the Rural Health Research Center.[8]

Sample Representativeness

Table 2 compares some of the sample socio-demographic characteristics to the same characteristics for the population. Population characteristics are calculated by weighting the US Census Bureau's American Community Survey 5-year (2007-2012) county estimates by county population. The sample is slightly more female and less white than the population. Compared to the population, sample respondents are less likely to be married or to own a home. Respondents are quite a bit more educated and wealthier than the population at large.

Factors Affecting Responses

Table 3 lists the independent variables, representing respondent characteristics, which are used in the rest of the analysis. The primary purpose of the current analysis is to determine the effect of location on respondent behaviors and attitudes, holding important socio-demographic characteristics constant. Gender, age, race, income, and education are held constant when considering the impact of location. The RUCA independent variables capture the effects of location, after controlling for these socio-demographic differences.

Note that the education variables refer to the highest education level in the household of a respondent. The education baseline for the analysis that follows is a high

Table 3: Independent Variables Used in the Analysis

Variable	The Variable Shows the Difference in Response:
Male	Of a Male Respondent, Compared to a Female Respondent
Age	Associated with Increases in a Respondent's Age
Non-White	Of a Respondent from a Non-White Race or Ethnic Group, Compared to a White Respondent
Inc	Associated with Increases in a Respondent's Household Income from All Sources
Education:	Of a Respondent from a Household with a Particular Highest Education Level (Categorized Below), Compared to a Respondent from a Household with High School or Equivalent (HS) as the Highest Level of Education:
<HS	Less Than a Completed High School Diploma or Equivalent
SC	Either Some College (but No Degree) or Completed: Associates Degree, Technical Degree, or 2-year Degree
C	Baccalaureate Degree, 4 Year Degree, Masters, Professional Degree, or Doctoral Degree.
RUCA:	Of a Respondent from a Household in a Particular RUCA (Categorized Below), Compared to a Respondent from a Household in an Urban (U) RUCA:
R	Rural RUCA
I	Isolated RUCA

Inc, Income. <HS, Less than High School. SC, Some College. C, College. RUCA, Rural Urban Commuting Area. R, Rural. I, Isolated.

Table 4: General Socio-Demographics by RUCA

	Values by RUCA		
Variable (n=275)	**U**	**R**	**I**
Male (%)	41.7	42.6	48.6
Median Age (Years)	36.0	36.0	46.0*
Non-White (%)	12.2	2.1	5.6
Average Income ($1000's)	64.4	58.7	54.2
Education (%):			
<HS	1.3	2.1	6.9*
HS	14.8	25.5	26.4*
SC	36.5	36.2	37.5
C	47.4	36.2	29.2*

RUCA, Rural Urban Commuting Area. R, Rural. I, Isolated. <HS, Less than High School. HS, High School. SC, Some College. C, College. The symbol "" designates a rural or isolated RUCA variable value which is significantly different than the urban RUCA variable value at the 0.05 level.*

school diploma, so the effect of each education level is compared against the effect of having a high school diploma. The RUCA baseline is the Urban RUCA, so the effect of living in a Rural or Isolated RUCA is compared against the effect of living in an Urban RUCA.

Socio-demographics by RUCA

Respondents living in different types of RUCAs have different socio-demographic characteristics. Before analyzing the effects of socio-demographic characteristics and RUCA location on behaviors and attitudes, it is important to consider these differences. Table 4 lists gender, age, race, income, and education characteristics by RUCA.

Compared to respondents in Urban RUCAs, respondents in Isolated RUCAs were significantly older, more likely never to have obtained a high school diploma, more likely to have achieved only a high school diploma, and less likely to have completed a college education. While similar differences existed between respondents from Rural RUCAs and those from Urban RUCAs, the differences were not statistically significant.

Effects of Socio-demographics and RUCA on Attitude and Behavior Differences

Activities: Table 5a shows the summary survey responses and significant effects of socio-demographic characteristics and RUCAs on eleven different activities. For example, consider summer physical activity: males were significantly more likely than females, and older respondents were significantly less likely than younger respondents, to have engaged in physical activities last summer. Age was significant in explaining

Table 5a: Activities (Summary Responses and Significant Differences) †

Activity (n=275)	Summary Survey Response¶	Male	Age	Non-White	Inc	Education <HS	Education SC	Education C	RUCA R	RUCA I
Hours of Sleep per Night (Hours)	6.99									
Hours of TV per Day (Hours)	3.13		++		-		-	-		
Have Internet Access at Home (Yes)	88.73		--		++			++		
Hours Online per Day, if Have Internet (Hours) (n=244)	2.99	-	--							
Engaged in Physical Activities Past Month, Mar-Apr 2013 (Yes)	75.64		--					++		++
Engaged in Physical Activities Last Summer (Yes)	69.09	++	--							
Visited a State, City, Community, or National Park in Past Year (Yes)	68.00		--				+	++		
Have Relatives Living in Other Homes within 30 Minutes (Yes)	74.55							--		
Attend Religious Services or Meetings (Yes)	55.64		++					++		
Attend Civic, Political, Professional, or Fraternal Meetings (Yes)	21.45	++	++			--		++		
Voted in Most Recent Presidential Election (Yes)	68.00		++			--		++		

Inc, Income. <HS, Less than High School. HS, High School. SC, Some College. C, College. RUCA, Rural Urban Commuting Area. R, Rural. I, Isolated.

† *This table presents the results of ordinary least squares and logistic regressions for continuous and dichotomous choice dependent variables, respectively. Dichotomous choice variables are those followed by "(Yes)" in the table above. A "++" or "+" in any column indicates the independent variable (socio-demographic characteristic, education level, or RUCA) listed across the top of the table has a significantly positive effect, at the 0.05 and 0.10 levels respectively, on the particular dependent variable listed along the left of the table, everything else constant. Similarly, a "- -" or "-" in any column indicates a significantly negative effect, at the 0.05 and 0.10 levels respectively. A blank cell indicates the independent variable does not have a significant effect, even at the 0.10 level, on the given dependent variable. Coefficients are available from the authors upon request.*

¶ Summary *survey responses are in average unit terms. "Yes" responses are shown as percentages of the survey sample.*

variation in nine of the eleven activity dependent variables. Education also explained quite a bit of variation. After controlling for socio-demographic characteristics, RUCA was only significant in explaining the number of recent physical activities. Isolated respondents were significantly more likely to have engaged in physical activities during the months of March and April.

Grocery and Eating Habits: Table 5b shows the summary survey responses and significant effects of socio-demographic characteristics and RUCAs on six different individual habits and six different household habits. For example, consider alcohol consumption: males were significantly more likely than females, older respondents were significantly less likely than younger respondents, and respondents with higher incomes were significantly more likely than those with lower incomes, to drink one or more alcoholic beverages each week. Income was significant in explaining variation in eight of the twelve grocery and eating habit dependent variables. Race also explained quite a bit of variation. After controlling for socio-demographic characteristics, RUCA was significant in explaining two habits. Isolated respondents were significantly more likely to buy meat from local farmers, and to raise chickens and cattle for food.

Health Characteristics: Table 5c shows the summary survey responses and significant effects of socio-demographic characteristics and RUCAs on thirteen different health characteristics. For example, consider health insurance: males were significantly more likely than females, older respondents were significantly more likely than younger respondents with higher incomes were significantly more likely than those with lower incomes, and more educated respondents were significantly more likely than less educated respondents, to have health insurance. Age was significant in explaining variation in nine of the thirteen health dependent variables. Gender and education also explained quite a bit of variation. After controlling for socio-demographic characteristics, RUCA was significant in explaining four health characteristics. Rural

Table 5b: Grocery and Eating Habits (Summary Responses and Significant Differences)†

Grocery and Eating Habits (n=275)	Summary Survey Response¶	Male	Age	Non-White	Inc	Education <HS	Education SC	Education C	RUCA R	RUCA I
On a Diet for Any Reason (Yes)	16.00	--		--		--				
Had a "Sit Down Meal" at Home since Yesterday Morning (Yes)	61.45				++					
Purchased Food from a Drive-Through Window in Last Week (Yes)	60.73				-					
Had Food Delivered to the Home in the Last Week (Yes)	17.09	++	--							
Drink, on Average, 1 or More Alcoholic Drinks Each Week (Yes)	36.36	++	--		++					
Drink, on Average, 1 or More Carbonated Beverages Each Day (Yes)	41.09				++		--	--		
Household Purchases Mostly Fresh Fruits and Vegetables (Yes)	29.04	//	//		++					
Household Shopped at a Farmer's Market in Past Year (Yes)	38.18	//	//		++					
Household Buys Meat from Local Farmers (Yes)	9.09	//	//	--	++	--				++
Household Ever Buys Organic or Animal Friendly Foods (Yes)	18.55	//	//	--		--	++	++		
Household Has a Vegetable Garden (Yes)	21.82	//	//	-	++					
Household Raises Chickens or Cattle for Food (Yes)	4.00	//	//	--				--		++

Same Abbreviations as Table 5a.
† This table presents the results of logistic regressions for dichotomous choice dependent variables. A "++" or "+" in any column indicates the independent variable (socio-demographic characteristic, education level, or RUCA) listed across the top of the table has a significantly positive effect, at the 0.05 and 0.10 levels respectively, on the particular dependent variable listed along the left of the table, everything else constant. Similarly, a "- -" or "-" in any column indicates a significantly negative effect, at the 0.05 and 0.10 levels respectively. A "//" indicates the independent variable is not used in the regression because it measures an individual respondent effect and the dependent variable measures a household activity. A blank cell indicates the independent variable does not have a significant effect, even at the 0.10 level, on the given dependent variable. Coefficients are available from the authors upon request.
¶ Summary survey responses are in average unit terms. "Yes" responses are shown as percentages of the survey sample.

Table 5c: Health Characteristics (Summary Responses and Significant Differences)†

Health Characteristic (n=275)	Summary Survey Response¶	Male	Age	Non-White	Inc	Education <HS	Education SC	Education C	RUCA R	RUCA I
Adult Respondent is Obese (Yes)	27.27		++						++	
Has Hypertension (Yes)	21.90	+	++							--
Has High Cholesterol (Yes)	19.05		++							
Has Diabetes (Yes)	10.99		++							
Ever Been Diagnosed with Cancer (Yes)	10.58	--	++							
Smoked at Least One Cigarette in Past Month (Yes)	24.18			++				--		
Smokes, on Average, at Least One Pack of Cigarettes Each Day (Yes)	5.45			++				--		
Used Tobacco Product Other than Cigarettes in Past Month (Yes)	9.82	++								
Has Health Insurance (Yes)	87.64	++	++		++		++	++		
Has a Regular Annual Medical Checkup (Yes)	67.15		++				++	++		++
Has a Regular, at least Annual, Dental Checkup (Yes)	55.64	-			++		++	++	-	
Has a Disability that Limits Work or Daily Activities (Yes)	15.64		++		-					
Had a Flu Shot This Past Year (Yes)	49.45		++					+		

Same Abbreviations as Table 5a.
†, ¶ See notes for Table 5b.
§ For *"Child is Obese," the independent variables Male and Age refer to the child's gender and age. Education refers to the household's highest education level. Observations include all children living in all respondent's households.*

respondents were significantly more likely to be obese, and significantly less likely to have an annual dental checkup. Isolated respondents were significantly less likely to have ever been diagnosed with hypertension, and significantly more likely to have an annual medical checkup.

Personal Attitudes: Table 5d shows the summary survey responses and significant effects of socio-demographic characteristics

and RUCAs on two different attitudes. The first attitude is internal Locus of Control. Locus of Control is a term used in social psychology to refer to the extent to which individuals believe that they can control events or outcomes in their own lives.[10] An Individual with a strong internal Locus of Control will tend to believe that events in his or her life are the result of his or her actions. Males have a significantly higher internal Locus of Control than do females. Respondents with higher incomes have a significantly higher internal Locus of Control than do respondents with lower incomes. The survey measured happiness using the method developed in 2010 by the Office of National Statistics in the United Kingdom.[11] Non-white respondents were significantly less happy than white respondents. Respondents with higher incomes and those with some college were significantly happier than respondents with less income and high school diplomas. After controlling for socio-demographic characteristics, RUCA was not significant in explaining internal locus of control or happiness.

Results Robust to Interstate Migration: It is possible that respondents who had lived out-of-state at any time in their lives prior to moving to their current RUCA might have different health characteristics than do respondents who have lived in West Virginia their whole lives. To test for this, a variable for inter-state migration was included in all regressions reported in this study. The results proved robust to inter-state migration; all RUCA effects remained significant with the same signs.

Discussion

The analysis shows that age, education, and income are significant factors in explaining differences in many behaviors and attitudes. Despite not being included as an independent variable in six of the 38 regressions, age is found to be significant in 20 of the regressions. Similarly, in 20 of the regressions at least one of the education variables is found to be significant. Income is found to be significant in 15 of the 38 regressions. Gender and race explain some differences in health related behaviors and attitudes, but not as many as age, education, and income do.

After controlling for socio-demographic differences, location of any sort is found to be significant in explaining only a few differences. Isolated individuals are more likely to engage in physical activity during the spring months of March and April, to buy meat from local farmers, to raise their own chickens and cattle for food, and to have a regular annual medical checkup. The only significant health characteristic of isolated respondents is that they are less likely to have ever been diagnosed with hypertension. This indicates that, everything else constant, isolated individuals may eat better and get more exercise than they would if they lived in

Table 5c: Health Characteristics (Summary Responses and Significant Differences)†

Health Characteristic (n=275)	Summary Survey Response¶	Male	Age	Non-White	Inc	Education <HS	Education SC	Education C	RUCA R	RUCA I
Adult Respondent is Obese (Yes)	27.27		++						++	
Has Hypertension (Yes)	21.90	+	++							--
Has High Cholesterol (Yes)	19.05		++							
Has Diabetes (Yes)	10.99		++							
Ever Been Diagnosed with Cancer (Yes)	10.58	--	++							
Smoked at Least One Cigarette in Past Month (Yes)	24.18			++				--		
Smokes, on Average, at Least One Pack of Cigarettes Each Day (Yes)	5.45			++				--		
Used Tobacco Product Other than Cigarettes in Past Month (Yes)	9.82	++								
Has Health Insurance (Yes)	87.64	++	++		++		++	++		
Has a Regular Annual Medical Checkup (Yes)	67.15		++				++	++		++
Has a Regular, at least Annual, Dental Checkup (Yes)	55.64	-			++		++	++	-	
Has a Disability that Limits Work or Daily Activities (Yes)	15.64		++		-					
Had a Flu Shot This Past Year (Yes)	49.45		++					+		

Same Abbreviations as Table 5a.
†, ¶ See notes for Table 5b.
§ For *"Child is Obese," the independent variables Male and Age refer to the child's gender and age. Education refers to the household's highest education level. Observations include all children living in all respondent's households.*

Table 5d: Personal Attitudes (Summary Responses and Significant Differences)†

Personal Attitude (n=275)	Summary Survey Response¶	Male	Age	Non-White	Inc	Education <HS	Education SC	Education C	RUCA R	RUCA I
Internal Locus Index (Scale 0-1)	0.69	+			+					
Higher Number Associated with Higher Internal Locus of Control										
Happiness Index (Scale 0-1)	0.81			-	++		++			
Higher Number Associated with Higher Level of Happiness										

Same Abbreviations as Table 5a.
†, ¶ See notes for Table 5b.

another location. This may lead to at least a modest health improvement.

The results show that the significant effects of living in a rural area are different than the effects of living in an isolated area. Rural respondents are more likely to be obese and less likely to have an annual dental checkup. The obesity may be due to more time spent commuting to and from urban areas. Isolated respondents commute less often and spend more time growing their own food. The lower likelihood of an annual dental checkup among rural respondents may be due to the decreased access to dentists in rural areas. Isolated respondents show no such lower likelihood. Isolated respondents are significantly more likely than even urban respondents to have an annual medical checkup. Perhaps, isolated respondents schedule dental checkups more carefully and regularly, as they visit the urban areas less often.

To the extent that respondents from Isolated RUCA's are older, less well educated and poorer than other respondents, it might be expected that the characteristics associated with increased age, lower education and lower income are associated with living in an isolated area. This might indicate individuals living in an isolated area would watch more television, have less access to the internet, spend less time engaged in physical activities, and have more health problems. Stereotypes could develop characterizing isolation as causing these symptoms. However, after controlling for socio-demographic differences, location is found to have only a small effect on behavior and attitudes, and some of the effects run counter to stereotypes of isolated populations. This indicates that the socio-demographic characteristics of the individuals living in rural and isolated areas affect health-related behaviors and attitudes more than the fact that they live far from urban centers.

Care must be taken when generalizing the results of this study. First, the sample is drawn from a nine-county region in western West Virginia. Other than by comparing sample characteristics to the

known estimates of population characteristics, there is no way to ascertain the representativeness of the sample. Second, the survey was in-depth and conducted door-to-door, but respondents had to agree before participating. The distribution of refusals across RUCAs is not known. Third, it is impossible to control for intrastate migration. Respondents from any particular RUCA may have previously lived in other RUCAs. The effects of having lived in those other RUCAs could be captured in the current regression results. Fourth, respondents self-reported all health measures, including weight, height, hypertension, high cholesterol, diabetes, and cancer. However, the results of this study, if qualified appropriately, can be used as one indicator of differences in health behaviors and attitudes between rural and isolated populations.

Conclusions

This paper considers differences in the health-related behavior and attitudes of individuals and how these differences are affected by location, holding socio-demographic characteristics constant. Age, education, and income are the socio-demographic characteristics found to be most significant in explaining differences in many behaviors and attitudes, and the effects of these characteristics are generally as expected. After controlling for socio-demographic differences, location is found to have only a small effect on behavior and attitudes, and some of the effects run counter to stereotypes of isolated populations.

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