Spring 4-7-2023

Examining Perception and Understanding of Stroke and its Risk Factors in a Rural Population

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Examining Perception and Understanding of Stroke and its Risk Factors in a Rural Population (2023) Directed by Dr. Ann Cralidis, Dr. Alison King, and Dr. Erin Wallace

ABSTRACT

Stroke, also sometimes referred to as a brain attack, occurs when there is a blockage in blood supply to the brain or when a blood vessel bursts within the brain (CDC, 2022). Rural populations have a higher incidence of stroke and higher stroke mortality in the United States (Howard et al., 2017). Although there is a higher incidence rate of stroke in rural populations, researchers have also found that these populations appear to have limited knowledge on stroke and its risk factors. The current study employed a non-experimental descriptive design that explored stroke knowledge in adults residing in rural populations in the United States via an online survey.

The survey consisted of multiple choice, multiple selection, short answer, and true/false questions that examined the participants' demographic information such as age, race, ethnicity, gender, education levels, current health status (i.e., current, and past diagnoses), and current city of residence, as well as a knowledge check designed to assess participants' knowledge of risk factors and warning signs of stroke.

This study showed that respondents residing in rural populations with less stroke risk factors had less knowledge of stroke risk factors. Improving stroke knowledge in rural populations is crucial for reducing stroke-related mortality in rural communities.

KEYWORDS: stroke, stroke education, risk factors, warning signs, rural, knowledge, awareness

EXAMING PERCEPTION AND UNDERSTANDING OF STROKE AND ITS RISK FACTORS IN A RURAL POPULATION

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A Thesis Submitted in Partial Fulfillment of The Requirement for The Degree of Master of Science in Communication Sciences & Disorders

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Dedications

To our friends, family, and the CSDS Class of 2023

Acknowledgements

The completion of this study could not have been possible without the expertise of our thesis committee Dr. Ann Cralidis, Dr. Alison King, Dr. Erin Wallace, and Dr. Shannon Salley. We would like to express our deepest gratitude for their continuous support, engagement, and guidance through the time of our research and completion of this thesis. Additionally, we would like to thank our loved ones and classmates for their encouragement along the way. We are forever thankful.

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Definitions of Key Terms

Cardiovascular Disease. Cardiovascular disease is defined as a group of diseases of the heart and blood vessels. This may include coronary heart disease, heart failure, and heart valve problems (NACDD, n.d.).

Cardiovascular Health. Cardiovascular health is defined as the heart's health and blood vessels (NACDD, n.d.).

Diabetes Mellitus. A group of diseases that affect how the body turns food into energy (CDC, 2022). When an individual has diabetes, their body does not make enough insulin or can't use it as well (CDC, 2022). Diabetes mellitus is a stroke risk factor.

Health Literacy. Health literacy is defined as an individual's ability to identify, understand, and utilize health information to make informed health-related decisions for themselves and others (CDC,2022).

Hypertension. Hypertension also called high blood pressure, is blood pressure that is higher than what is considered typical (CDC. 2021). Throughout the day, blood pressure fluctuates based on what you're doing. When your blood pressure remains consistently high, this may result in a diagnosis of hypertension. High blood pressure is a risk factor for stroke (CDC. 2021).

Mortality Rate. Mortality Rate is defined as a measure for the frequency of death in a defined population in a certain period of time (CDC, 2012).

Rural. Rural is defined in this research as housing or territory that is not urban and contains a population with less than 50,000 residents.

Socioeconomic Status. Socioeconomic status is defined in this research as a way of describing social standing of an individual or group based on their education, income, and type of job (NCI, n.d.).

Speech-Language Pathologist. Speech-language pathologist is defined in this research as a health professional who is responsible for preventing, assessing, and treating speech, language, cognitive-communication, and dysphagia across the lifespan (ASHA, n.d.).

Stroke. Stroke is defined as blood supply to a part of the brain that is blocked or when a blood vessel in the brain bursts. In either case, the brain becomes damaged and can cause long term disability or even death. (CDC, 2022).

Stroke Prevention. Stroke prevention is defined in this research as lifestyle changes (e.g., healthy diet, exercise) that can reduce your risk for stroke (CDC, 2022).

Stroke Risk Factors. Stroke risk factors can increase an individual's chance of having a stroke. Risk factors for stroke include, previous stroke, high blood pressure, high cholesterol, heart disease, diabetes, obesity, drug and alcohol use, physical inactivity, and poor diet (CDC, 2022).

Stroke Warning Signs. Stroke warning signs are signs and symptoms of a stroke. This can include sudden numbness confusion, difficulty seeing, difficulty walking, severe headache, facial drooping, arm weakness, and speech difficulty (CDC, 2022).

Chapter I: Introduction

Experts estimate that more than 795,000 individuals in the United States have a stroke each year, and every four minutes someone dies from a stroke (CDC, 2022). Centers for Disease Control and Prevention (CDC), defines stroke as something blocking "blood supply to part of the brain or when a blood vessel bursts." Stroke can lead to a range of impairments, long-term disability, or in some cases, death (CDC, 2022). Stroke is a leading cause of death in the United States as well as a major cause of disability (CDC, 2022), yet the levels of knowledge of the risk factors as well as stroke warnings appear to be low across the general population (Nicol & Thrift, 2005). It is crucial that individuals are aware of the risk factors of strokes so that they can attempt to prevent one from occurring, as strokes can be mostly preventable through management and awareness of risk factors (Becker et al., 2001).

The term rural is defined by the US Census Bureau as "all population, housing, and territory not included within an urbanized area or urban cluster" (US Census Bureau, n.d.). Researchers in this study defined rural areas as any community with a population under 50,000 individuals, as suggested by the Census Bureau.

Blades et al., (2005), reported individuals residing in two rural counties in Montana were generally aware of stroke warning signs, but their knowledge of stroke risk factors was limited. Furthermore, Swanoski et al., (2012) found that U.S. adults who had low composite heart attack and stroke knowledge scores were more likely to reside in a

rural population. Harrington et al. (2020) compared demographics between rural and urban communities in the US and found that individuals who live in rural populations have overall worse health in comparison to urban communities, which increases the risk of stroke in these rural areas. Rural regions are more vulnerable to stroke and other cardiovascular diseases due to a history of high unemployment rates, poverty, and lower levels of education (Alkadry et al., 2006). This results in rural populations having a higher risk of developing health conditions such as diabetes, obesity, and hypertension, which are all risk factors of stroke (Howard et al., 2017). These findings suggest that the improvement of stroke education and awareness in rural populations may be necessary for managing and preventing strokes in rural communities.

Not only could stroke education and awareness lead to better health outcomes across this population, stroke awareness and risk management could also be an effective way to reduce the gross expenditures on healthcare. As of 2003, the United States spent $30 billion on the indirect and direct cost of treating strokes (National Stroke Association (NSA), 2003). By raising awareness of stroke and improving prevention and management in rural communities, the burden of stroke on individuals, families, and healthcare systems can be greatly reduced.

Providing stroke education can also aid in improving individuals' quality of life. Xie et al. (2006) revealed that stroke has a detrimental effect on quality of life. Strokes can lead to long term disability and cause weakness or paralysis, speech and language deficits, dysphagia (swallowing difficulties), and cognitive deficits, all of which greatly impact one's ability to participate in or enjoy life events. This can lead to lasting impacts

on the individual and significantly impact their overall quality of life. Stroke education is crucial in preventing an adverse impact on one's overall well-being.

Many professionals are involved in the rehabilitation of stroke patients including, speech-language pathologists, nurses, occupational therapists, physical therapists, primary care physicians, neurologists, recreational therapists, and physiatrists (AHA, 2019). Speech-language pathologists (SLPs) play an integral role in the evaluation, management, and rehabilitation of stroke survivors with communication deficits and/or dysphagia (Dilworth, 2008). According to American Speech-Language Hearing Association (ASHA) (2016), SLPs also play a role in the prevention and wellness activities that are geared toward reducing the risk of a disease or disorder (ASHA, 2016). SLPs have a responsibility to educate individuals about risk factors associated with stroke (ASHA, 2016).

The purpose of this study is to analyze the results of stroke knowledge, specifically regarding warning signs and risk factors among rural populations across the United States. Secondly, this study will determine whether the number of diagnosed stroke risk factors impacts rural respondents' knowledge of stroke risk factors and warnings signs. This research is necessary to conduct to determine the need for stroke education in rural communities and how health care professionals, such as SLPs can play a role in educating these populations.

Chapter II: Review of Literature

It is thought that demographic and individual health factors strongly contribute to poorer health outcomes in rural communities in comparison to urban communities (Harrington et al., 2020). Howard et al., (2017), found that higher stroke mortality rates in rural settings appear to occur primarily due to a higher incidence rate of stroke in these populations, when compared to more urban settings. It is estimated that the risk of stroke within rural populations is about 23 percent higher than it is in urban populations (Howard et al., 2017).

Stroke Risk Factors in Rural Populations

Higher incidence of risk factors such as obesity, high cholesterol, high blood pressure, and diabetes in rural populations, along with lower socioeconomic status and limited access to healthcare, may contribute to an increased risk of stroke (CDC, 2022). To illustrate, The National Health and Nutrition Examination Survey found that the prevalence of diabetes mellitus and hypertension tend to be higher in rural populations in comparison to urban areas (Howard et al., 2017). The prevalence of diabetes mellitus is 6.5 percent higher for Caucasians and 9.5 percent higher for African Americans in rural populations compared to urban populations (Howard et al., 2017). Additionally, poorer control of diabetes was noted for African Americans living in rural populations when compared to urban populations (i.e., 60 percent for rural versus 45 percent for urban) (Howard et al., 2017). Residents in rural populations also showed similar findings

regarding high blood pressure. Howard et al., (2017), reported a higher prevalence of high blood pressure in rural populations for both Caucasians (28.5 %) and African Americans (36 %) than Caucasians (23.3 %) and African Americans (28.8 %) in urban populations.

The presence of these health conditions, amongst others, likely contribute to the growing rate of obesity and morbid obesity that tend to be higher in rural settings. Obesity alone holds strong implications for overall cardiovascular health and is a strong contributor to the risk of stroke (Howard et al., 2017). The higher prevalence of hypertension and diabetes mellitus in rural areas may be due to the increased rate of obesity in rural areas (Howard et al., 2017). Overall, rural populations tend to be older, less physically active, and are more likely to engage in health-endangering behaviors such as smoking, drug, and alcohol consumption (Harrington et al., 2020).

Kapral et al., (2019), found that in a population-based study with over 6 million people, rural residents had more diagnosed stroke risk factors and were less likely to keep these risk factors controlled compared to urban respondents. Rural residents who had never had a prior stroke showed increased prevalence of cardiovascular risk factors, limited screening for diabetes and hyperlipidemia, and poor control of diabetes (Kapral et al., 2019). Kapral et al., (2019), also found that rural populations had a higher rate of stroke and mortality which is consistent with previous literature in the United States.

Knowledge of Stroke Warning Signs and Risk Factors

Blades et al, (2005) surveyed 800 adults aged 45 years and older from two rural Montana counties about their awareness of stroke warning signs and risk factors. They found that respondents identified two or more warning signs for stroke such as numbness

or speech difficulty as well as two or more stroke risk factors such as smoking and high blood pressure. However, over half of the respondents could identify warning signs but less than half could identify risk factors. Additionally, Swanoski et al. (2012), surveyed over one million adults in the United States from 25 states on their knowledge of heart attack and stroke symptoms. Their survey included three heart attack questions, four stroke questions, and one appropriate response question. Researchers asked respondents if the options listed (e.g., sudden numbness, trouble seeing, dizziness, etc.) were warning signs of stroke (Swanoski et al., 2012). An incorrect sign such as chest pain was included to determine whether respondents would answer "yes" for all the symptoms listed (Swanoski et al., 2012). Respondents from rural populations had more incorrect answers for nine of the 13 questions (Swanoski et al., 2012).

These findings suggested that individuals residing in rural populations had a knowledge deficit in regard to stroke and heart attack symptoms as well as appropriate response to the occurrence of a stroke or heart attack (Swanoski et al., 2012). In addition, they also found that Hispanic males who had less than a high school level of education and a low socioeconomic status, defined as an annual household income of less than $50,000, were more likely to have less knowledge on heart attack and stroke symptoms in comparison to other demographic groups.

Alkadry and colleagues (2006) surveyed 1,011 individuals living in West Virginia and found that less than half of the participants correctly identified all four signs of stroke including: (a) sudden numbness; (b) sudden severe headache; (c) loss of vision; and (d) loss of speech. Approximately 80 percent of participants with diabetes stated that they checked their blood sugar less than twice a year, and 27 percent of individuals with

high blood pressure indicated that they check their blood pressure less than twice a year (Alkadry et al., 2006). These results suggest that community education regarding stroke risk factors and symptoms is a necessary step towards stroke prevention.

When patients have an education and awareness of the early signs of stroke, they are more likely to use emergency medical services (Nemeth et al. 2016). Nemeth et al. (2016) examined the individual and community level barriers to seeking medical care after the onset of stroke symptoms in a rural community in South Carolina and found that this population demonstrates a delay in seeking medical treatment after the onset of symptoms (Nemeth et al. 2016). Rural populations may have a lower health literacy, which is one contributing factor to the delay in seeking emergency services for stroke (US Department of Health and Human Services, 2000). After conducting eight focus groups consisting of patients with a history of stroke, family members of the stroke patients, community leaders, emergency department professionals, emergency medical services, and local primary care providers, Nemeth et al. (2016) found that patients in this rural community did not have the knowledge and understanding of stroke symptoms to seek medical care in a timely manner. There was also a relationship of mistrust between community members and healthcare workers. Residents noted a lack of trust and confidence in medical providers' ability to consistently meet their medical needs. Primary care providers also stated that they did not trust patients to take medical advice or prescribed medications to avoid stroke (Nemeth et al. 2016).

Socioeconomic Impact on Stroke

Socioeconomic state and level of education are likely two contributing factors to the worsened cardiovascular health among rural residents. Harrington et al. (2020)

discovered that the national average income in rural areas in the United States was around $47,000, which is about $10,000 less than the national average income. Poverty rates in rural areas, on average, are around 18 percent, compared to urban areas where the poverty rate is 17 percent.

According to a study done by Liao and colleagues (2009), socioeconomic status, which includes factors such as income and level of education, makes up 32 percent of the excess deaths in states with high stroke mortality rates (otherwise known as stroke-belt states). Poverty and low levels of education limit individuals from being able to make healthier choices, such as eating healthy foods including fruits and vegetables, or having access to facilities for physical activity (Balamurugan et al., 2013). Socioeconomic status also restricts access to medications due to the inability to afford them and the compliance for taking blood pressure medicine (Balamurugan et al., 2013). These risk factors (lower education level and socioeconomic status) become less relevant in individuals > 65 due to their access to health care improving because they become eligible for Medicare and Social Security benefits (Balamurugan et al., 2013). As of 2013, the percentage of individuals, from ages 18-64, that have health insurance is only ≈25 percent (Balamurugan et al., 2013).

Health literacy tends to be lower for individuals residing in rural areas. Wood (2005) examined the reading levels of 57 individuals in the southeastern United States and found that about 39 percent could only read at a seventh or eighth grade level. In contrast, the majority of written healthcare materials that are provided in physician offices, urgent care centers, hospitals, and the like are written at a ninth-grade reading level (Davidhizar & Brownson, 1999). This suggests that those in rural areas may be

unable to adequately access written material that may help them to understand and manage their healthcare needs.

In 2003, only 12% of adults did not have difficulty with health information. Members of disadvantaged groups were more likely to have limited health literacy (Power-deFur, L, 2022). Those disadvantaged groups included (a) the elderly; (b) individuals with lower education; (c) individuals with public or no insurance; (d) individuals who did not speak English prior to the age of 5; and (e) members of racial and ethnic minority groups. Health care providers do not always check with their patients to ensure their instructions were clear and understood (Power-deFur, L, 2022).

Rural Access to Healthcare

Local hospital care is severely limited for individuals living in rural communities (Harrington et al., 2020). On average, rural residents live 10.5 miles from a hospital, whereas urban residents live, on average, around 4.4 miles away from their nearest hospital (Harrington et al., 2020). Not only do rural residents live relatively further away from hospitals compared to urban residents, but since 2010, over 100 rural hospitals have closed (Harrington et al., 2020). The majority of these closures were due to states not increasing their Medicaid coverage through the Affordable Care Act (Harrington et al., 2020). The occupancy rate of hospitals in rural areas is around 40 percent which suggests that even more hospitals may be at risk of closure (Harrington et al., 2020). Having limited access to hospitals can be extremely dangerous and increase the risk of mortality.

Education

Stroke education and awareness leads to better health outcomes across rural populations. Rural populations can be educated on lifestyle changes that individuals can

make to prevent stroke such as, regular physical activity, healthy food choices, control of medications, and limited alcohol consumption. Health care professionals who treat patients after a stroke serve on a multidisciplinary team of medical professionals including speech-language pathologists, nurses, occupational therapists, physical therapists, primary care physicians, neurologists, recreational therapists, and physiatrists (AHA, 2019). These professionals play an integral role in keeping the patient educated on stroke and its risk factors and warning signs.

Speech-language pathologists are involved in identifying and increasing awareness of risk behaviors that lead to communication and swallowing disorders (ASHA, 2016). Up to 50 percent of stroke patients experience dysphagia and up to 30 to 60 percent experience a communication deficit (Dilworth, 2008). Therefore, SLPs can continue to educate at risk populations to prevent future swallowing and communication deficits following stroke that negatively impact an individual's overall well-being. Following patient education, SLPs should ask to confirm understanding of provided information to ensure they are providing health literate care. Health care professionals play an important role on making sure patients can find, understand, and use health information (Power-deFur, L, 2022).

Research Questions

The questions for the current research relate to the knowledge and perception of individuals living in rural populations with regards to stroke warning signs and risk factors. The questions address (a) rural respondents' knowledge of stroke risk factors and stroke warning signs; and (b) whether more diagnosed risk factors lead to better performance on knowledge checks. The research aims to evaluate whether more stroke

education is needed in rural populations to aid in stroke rate disparities between rural and urban populations. A group of doctoral professors with research experience and graduate students developed an internet-based survey to answer the following research questions:

1. What knowledge do rural populations have regarding stroke warning signs and risk factors?
2. Do individuals with more diagnosed risk factors perform better on knowledge checks of stroke warning signs and risk factors?

Chapter III: Methods

Study Design

This study utilized a non-experimental quantitative descriptive design to investigate the perception and understanding of stroke and its risk factors in a rural population. The independent variable being examined was the population of the participants, specifically that they live in rural populations, while the dependent variable was the participants' knowledge of stroke and its risk factors.

Data Collection

The research questions guiding the current research study ask, 'What knowledge do rural populations have regarding stroke warning signs and risk factors?' and 'Are individuals who have been diagnosed with stroke risk factors more knowledgeable about stroke warning signs and risk factors compared to individuals with less diagnoses?'. The researchers conducted an online survey via Qualtrics that was administered to individuals who a) lived in rural populations; b) reside within the United States; and c) are 18 years of age or older. Researchers analyzed the results using Qualtrics and Statistical Package for the Social Sciences Software (SPSS).

Participants

The population being investigated in this study included individuals residing in rural populations in the United States. Researchers defined the term *rural* as populations containing <50,000 individuals (US Census Bureau, n.d.). Researchers posted an online

survey on social media platforms such as specialized Facebook groups. Individuals residing in rural populations were asked to complete the survey. The inclusion criteria for participants included a) individuals must reside in rural populations; b) individuals must reside within the United States; and c) respondents must be 18 years of age or older. A total of 56 individuals completed the survey, however, only 41 of these individuals met the inclusion criteria. Therefore, the sample size was 41.

Participant Recruitment

A link to the survey was provided on a recruitment flier (see Appendix C) containing information regarding the purpose of the study posted across Facebook groups. Participants also received educational information containing the correct warning signs and risk factors for stroke at survey completion.

Measures

The researchers developed and distributed a survey created on Qualtrics, an online software platform that aids individuals in producing and creating comprehensive surveys and automatic reports (Qualtrics, n.d.). The survey took place over a four-month period and included 29 questions comprised of multiple choice, multiple selection, short answer, and true/false questions which examined participants' knowledge of stroke risk factors and warning signs, as well as their demographic information (see Appendix B). Demographic information included age, race, ethnicity, gender, education levels, current health status (i.e., current, and past diagnoses), and current city of residence. The second section of the survey explored the participants' perception and knowledge of stroke warning signs and risk factors as defined by the CDC (2022). Previous research conducted in this area, which indicated a discrepancy in the knowledge that rural and

urban populations have regarding stroke (Alkadry et al., 2006; Blades et al., 2005; Howard et al., 2017), inspired the demographic and knowledge check sections of the survey in the current research. The knowledge check portion of the survey consisted of true/false and multiple selection answer choices to assess the amount of knowledge individuals living in rural areas have regarding stroke risk factors and warning signs. The survey concluded with an educational portion containing the common risk factors and warning signs of stroke as defined by the CDC (2022).

Data Collection Procedures

Prior to beginning the survey, informed consent was obtained (see Appendix A). To recruit participants, a flier (see Appendix C) was posted across specialized Facebook rural community groups such as 'Goochland Living', 'What's Happening in Farmville VA', and 'Hanover VA Residents'. Researchers used snowball sampling to recruit participants and encouraged reposting of the flier among participants and community group members. The flier contained information about (a) the purpose of the investigation; (b) survey completion time; (c) participant criteria; and (d) a link to the survey. Data from the survey was collected and analyzed using SPSS to examine the knowledge of stroke and its risk factors in rural populations. The collected data remained anonymous and no identifiable information was disclosed to the public.

Data Analysis Procedures

After the survey was closed to participants, the researchers analyzed the data collected from the survey in Qualtrics. A total of 56 individuals completed the survey. Demographic information was analyzed in Qualtrics. The researchers examined each

response and removed any participants who did not meet the inclusion criteria, which left a total of 41 participants.

Using SPSS, the researchers conducted one-sample *t*-tests to determine whether rural respondents' knowledge of stroke warning signs and stroke risk factors are significantly different than rural populations knowledge of stroke risk factors and warning signs based on previous research. Researchers conducted Spearman correlations in SPSS to analyze the relationship between the amount of risk factors each participant had been diagnosed with and their performance on knowledge checks of stroke risk factors and warning signs.

Validity and Reliability

Due to the voluntary nature of the study, the data collected may contain an unavoidable source of bias. Two speech-language pathologists examined the survey to ensure content validity for the questions regarding stroke risk factors and warning signs, as well as demographic information that could potentially impact stroke risk. Researchers based the survey questions on prior research which establishes construct validity. Moreover, licensed speech language pathologists thoroughly reviewed the survey before distribution. However, the study sample was recruited through social media which may limit the generalizability of the findings beyond this population.

Institutional Review Board

Institutional Review Board (IRB) approval of "Examining perception and understanding of stroke and its risk factors in a rural population" was sought prior to beginning data collection because this research involved human subjects. This study

qualified for exemption under category 2 (IRB 45 CFR 46.104(d)(2)(i)) (See appendix A).

Summary of Methodology

The current non-experimental quantitative descriptive study aimed at examining the knowledge and perception that individuals living in rural populations have regarding stroke warning signs and risk factors. The researchers also aimed to answer the following questions (a) 'What knowledge do rural populations have regarding stroke warning signs and risk factors'; and (b) 'Do individuals with more diagnosed risk factors perform better on knowledge checks of stroke warning signs and risk factors compared to individuals with less diagnoses?'.

An online survey composed of demographic questions and knowledge checks regarding stroke risk factors and warning signs was created through the platform Qualtrics. The survey was distributed via a link on a recruitment flier posted online among various Facebook groups targeting individuals living in rural communities. The survey was left open to collect responses for a period of four months. After closing the survey, the researchers removed individuals who did not meet the inclusion criteria or did not fully complete the survey.

The researchers analyzed demographic information in Qualtrics and conducted further statistical analyses in SPSS. The researchers examined the knowledge rural respondents had regarding stroke risk factors and warning signs and the relationship between reported diagnoses and performance on knowledge checks of stroke warning signs and risk factors through one-sample *t*-tests and Spearman correlations.

Chapter IV: Results

Data Management and Data Reduction

The data collected from participants included demographic information such as age, race, ethnicity, gender, education levels, current health status (i.e., current, and past diagnoses), and current city of residence, as well as a knowledge check to assess participants' knowledge of risk factors and warning signs of stroke. The researchers employed SPSS to manage, document, and conduct data analysis.

The researchers used Qualtrics database to filter out specific criteria and clean the data in preparation for analysis. Examples of the data management process included removing individuals that did not fully complete the survey from start to finish, removing participants who did not consent to participating in the research, and removing participants who did not meet all the inclusion criteria. Researchers utilized one-sample *t*-tests and Spearman correlations to analyze the relationship between the amount of risk factors each participant had been diagnosed with and their performance on knowledge checks of stroke risk factors and warning signs.

Survey Constructs

The survey included measures, constructs, and characteristics including (a) demographic and personal health data; (b) true and false questions regarding stroke; and (c) a knowledge check regarding stroke and its risk factors and warning signs. The survey

required participants to “check all that apply” given 13 options for warning signs, and 10 options for risk factors, some of which were correct and incorrect options. Researchers provided incorrect choices to ensure participants were completing the survey meaningfully rather than providing random answers.

The survey developed for this study was based on a previous survey conducted by Alkadry et al. (2006), which was published in a research article titled, “Stroke Awareness Among Rural Residents”. This article examined the level of stroke awareness among residents of West Virginia. The current study aimed to expand the scope to all rural populations in the United States, in order to investigate whether it is more common for rural populations across the country to have less knowledge about stroke risk factors and warning signs. Alkadry et al.’s (2006) research article inspired the demographic and personal health questions asked of participants as well.

Rural Participant Demographics

The majority of respondents identified as white (92%) and reported a bachelor’s degree as their highest level of education (31%). Additionally, most of the participants reported being married (65%) and reported an annual household income greater than $100,000 (46%). The majority of participants also (a) rated their health status as good to excellent (90%); (b) visited their primary care physician one to two times a year (58 percent); and (c) had health insurance (97%).

Regarding the participants’ medical history, the majority had never been diagnosed with (a) high blood pressure (73%); (b) high cholesterol (78%); (c) diabetes (97%); (d) depression (70%); or (e) obesity (70%). Additionally, only one participant out of the 41 reported having a stroke in the past. Researchers noted a limitation in which

they were unsure when the stroke had occurred and if the participant completed the survey accurately, given that their cognitive status was unknown.

Regarding family medical history, 41% of the participants reported that a family member had previously experienced a stroke, while an equal percentage reported no prior incidence of stroke in their family. Only 17% of participants were unsure if a family member had ever had a stroke. Additionally, 31 participants reported that they lived 20-30 minutes away from their nearest doctor's office.

Within the survey, researchers asked participants if they had previously lived in another location, and 51% of the participants reported that they had. Researchers then asked those participants to specify the location that they had previously lived in, if applicable, to investigate the population of that residence. Out of the participants who reported having lived in another location, the majority (79%) had previously lived in an urban area at some point in their lives.

Table 1. shows the demographic information of rural participants. Column one (Description) displays the gender, age, race and ethnicity, marital status, and annual household income of survey respondents. Column two (Total Responses) lists the number of responses for each description. Column three (Percentage) converts the total number of responses from each description into a percentage value.

Table 1

Demographics of Rural Population

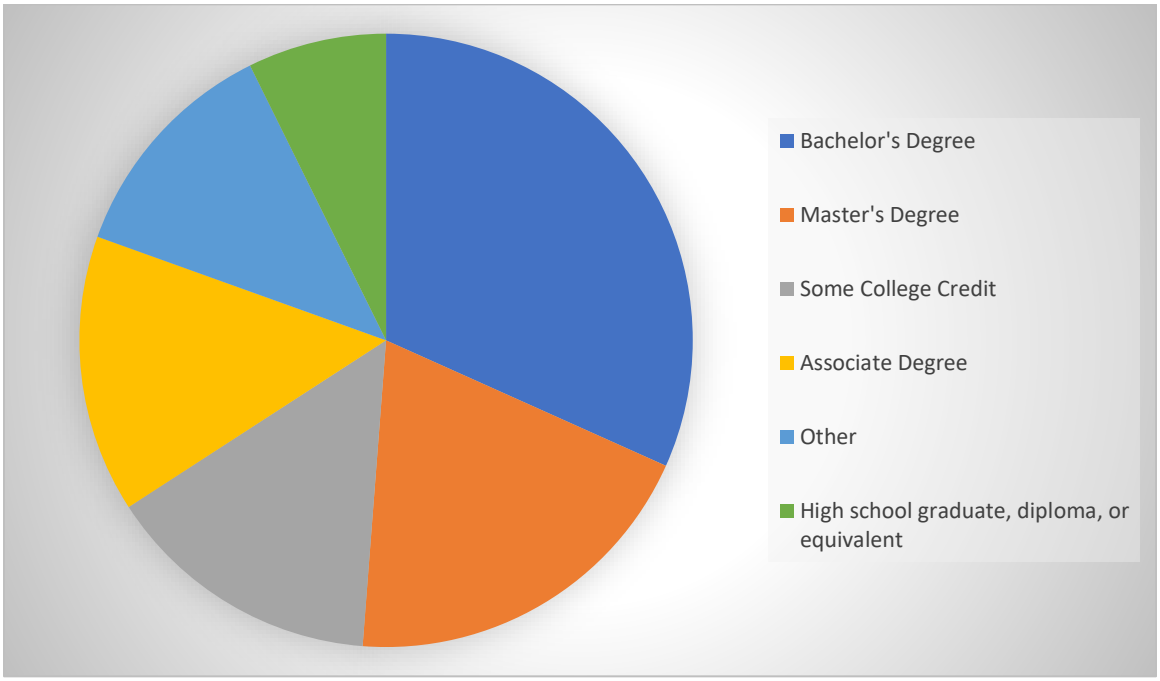
Description	Total Responses 41	Percentage
	Gender	
Female	35	85.37%
Male	6	14.63%
	Age	
18-44 years	20	48.78%
45-64 years	18	43.90%
>65 years	3	7.32%
	Race and Ethnicity	
White	38	92.68%
Hispanic or Latino	1	2.44%
Black or African American	1	2.44%
Other	1	2.44%
Native American or American Indian	0	0.00%
Asian/Pacific Islander	0	0.00%
	Marital Status	
Married	27	65.85%
Single, Never Married	9	21.95%
Divorced	4	9.76%
Widowed	1	2.44%
	Annual Household Income	
Greater than $100,000	19	46.34%
$60,000 - $69,999	5	12.20%
$70,000 - $79,999	5	12.20%
$50,000 - $59,999	4	9.76%
Prefer Not to Say	3	7.32%
$30,000 - $39,999	2	4.88%
$90,000 - $99,999	1	2.44%
$10,000 - $19,999	1	2.44%
$20,000 - $29,999	1	2.44%
$40,000 - $49,999	0	0.00%
$80,000 - $89,999	0	0.00%
Less than $10,000	0	0.00%

Figure 1. represents the education level of the rural participants. To review, 32 percent of rural participants stated they received a bachelor's degree as their highest level of education, while 19 percent reported they received a master's degree. Fifteen percent

indicated they received some college credit and another 15 percent reported that they received an associate degree. Seven percent indicated that they graduated high school, received a diploma, or equivalent, and another 12 percent selected "other" as their highest level of education.

Figure 1

Rural Participants' Education History



Stroke Warning Signs

Of the provided correct stroke warning sign options within the survey, participants identified (a) numbness (10%); (b) confusion (13%); (c) difficulty seeing (6%); (d) difficulty walking (10%); (e) severe headache (8%); (f) facial drooping (13%); (g) arm weakness (7%); and (h) speech difficulty (14%).

Researchers also included incorrect stroke warning signs to test participants' knowledge. Participants selected the following incorrect stroke warning signs: (a) trouble

breathing (4%); (b) pain/discomfort in chest (2%); (c) nausea or vomiting (3%); (d) pain in arm/shoulder (4%); and (e) jaw, neck, or back pain (3%).

Table 2. shows the knowledge of warning signs in a rural population. Column one, (Correct Stroke Warning Signs), displays a list of accurate stroke warning signs. Column two, (Total Responses), shows the number of respondents that correctly identified each stroke warning sign. Column three (Percentage) converts the total number of responses to a percentage value for each stroke warning sign.

Table 2

Knowledge of Warning Signs in a Rural Population

Correct Stroke Warning Signs	Total Responses	Percentage
Speech Difficulty	40	13.89%
Confusion	39	13.54%
Facial Drooping	37	12.85%
Numbness	31	10.76%
Difficulty Walking	28	9.72%
Severe Headache	23	7.99%
Arm Weakness	21	7.29%
Difficulty Seeing	19	6.00%

Table 3. shows the incorrect warning signs chosen by rural respondents. Column one, (Incorrect Stroke Warning Signs), displays a list of false stroke warning signs. Column two, (Total Responses), shows the number of respondents that identified an incorrect stroke warning sign. Column three (Percentage) converts the total number of responses to a percentage value for each incorrect stroke warning sign.

Table 3

Incorrect Warning Signs Selected by Rural Participants

Incorrect Stroke Warning Signs	Total Responses	Percentage
Trouble Breathing	12	4.17%
Pain in Arm/Shoulder	12	4.17%
Nausea or Vomiting	11	3.82%
Jaw, Neck, or Back Pain	9	3.13%
Pain/Discomfort in Chest	6	2.08%

Stroke Risk Factors

Of the provided options of correct risk factors within the survey, respondents accurately identified (a) previous stroke (15%); (b) high blood pressure (12%); (c) diabetes (9%); (d) poor diet (9%); (e) inactivity (8%); (f) drug/alcohol use (9%); and (g) age (12%). Researchers also included incorrect stroke risk factors to test participants' knowledge. Of the incorrect risk factors included as options to select, residents selected genetics (14%), pregnancy (3%), and car accidents (3%).

Table 4. shows the knowledge of stroke risk factors in a rural population. Column one, (Correct Stroke Risk Factors), displays a list of accurate stroke risk factors. Column two, (Total Responses), shows the number of respondents that correctly identified each stroke risk factor. Column three (Percentage) converts the total number of responses to a percentage value for each stroke risk factor.

Table 4

Knowledge of Risk Factors in a Rural Population

Correct Stroke Risk Factors	Total Responses	Percentage
Previous Stroke	38	15.70%
High Blood Pressure	30	12.40%
Age	30	12.40%
Diabetes	24	9.92%
Poor Diet	23	9.50%
Drug/Alcohol Use	23	9.50%
Inactivity	21	8.68%

Table 5. shows the incorrect risk factors chosen by rural respondents. Column one, (Incorrect Stroke Risk Factors), displays a list of false stroke risk factors. Column two, (Total Responses), shows the number of rural respondents that identified an incorrect stroke risk factor. Column three (Percentage) converts the total number of responses to a percentage value for each incorrect stroke risk factor.

Table 5

Incorrect Risk Factors Selected by Rural Participants

Incorrect Stroke Risk Factors	Total Responses	Percentage
Genetics	36	14.88%
Pregnancy	9	3.72%
Car Accidents	8	3.31%

Data Analysis

A one-sample *t*-test was run to determine if rural participants performance on a knowledge check of warning signs is significantly different from a hypothetical knowledge check score of four. This hypothetical value of four was chosen based on previous research found on the same population (Alkadry et al., 2006; Blades et al.,

2005). On average, rural participants (M = 5.8049, SD = 1.52019) reported higher levels of knowledge of stroke warning signs (t (40) = 7.60, p < .001).

Since p < .001, the study found evidence to reject the null hypothesis that the mean average knowledge check score is equal to the hypothesized population mean of four. This concludes that the mean knowledge check score of stroke warning signs is significantly different than four.

Table 6. displays the sample descriptives for the rural population's knowledge of stroke warning signs, as assessed by a knowledge check. The table describes the sample size, average of correct risk factors selected, standard deviation, and standard error mean of the rural group.

Table 6

Sample Descriptives for Rural Population's Knowledge of Stroke Warning Signs

One-Sample Descriptive Statistics				
	n	Mean	Std. Deviation	St. Error Mean
Knowledge	41	5.8049	1.52019	0.23741

*Note: n = Sample Size

Table 7. displays one-sample *t*-tests conducted to assess the rural sample's knowledge of stroke warning signs as assessed by a knowledge check. The table depicts the *t*-value, degrees of freedom, significance, mean difference, and confidence intervals across the top row, with the corresponding values in the row below.

Table 7

One-Sample t-tests of Stroke Warning Signs

	Test Value = 4					
					95% Confidence Interval of the Difference	
	t	df	sig. (2-tailed)	Mean Difference	Lower	Upper
Knowledge	7.60.	40	.000	1.80488	1.373171	2.2847

*Note: t = t-value, df = degrees of freedom

A one-sample *t*-test was run to determine if rural participants performance on a knowledge check of risk factors is significantly different from a hypothetical knowledge check score of three. A hypothetical value of three was chosen based on previous research found on the same population (Alkadry et al., 2006; Blades et al., 2005). On average, rural participants (M = 4.6098, SD = 1.96059) reported higher levels of knowledge of stroke risk factors (t (40) = 5.25, $p < .001$).

Since $p < .001$, the study found evidence to reject the null hypothesis that the mean average knowledge check score is equal to the hypothesized population mean of three. This concludes that the mean knowledge check score of stroke risk factors is significantly different than three.

Table 8. displays the sample descriptives for the rural population's knowledge of stroke risk factors, as assessed by a knowledge check. The table describes the sample size, average of correct risk factors selected, standard deviation, and standard error mean of the rural group.

Table 8

Sample Descriptives for Rural Population's Knowledge of Stroke Risk Factors

One-Sample Descriptive Statistics				
	n	Mean	Std. Deviation	St. Error Mean
Knowledge	41	4.6098	1.96059	0.30619

*Note: n = Sample Size

Table 9. displays one-sample *t*-tests conducted to assess the rural sample's knowledge of stroke risk factors as assessed by a knowledge check. The table depicts the *t*-value, degrees of freedom, significance, mean difference, and confidence intervals across the top row, with the corresponding values in the row below.

Table 9

One-Sample t-tests of Stroke Risk Factors

Test Value = 3						
					95% Confidence Interval of the Difference	
	t	df	sig. (2-tailed)	Mean Difference	Lower	Upper
Knowledge	5.257	40	.000	1.60976	0.9909	2.2286

*Note: t = t-value, df = degrees of freedom

A Spearman correlation analysis was conducted to analyze the associations between the amount of risk factors each participant had been diagnosed with and their performance on knowledge checks of stroke risk factors and warning signs. Knowledge check performance of stroke warning signs was not significantly correlated with the number of diagnosed risk factors ($r = .190$, $p > .001$). However, knowledge check

performance of stroke risk factors was significantly correlated with number of diagnosed risk factors ($r = .579$, $p < .001$).

Table 10. shows a Spearman correlation of the association between rural respondents' number of diagnosed risk factors and their knowledge of stroke risk factors. Row one, (Diagnosed Risk Factors) displays the correlation coefficient for number of diagnosed risk factors and their score on the knowledge check of stroke risk factors, sig (2-tailed) value, and the sample size (n). Row two (Knowledge Check) displays the correlation coefficient for number of diagnosed risk factors and their score on the knowledge check of stroke risk factors, sig (2-tailed) value, and the sample size (n).

Table 10

Spearman Correlation of Diagnosed Risk Factors and Knowledge of Stroke Risk Factors

			Diagnosed Risk Factors	Knowledge Check of Risk Factors
Spearman's Rho	Diagnosed Risk Factors	Correlation coefficient	1.000	.579**
		Sig. (2-tailed)	.	.000
		n	41	41
	Knowledge Check	Correlation coefficient	.579**	1.000
		Sig. (2-tailed)	.000	.
		n	41	41

*Note: n = Sample Size

Table 11. shows a Spearman correlation of the association between rural respondents' number of diagnosed risk factors and their knowledge of stroke warning signs. Row one, (Diagnosed Risk Factors) displays the correlation coefficient for number of diagnosed risk factors and their score on the knowledge check of stroke warning signs, sig (2-tailed) value, and the sample size (n). Row two (Knowledge Check) displays the

correlation coefficient for number of diagnosed risk factors and their score on the knowledge check of stroke warning signs, sig (2-tailed) value, and the sample size (n).

Table 11

Spearman Correlation of Diagnosed Risk Factors and Knowledge of Stroke Warning Signs

			Diagnosed Risk Factors	Knowledge Check of Warning Signs
Spearman's Rho	Diagnosed Risk Factors	Correlation coefficient	1.000	.190
		Sig. (2-tailed)	.	.233
		n	41	41
	Knowledge Check	Correlation coefficient	.190	1.000
		Sig. (2-tailed)	.233	.
		n	41	41

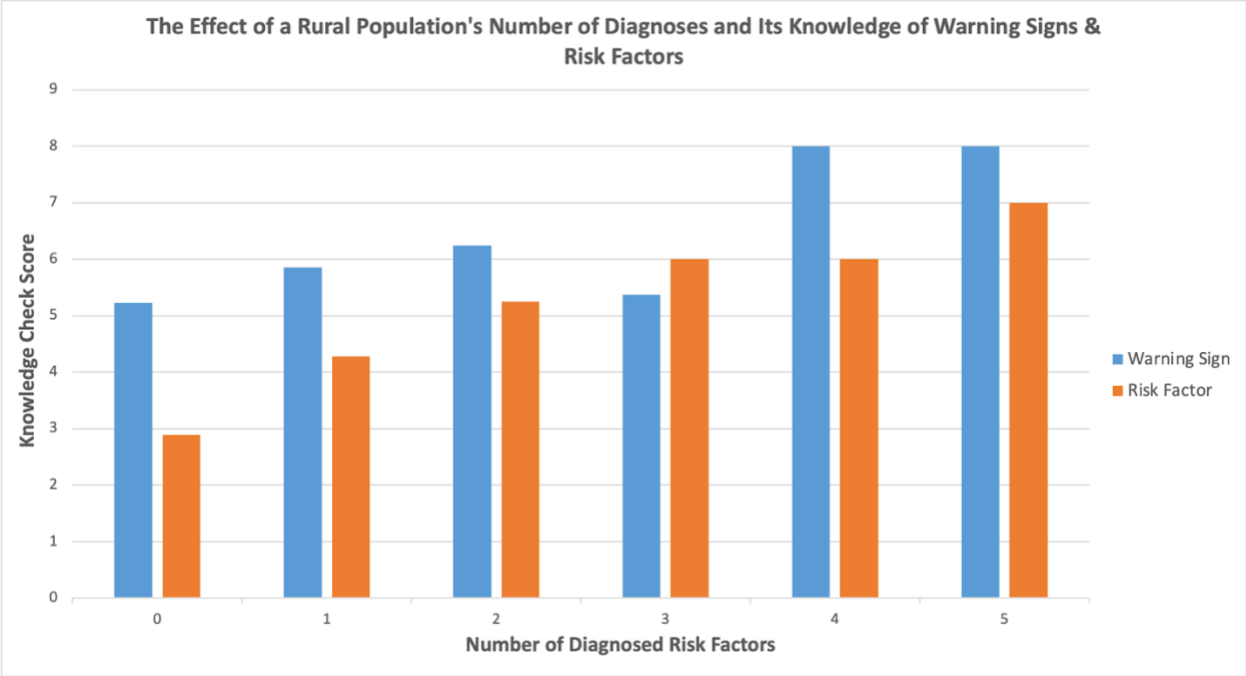
*Note: n = Sample Size

With the highest possible score of eight for a knowledge check of stroke warning signs, and the highest possible score of seven for a knowledge check of stroke risk factors, rural participants averaged a score of 5.8 correct answers regarding stroke warning signs and 4.6 for risk factors.

Figure 2. displays rural respondents' knowledge of warning signs and risk factors based on the number of diagnosed risk factors they have. The x-axis displays the number of diagnosed risk factors rural respondents have. The y-axis displays the knowledge check score the participants received based on their responses to the survey. The amount of warning signs accurately identified are displayed in blue, and the amount of risk factors accurately identified are displayed in orange.

Figure 2.

The Effect of a Rural Population's Number of Diagnoses and Its Knowledge of Warning Signs & Risk Factors



Stroke Awareness

The inability to accurately identify warning signs of a stroke may hinder individuals' ability to seek prompt medical attention. For example, 97% of participants indicated that they would "call 911 immediately" if they felt as if someone was having a stroke, however, several of these individuals were unable to recognize correct stroke symptoms. While it's crucial to know what actions to take when someone has a stroke, being able to recognize the symptoms is equally as important.

The researchers gave participants five true or false questions at the end of the survey to further assess participants' awareness of strokes. Participants were first asked if strokes can be prevented. Sixty-five percent indicated that they can be prevented, while 34 percent indicated that they cannot. When provided the false statement, "You do not

have to see a doctor if stroke symptoms go away", 100% of participants accurately disagreed. Similarly, all participants disagreed with the statement, "Strokes only affect the elderly population". When asked if strokes and heart attacks are the same thing, 100% of participants also disagreed. Lastly, researchers asked participants to agree or disagree that strokes occur in the brain. Ninety percent of respondents accurately indicated that they do occur in the brain while ten percent indicated that they do not.

Chapter V: Discussion

Researchers hypothesized that rural residents would have minimal knowledge of stroke and its risk factors. Based on the results of the survey, respondents living in rural populations with less diagnoses of stroke risk factors (e.g., diabetes, high blood pressure) had less knowledge of stroke risk factors. Additionally, participants with more diagnoses of risk factors were more likely to score higher on the knowledge check of stroke risk factors. However, respondents with more diagnosed stroke risk factors did not indicate better performance on knowledge check of stroke warning signs. Rural respondents identified an average of 5.8 correct stroke warning signs out of eight. For stroke risk factors, rural respondents correctly identified an average of 4.6 stroke risk factors out of seven. Researchers identified a significant difference in the mean knowledge of stroke warning signs and risk factors in rural respondents of this survey as there were higher levels of knowledge of stroke warning signs and risk factors compared to former research (Alkadry et al., 2006; Blades et al., 2005).

The current survey results align with previous literature. Blades et al., (2005) found that rural respondents could identify stroke warning signs but less than half could identify risk factors. These findings are consistent with the current research, as respondents identified an average of more stroke warning signs than risk factors. Respondents were able to identify more stroke risk factors if they had a diagnosis of a

stroke risk factor. Results of the study also differ from previous literature. According to a study done by Swanoski et al. (2012) respondents from rural populations had several incorrect responses for warning signs of stroke, suggesting that individuals living in rural populations had a knowledge deficit of stroke symptoms. Results of this survey found that respondents living in rural populations had more knowledge of stroke warning signs which was not associated with more diagnoses of stroke risk factors.

Limitations

This investigation has several limitations. Firstly, the study did not ask respondents to indicate their state and/or county of residence, which limits researchers' ability to verify if the respondents met the survey criteria. Researchers only required respondents to answer if their population was rural (<50,000), so inaccurate results may have been provided if they did not confirm their place of residence met the population criteria. Secondly, some participants selected all answer choices for stroke risk factors and warning signs, which may suggest they did not provide a well-informed response but rather selected responses at random to complete the survey. This could skew the results by making some participants appear more knowledgeable than others.

Of the 41 participants in this study, 46.34% reported an annual household income of greater than $100,000 and 32% reported a bachelor's degree as their highest level of education. The rural sample in this study reported a higher level of education and annual household income compared to previous research on rural populations in the United States (Harrington et al., 2020; Swanoski et al., 2012; US Department of Health and Human Services, 2000; Wood, 2005). The higher levels of household income and education in the present study could account for the increased levels of knowledge of

stroke risk factors and warning signs reported in this study compared to previous research. Due to the higher socioeconomic status and education of the study's participants, the rural sample collected in this study may not be representative of the general rural population of the United States.

Several participants also reported that they had previously resided in one or more cities/states which were, by definition, urban populations, which could impact their level of knowledge. Rural respondents who did respond accurately may have had stroke education in their previous urban residence, thus impacting the accuracy of the survey results. Another limitation is that not all respondents who began the survey completed it, causing researchers to remove incomplete survey responses. The researchers did not include a control for neurological disorders such as intellectual disability or cognitive status if respondents answered "yes" to previous stroke. There were 63 participants who began the survey, only 56 fully completed it, and only 41 participants met the inclusion criteria. Overall, there is an unavoidable bias when utilizing surveys to obtain data such as the question placement throughout the survey, survey answer options, personal beliefs, etc.

Based off the results of this study, researchers now question whether the number of stroke risk factors may determine the level of knowledge an individual has on stroke risk factors. More participants were able to identify stroke risk factors when they have more diagnosed risk factors. These findings also raise the question of whether or not having stroke risk factors equate to having more knowledge of stroke.

Many respondents on the survey resided in other areas before living in a rural community. Researchers now question whether residents who have only lived in a rural

population have less knowledge of stroke risk factors and warning signs compared to individuals who have lived in mixed populations of both rural and urban. Researchers did not ask survey respondents to identify whether they have received previous stroke education and therefore, it is uncertain whether urban respondents had more knowledge due to education or other factors. Future research on stroke education could address this question to determine whether urban populations are more educated on stroke risk factors and warning signs compared to rural populations.

Implications

The findings from this study revealed that individuals living in rural areas who had several diagnosed risk factors for stroke were more likely to have greater knowledge about these risk factors. However, this knowledge of risk factors did not equate to greater knowledge of warning signs of stroke. Individuals in a rural population who did not have any stroke risk factors tended to have less knowledge of stroke risk factors. These results suggest that rural regions may benefit from increased education and awareness regarding stroke risk factors, especially among respondents without any risk factors who had limited knowledge of stroke. It should be noted that some rural respondents had up to five diagnoses of risk factors. This highlights the importance of further education and awareness of stroke to improve knowledge of risk factors and possibly prevent additional diagnoses. Additional stroke education and awareness in rural regions may be beneficial as they are more vulnerable to stroke and other cardiovascular diseases (Alkadry et al., 2006).

Future research should focus on comparing both urban and rural populations to obtain a more accurate representation of their knowledge of stroke risk factors and

warning signs. Additionally, future studies may also benefit from surveying a greater and more diverse range of respondents across the nation in both rural and urban populations.

Policy. Based on the findings of the current research study, there are several recommendations on policy implications to improve stroke prevention and management. Firstly, there is a need for greater education on stroke risk factors, prevention, and the importance of seeking medical attention promptly. This could be achieved through targeted campaigns, community outreach programs, and the integration of stroke education into school curricula.

It is also necessary to improve the quality of stroke care services, specifically in rural areas, which could be done by training medical professionals who specialize in stroke. Additionally, there is a need for improvement regarding the social determinants of stroke. This could be achieved through the development and implementation of policies that encourage healthy living and the promotion of community-based initiatives.

By implementing these policy recommendations, the incidence of stroke could be reduced, there could be improvements in outcomes for stroke survivors, and the overall health and well-being of communities could be improved.

Practice. The research findings have implications for healthcare providers involved in stroke care. Healthcare professionals should be continuously practicing improving the quality of the services provided to individuals with strokes, especially in the rehabilitation process and prevention of secondary strokes. For this to happen, professionals should utilize evidence-based guidelines and protocols, become a part of interdisciplinary care teams, and implement comprehensive treatment plans to address the needs of stroke survivors in all aspects of their lives.

Support and education are very important aspects of practicing as health care professionals. Communication between healthcare providers, stroke survivors, and their families is a huge part of the rehabilitation process. It is crucial that education and support are being provided to stroke survivors and their families, while also integrating community-based resources into the plan of care.

It is important that health care professionals are taking their patients' wants and needs into consideration while continuing to provide high quality stroke care services. It is also important to communicate effectively with not only stroke survivors, but also their families. The implementation of these practice recommendations can help health care professionals to improve the outcomes for stroke survivors and enhance the quality of services provided.

Research. Our findings have several implications for future stroke research. Further research could investigate the reasons behind the lack of knowledge that rural individuals possess regarding stroke risk factors. This might include examining factors such as past medical history, education, and comorbidities, etc., more in-depth. Future research may also focus on investigating appropriate and effective methods for improving knowledge of stroke in rural populations such as community-based interventions, education in the school system, or partnerships with local healthcare providers.

Overall, the research implications highlight the importance of continuing efforts to improve stroke knowledge and awareness in rural populations. By doing this, the rate of stroke and stroke related mortality rates in these communities could be reduced.

Conclusions

Researchers aimed to examine stroke knowledge and awareness of risk factors and warning signs in rural populations across the United States. The findings of this study provided evidence to show rural residents have limited knowledge of stroke risk factors when they have less diagnoses of stroke risk factors, however, reported higher levels of knowledge of stroke warning signs and risk factors compared to rural populations in the U.S. from previous research (Alkadry et al., 2006; Blades et al., 2005).

The findings suggest that healthcare providers and public health officials should prioritize stroke education for individuals diagnosed with stroke risk factors, particularly in rural areas where knowledge may be lower. Additionally, further research should explore interventions aimed at improving stroke knowledge among those without diagnosed stroke risk factors, to potentially prevent or reduce the incidence of stroke

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Appendix A - Copy of IRB Approval Email

LONGWOOD
UNIVERSITY

Academic Affairs
Rotunda
201 High Street
Farmville, VA 23909
tel: (434) 395-2010
fax: (434) 395-2506

October 21, 2022

IRB#: 2022-09-03
Study Title: *Examining Perception and Understanding of Stroke and its Risk Factors in a Rural Population*

- This study is **approved.**
- **Research category:** Exempt under 45 CFR 46.104(d)(2)(i)
- **Consent:** Full consent will be obtained electronically.
- **Expiration:** October 21, 2023, if you need to continue collecting data beyond this date please apply for continuing approval prior to expiration. Continuing approval is usually expedited.
- **Amendments:** If you need to make any amendments please resubmit your proposal with the amendments highlighted. Approval for amended protocols is usually expedited.
- **Unanticipated problems:** Please report any unanticipated problems that are serious adverse events to the IRB within 1 week of becoming aware of the event. All other unanticipated problems should be reported to the IRB within 2 weeks of the investigator becoming aware of the event.

Appendix B- Questionnaire

Examining Perception and Understanding of Stroke and its Risk Factors in a Rural Population Survey Questions

Q1: Consent to Participate in a Research Study

Investigator(s): This study is being conducted by Mary Gardiner, Gabrielle Scarpa, and Mackenzie King, students of Class of 2023 at Longwood University under the supervision of Ann Cralidis, Ph.D., CCC-SLP, Associate Professor, Department of Social Work and Communication Sciences and Disorders.

Purpose of the Study

You are invited to participate in a research study. The general purpose of this research is to spread awareness of stroke and the risk factors associated with it. Researchers are aiming to address the level of understanding of stroke and its risk factors in rural populations.

Study Procedures

If you decide to participate in this study we will ask you to complete a survey on Qualtrics, developed by the investigators, that primarily consists of multiple choice and true/false questions. In this survey, we will probe for information such as age, race, ethnicity, gender, education levels, current health status (i.e., current, and past diagnoses), current address, and knowledge of risk factors and warning signs of stroke. Participation in this study will take approximately 5-10 minutes. Any questions can be skipped if you do not feel comfortable answering, or you can stop the survey at any time. Findings from this study will be used in a student thesis and could potentially be published in a scholarly journal.

Risks and Discomforts

There are no known risks associated with this research which means that no harm or discomfort is anticipated in the research. You may terminate your involvement in this study at any time.

What happens if I get hurt, become sick, or have other problems because of this research?

Please tell the researchers if you believe you have any injuries/adverse effects caused by your participation in the study. The researchers may be able to assist you with locating emergency treatment, if appropriate, but you or your insurance company will be responsible for the cost.

Benefits

There are no direct benefits to you for participation in this research study. Indirect benefits may include a better understanding of stroke and its risk factors.

Confidentiality and Data Security

Please note that the survey is being conducted using Qualtrics with its own privacy and security policies that you can find at its website. We anticipate that your participation in this survey presents no greater risk than everyday use of the internet. Responses will be kept confidential, to the extent permitted by law. The data will be stored in a secure locked box at the Speech, Hearing, and Learning Services (SHLS) clinic and in a password-protected, cloud-based storage system. The research reports will only present findings on a group basis, without any personally identifying information. The information you provide will only be used by the research team for the project described in this document.

Voluntary Participation

Your participation in this study is completely voluntary. You have the right to withdraw from the study at any time without penalty.

Contact Information

If you have questions at any time during the study, or you experience adverse effects as a result of participating in this study you may contact the Principal Investigator, Dr. Ann Cralidis. If you have questions regarding your rights as a research participation, or if problems arise that you feel you cannot discuss with the Principal Investigator, please contact the Institutional Review Board at IRB@longwood.edu, Academic Affairs at (434) 395 2010, or report your concern online at http://www.longwood.edu/studentresearch/institutional-review-board-irb/report-irb-concern/

Consent

I have read and understand the information provided. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason, and without cost. I understand that I may save or print a copy of this consent for my records.

- o I voluntarily consent to participate in this study
- o I DO NOT consent to participate in this study

Demographics

Q2 What is your sex?

- o Male
- o Female
- o Other

Q3 What is your age?

- o 18-44 years of age
- o 45-64 years of age
- o >65 years of age

Q4 What is your race and ethnicity?

- o White
- o Hispanic or Latino
- o Black or African American
- o Native American or American Indian
- o Asian/Pacific Islander
- o Other

Q5 What is your highest level of education attained?

- o No high school education
- o High school graduate, diploma, or equivalent
- o Some college credit
- o Associate Degree
- o Bachelor's Degree
- o Master's Degree
- o Other

Q6 What is your marital status?

- o Single, never married
- o Widowed
- o Divorced
- o Married

Q7 What is your annual household income?

- o Less than $10,000
- o $10,000 to $19,999
- o $20,000 - $29,999
- o $30,000 - $39,999
- o $40,000 - $49,999
- o $50,000 - $59,999
- o $60,000 - $69,999
- o $70,000 - $79,999
- o $80,000 - $89,999
- o $90,000 - $99,999
- o Greater than $100,000
- o Prefer not to say

Q8 What is your geographic location?

- o Click to write Choice 1
- o Rural (<50,000 Residents)
- o Urban (>50,000 Residents)

Q9 Have you resided in another location previously?

- o Yes
- o No

Q10 If you have resided in another location, where?

_____

Q11 How would you describe your current health status?

- o Good to excellent health condition
- o Fair to poor health condition

Q12 On average, how many times a year do you visit your primary care doctor?

- o Less than once a year
- o 1-2 times
- o 3-4 times
- o 5 or more

- o I don't have a primary care doctor

Q13 What is your health insurance status?

- o I have health insurance
- o I do not have health insurance

Q14 How far is the drive to your closest doctor's office?

- o Less than 5 minutes
- o 5-10 minutes
- o 10-20 minutes
- o 20-30 minutes
- o 30-45 minutes
- o More than 45 minutes

Q15 Have you ever been diagnosed with high blood pressure?

- o Not diagnosed
- o Diagnosed

Q16 Have you ever been diagnosed with diabetes?

- o Not diagnosed
- o Diagnosed

Q17 Have you ever been diagnosed with high cholesterol?

- o Not diagnosed
- o Diagnosed

Q18 Have you ever been diagnosed with depression?

- o Not diagnosed
- o Diagnosed

Q19 Have you ever been diagnosed with obesity?

- o Not diagnosed
- o Diagnosed

Q20 Have you ever had a stroke?

- o Yes
- o No

Q21 Has anyone in your family ever had a stroke?

- o Yes
- o No
- o Unsure

Perceptions of Stroke Warning Signs and Risk Factors

Q22 Which of the following are warning signs of stroke?
Check all that apply:

- ☐ Numbness
- ☐ Trouble breathing
- ☐ Confusion
- ☐ Difficulty seeing
- ☐ Pain/Discomfort in chest
- ☐ Facial drooping
- ☐ Nausea or vomiting
- ☐ Difficulty walking
- ☐ Severe headache
- ☐ Pain in arm or shoulder
- ☐ Arm weakness
- ☐ Speech difficulty
- ☐ Jaw, neck, or back pain

Q23 Which of the following are risk factors for stroke?
Check all that apply:

- ☐ Previous stroke
- ☐ Genetics
- ☐ Poor diet
- ☐ Pregnancy

- ☐ Inactivity
- ☐ Car accidents
- ☐ Drug/alcohol use
- ☐ Age
- ☐ Diabetes
- ☐ High blood pressure

Q24 What is the first thing you would do if you felt like someone you know was having a stroke?

- o Take them to the hospital
- o Tell them to call their healthcare provider
- o Call 911 immediately
- o Not sure

Q25 True or False: Strokes can be prevented

- o True
- o False

Q26 True or False: You don't have to see a doctor if stroke symptoms go away

- o True
- o False

Q27 True or False: Strokes only affect the elderly population

- o True
- o False

Q28 True or False: Stroke and heart attacks are the same thing

- o True
- o False

Q29 True or false: Strokes occur in the brain

- o True
- o False

Q30 For educational purposes, the correct warning signs of stroke include:

-Numbness
-Confusion
-Difficulty Seeing
-Difficulty Walking
-Severe Headache
-Facial Drooping
-Arm Weakness
-Speech Difficulty

-For educational purposes, the correct risk factors of stroke include:
-Previous stroke
-High blood pressure
-High cholesterol
-Diabetes
-Poor Diet
-Inactivity
-Drug/alcohol use

Is there anything else you would like us to know?

_____

Thank you.

Appendix C- Recruitment Flier