How Can Elderly Residents of Texas Be Informed about Medicare?

A Geographic Approach to Media Consumption by Older Population of Texas

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ABSTRACT

This study intends to locate Medicare beneficiaries in Texas and to propose effective outreach methods to use for providing elderly people with information about Medicare. Data, used for this study, have primarily been acquired from U.S. Census and a survey, customized by the School of Journalism and Mass Communication at Texas State University. Two research objectives were expected to be achieved: a) at the individual level, the associations between socio-demographic characteristics of elderly people and the type of media that they use, were questioned and studied. Some of the characteristics that were significantly correlated with the media consumption are age, income, education, and ethnicity; b) at the geographical level, spatial autocorrelations - being random, clustered or dispersed - for media consumption, were studied. Not so many types of media resulted to be spatially clustered or dispersed. However, patterns show differences between rural areas, urban/suburban areas, and locations with clustered Hispanic population. Regardless of limitations of this study, the results can be used for identifying new policies and methodologies that can help expanding health and healthcare awareness more effectively.

Key words: GIS, media consumption, elderly, health information, Medicare

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PROBLEM STATEMENT and RESEARCH QUESTIONS

Elderly people, one of the most susceptible groups of society, are subjected to many health risks. In addition to age, there are other important factors that impact people's susceptibility to disease: sex, race and ethnicity, income, and family structure. Any combination of these factors increases the probability of illness for that specific population. People, with different socio-demographic characteristics, perceive themselves being susceptible to disease differently. Social and environmental characteristics of the neighborhood of residence, access to the healthcare services, and health insurance coverage also impact a person's wellbeing.

A critical factor, however, may be the level of individuals' health knowledge, which can be achieved through media, civic engagement, and interpersonal communication.

The older population (i.e. persons 65 years or older) in the United States numbered 46.2 million in 2014. They represented 14.5% of the U.S. population, about one in every seven Americans. By 2060, there will be about 98 million older persons, more than twice their number in 2014. (Administration on Aging, 2014). Concurrent with the exponential growth of the US elderly population, is the exponential growth of health care costs. For instance, the expenses of the elderly increased 35% between years 1990 and 1999, and 12% of their total expenditure was on health care, compared to the 4% spent by the non-elderly (US Department of Health and Human Services, 1999). There are several services, including healthcare, offered by U.S. government, for different age-groups. Medicare, the national social insurance in United States, provides health insurance for Americans aged 65 and older who have worked and paid into the system. It also provides health insurance to younger people with disabilities. Although the services are offered for all citizens, not all eligible people benefit from them. Regardless of Medicare's cost, being un-informed about this government's service, can partially explain why people do not enroll in it.

Studies show that rural and low-income elderly people generally face more health issues than urban residents. Geography plays an important role, not only in people's degree of susceptibility, but also in their access to healthcare and health information. Lack of access to health facilities, however, is not always the problem. Statistics tell that many elderly people are unaware that they are eligible for Medicare; and even if they are aware, they may not understand the services that Medicare provides and may not know how to apply for the program. Still, some people may prefer not to enroll in Medicare for other reasons. For instance, people who have negative attitude towards government cannot trust the services that are offered by the government. However, trust can be gained and be increased through different ways, including media exposure, communication, and social ties.

This research is built upon two general questions. At the individual level, associations between socio-demographic characteristics of elderly people and the type of media that they use, have been studied. According to what was learned from literature, the assumption was that some characteristics such as age, income, and education are significantly correlated with people's media preferences and consumption. At the geographical level, spatial correlations and patterns of media type that are mainly preferred by residents, were studied. Based on previous studies and this research's hypotheses, different patterns for media consumption in rural versus urban areas, were expected to exist. To evaluate people's health knowledge and its possible association with the type of media that they used, correlation between people's knowledge of eligibility for Medicare and the sources that they used for information has been

studied. In short, this study intends to locate potential Medicare beneficiaries in Texas, to study their media consumption patterns, and to propose effective strategy that combats the gaps in awareness of services.

INTRODUCTION

Media play an important role in people's awareness of their health and the healthcare options that are available for them to benefit from. People of different groups of society and different area of residence, are exposed to different types and extents of media, which are decided by public policy makers and media experts. Media preferences of residents are shaped not only by their individual and household characteristics, but also by social and environmental contexts of their communities. We are aware that providing media supplies for some areas is accompanied by limitations, caused by geography and accessibility of those places (e.g. limited and unclear TV signals or restricted broadband internet). However, by providing different media types and by defining the extents of media exposure, policy makers impact people's media preference and consumption, too. Consequently, people in different places will be exposed to different levels of information, including health information.

To take geography into account in making such decisions, spatial studies are needed. Knowing the existing patterns of media consumption can help government officials identifying underserved communities to improve communication strategies. Such studies are possible through Geographic Information Systems (GIS). GIS is a collection of spatial analysis techniques that can be practical in any study that has geographical aspect. Media exposure and consumption may vary spatially. For instance, Spanish TV is expected to be highly demanded in Hispanic communities; or radio, in areas with clustered older population. This variation can be also caused by factors, including differentiation of access - assuming that media provisions cannot be easily available for remote places - or by differentiation in content of media and the number of choices that people have - that vary based on the size of market. Previous research on media consumption in United States show that market size stimulates demand for certain types of news products - higher newspaper use in smaller markets and higher local TV news, online news, and talk radio in larger markets (Althaus, et al., 2009). This means that people use what they are provided with. Geographical inequalities in media supplies will result in disparities of awareness. To improve communication with older residents of hard to reach regions, must not be neglected by public officials. The outcomes of policy reformation in this matter can be rewarding, since it can significantly enhance the public health. This study aims to locate the disadvantaged areas, to identify the communication means that work best for elderly populations of different areas, and to suggest effective means that may improve communities' health knowledge and may increase elderly's awareness of government's healthcare services.

LITERATURE REVIEW

The environment that people live in can have sever impacts on people's health and access to the health facilities. The health of rural elderly is significantly worse than urban elderly - they have more chronic diseases, and are more functionally impaired. Arthritis, hypertension, diabetes, and cardiovascular diseases are also more common in rural elders. The higher rates of health issues are due to lack of insurance and lower incomes (Forti & Koerher, 2002). There are many problems with access to and use of health and social services, especially in rural and medically underserved communities with limited resources and among hard-to-reach populations (Baker et al., 1997, Forti & Koerher, 2002). Race and ethnicity can affect the access and use of health care and social services. Although minorities may generally represent a smaller proportion of the older population in non-metropolitan than in metropolitan areas (Coburn, 2002), rural minorities (e.g. Latinos or African American) struggle with more barriers of health and healthcare access. The main access barriers can be unavailability, unawareness, and affordability (Hong, 2006). For instance, African Americans have less access to health care than White Americans (Forti & Koerher, 2002).

Outreach is a common element of many social services and disease prevention programs. The stages of outreach are: client identification, client contact with and engagement, client recruitment, assistance with access, client retention, provision of other services, and completion of positive outcomes (Leviton & Schuh, 1991). Previous studies suggest direct or indirect supports, either for information delivery or for enrollment assistance purposes. For instance, according to a study by Gorman et al. (2013), availability of direct client assistance in a community, directly increased the statewide participation. They suggest that elderly people are best reached through use of a senior-to-senior model. In their study, direct outreach was conducted in different ways such as faith-based pantries, meal sites, public housing, community social service agencies, senior centers, and community events. A toll-free information hotline also provided information about eligibility, enabled resolution of issues, was used to solve elderly transportation issues, and empowered application inquiries (Gorman, et al., 2013).

Not being enrolled or interested in enrolling in Medicare can be due to different causes. Approximately 5 million older Americans who qualify for federal health benefit programs are not receiving what they are entitled to receive and 3 million who are eligible for Medicare are not enrolled (Forti & Koerher, 2002). In order to help elderly people receive better services and lower their healthcare costs, it is important to inform them about the benefits of the program and to help and to encourage them to enroll. According to Forti and Koerher's study (2002), barriers to accessing benefits included lower education levels, fear of the health care system, lack of awareness of services and resources, and not understating how to access health and social services.

People's degree of social activity and interpersonal communication affects their level of health knowledge. Media has the power of setting agenda, shaping political and cultural identity of people, and reducing their differences within the community by building social consensus (Coleman & McCombs, 2007, McCombs. 1997, Shaw & Martin, 1992). News media exposure and consumption decreases the opinions' disagreement among different groups of people in the society - including different ages, educations, and less likely income (Shaw & Martin, 1992). In general, media impact different dimensions of social capital such as trust, information, and consensus (Viswanath, 2008). Consensus grows with the increased exposure to the news media (McCombs, 1997). However, when there are more options, people may prefer entertainment over the news (Prior, 2007). Media, by increasing trust among people and government, may encourage people to participate in community events and to be more engaged in civic activities. Studies suggest that social ties put people in health information exposure. Media used for informational exchange contributes in social capital. Media play an important role in delivering health information (Viswanath, 2008). Therefore, there is a loop, connecting the extents of media consumption, civic engagement, and health knowledge. Trust that grows through different factors such as media and civic engagement, can work as catalyst that encourages people to communicate more and to be more informed about everything, including health and healthcare.

Media can have indirect role in information delivery. For instance, local TV news has positive impacts on people's degree of trust (Kwak, et al., 2013). However, the consumed time for following local TV news by people in more stable communities is more significantly positive, compared with less stable communities (Kang & Kwak, 2003). In less stable neighborhoods, instead, total TV watching and the time that is consumed for following local TV news can prevent people from social participation (Kang & Kwak, 2003, Kwak, et al., 2013). Mass media can have major public health impacts. Well-executed mass media campaign is another media-based methodology that impacts people’s health knowledge, attitudes, and behavior (Noar, 2006). The direct information delivery role of media, however, varies by the media type. For instance, newspaper delivers information more effectively than TV. However, this step works better when followed by people's interpersonal discussions (McLeod et al., 1999).

The extent of local mass media consumption and civic engagement is impacted by individual and social characteristics of communities (Paek, et al., 2005). Age, income, education, language proficiency, immigration history (being a part of community for a longer period of time), and communication skills are some of factors with positive effects on civic engagement (Chen, et al., 2013). People with different age and generation are differently exposed to media and they consume different types of media. Younger people, who are more attached to internet-based media, participate less in community activities; baby boomers, instead, are more TV users, and older people are typically newspaper users (McCombs, 1997).

Ethnicity also can influence people's social activity. For instance, people in multiethnic cities participate less in community events (Chen, et al., 2013). Residential length and stability, church and religious events participation, home ownership, social communication, and community news cultures are some of the other factors, impacting people's civic engagement and their media exposure and consumption (Althaus, et al., 2009, Kang & Kwak, 2003, Kwak, et al., 2013, Viswanath, 2008).

In addition to health care access, the language of communication and accessibility of media are other factors that impact the identification of effective outreach methods. The condition is worse for low access communities. Rural ethnic minorities (e.g. Hispanics or African American) are more disadvantaged compared with urban minorities, in terms of access to health care services (Baker et al., 1997, Mueller et al., 1999). Many of the health care access problems experienced by rural Latinos are the result of no insurance, low income, and language and cultural barriers related to their recent immigrant status (Casey et al., 2004). With increasing Latino population in U.S., their health communication and behavior demands using different strategies - particularly rural Latinos. According to Huckaby et al. (2006), outreach can be improved with bilingual materials, statewide PSAs, promotional materials, ethnic media outlets, focus groups, targeting of low-income residents, and bilingual and multicultural staff. Based on U.S. Census 2010, 25% of Texas over 60 speak a language other than English and 14% of Texas over 60 speak English less than "very well". Therefore, in areas where English is not the most common spoken language, the information must be provided in other common languages, usually in Spanish. Studies, in general, used multiple communication channels for this ethnic group of society; for instance, print materials, face-to-face communication or mass media (Elder et al., 2009).

According to a study by Gorman et al. (2013), media messaging plays an important role in exposing people to information. The outlets through which the messages are broadcast must be carefully selected to reach the target populations. For instance, advertisements must be aired on radio and television stations whose audiences are low-income working households (e.g., lite- rock station), the elderly (e.g., The Lawrence Welk Show), and Spanish-speaking households (e.g., the Spanish language television network, Telemundo). Radio messages should be aired four times per year for several weeks at a time. Hence, to cultivate a personal connection with the listener, these messages should be adapted to timely themes or to familiar situations (Gorman et al., 2013).

Elderly, potentially poorer and more rural residents have limited access to the internet. However, there is a distinct difference in Internet usage between young people and seniors. The differences can be attributed not only to age but also to levels of education and income (Bolin & Skogerbo, 2013). The design of the websites in order to be senior friendly (e.g. simplicity and having larger font size) considerably matters. Low computer literacy and lack of access to computers or the Internet may prevent beneficiaries

from choosing plans that best fit their needs (Wright & Hill, 2009). Media consumption, therefore, can be age separated (Bolin & Skogerbo, 2013). The oldest age groups generally watch more TV, read more newspaper and listen to the radio more than younger groups do, whereas the pattern is the opposite regarding use of the Internet, blogs, advanced functions on smartphones and other mobile personal media (Bolin & Skogerbo, 2013). Hence, to effectively provide elderly with information, direct client assistance must be available in some areas, either to deliver information or to help people with program enrollment.

Media exposure and consumption differ also by geography. The size of market and demand for media matter in providing residents of different communities with the media. If the quality, quantity, and the content of media vary by the size of market, we can conclude that media consumption is spatially correlated (Althaus, et al., 2009). The magnitude of mass media consumption is larger in denser and more pluralistic communities. People in larger communities are less attached to their communities and they need to be more exposed to health messages through media; since they live in a health-information poor environment (Viswanath, 2008). Residents of smaller areas (e.g. rural) typically read more newspaper; while in urban areas, people use more local TV news, online news, or radio. The spatial correlation is also more significant in smaller areas (Althaus, et al., 2009). This study aims to look for patterns and associations between people's sociodemographic characteristics and their media consumption. The ultimate goal of this research, however, is to identify possible methodologies that can be used for providing elderly residents of Texas with information about health and healthcare – more specifically about Medicare.

DATA

The study area for this research was the state of Texas. There were 3,595,907 Medicare beneficiaries living in Texas in 2015 (Centers for Medicare and Medicaid Services, 2015). According to the U.S. Census 2010, 3.8 million people, or 15 percent of the population of Texas was made up of adults over the age of 60. This number is expected to triple between 2010 and 2050, comprising 22% of total Texas population. With an estimated population of 27,469,114 (US Census 2015), Texas is the second most populated state in United States, ranked after California. Considering the individual and spatial variation in Texas, this research aims to identify whether a single outreach method works for every region of the state. And if not, what are those methods and how they vary by geography?

This study aims to answer questions that have demographic and spatial aspects. Spatial layers, such as zip codes and counties of Texas, were collected from US Census TIGER Products and Texas Natural Resources Information System (TNRIS). Demographic attributes, acquired from Census (2010 or 2013), as shown in Table 1, include age, ethnicity, income, language, disability, and health insurance possession. Census data were acquired in macro level (by zip codes) and the percent of values were used for my

analyses. Hence, the sample size (N = 1856) in Table 1 stands for the number of zip codes which are covered by my data from Census. The main source of data for this research, however, is the online survey that was customized by the School of Journalism and Mass Communication (SJMC) at Texas State University. The resources for the survey came from Medicare Improvement for Patients and Providers Act (MIPPA) grant project, supported by State of Texas, Department of Aging and Disability Services. MIPPA project's survey was distributed by Qualtrics, which maintains survey "panels" in which tens of thousands of people sign up to take occasional surveys in exchange for small incentives. This allows panel studies conducted through Qualtrics to have much higher rates of participation than randomly distributed surveys. It also allows clients like Texas State University to refine their target population for a study. Texas State University asked for a panel of close to 1,000 Texans, all aged 55 and above, favoring those from low-income households and who live in rural areas in Texas.

Table 1. Demographic variables from Census, percent of total population per zip code

Variables (% per zip code)	N	Minimum	Maximum	Mean	Std. Deviation
Age 60 and older	1856	0.2	100	21.66	12.28
Hispanics	1856	0	100	30.35	26.54
Spanish speakers	1856	0	100	23.09	22.91
Families under poverty	1856	0	100	13.16	10.38
Age 65 and older, with disability	1856	0	100	42.00	15.93
Age 65 and older, without insurance	1856	0	100	1.50	4.36

Surveys have been launched and collected data in December 2015. Total ~980 elderly people - aged 55 and older - participated. The micro (individual) level survey data was also summarized by zip codes and counties, for spatial analyses' purposes. Of total 254 counties and 2,598 zip codes in Texas, our sample is distributed in ~120 counties and ~ 550 zip codes. In spatial studies that deal with neighborhood sized unit of analysis, it is difficult to choose the best neighborhoods' scale. Since neighborhoods have both spatial and social aspects, it is necessary to consider social-spatial connections within and between neighborhoods. This means that there must be homogeneity within and heterogeneity between neighborhoods that we use as our unit of analysis. However, when no other neighborhood level data are available, it is acceptable to use administrative boundaries (Deng, 2015). In this study, zip codes were used as the smallest - closest to the neighborhoods' size - geographical unit. For better representation, however, data are depicted by counties as well.

Survey included questions about demographic characteristics, traditional and online media use, Medicare and healthcare, knowledge of Medicare, attitudes towards government, perceived susceptibility, and open-ended questions. Some sections were designed based on the Health Belief Model (Hochbaum et

al., 1952) which is constructed on four concepts of perceived susceptibility, perceived benefits, perceived severity, perceived barriers, cues of action, and self-efficacy. This research, however, has focused on questions which are based on only two components of perceived susceptibility and perceived barriers (people's opinions of government and its services).

Table 2. Demographic variables from survey, individual-based

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Age	983	55	90	63.44	6.63
Gender: male	983	0	1	0.38	0.49
Gender: female	983	0	1	0.62	0.49
Race: Asian	983	0	1	0.01	0.11
Race: Black African American	983	0	1	0.12	0.32
Race: White	983	0	1	0.86	0.35
Race: American Indian Alaska Native	983	0	1	0.01	0.1
Race: Native Hawaiian Pacific Islander	983	0	1	0	0.03
Ethnicity: Hispanic	983	0	1	0.08	0.27
Income	983	1	6	3.05	1.6
Education	983	1	6	3.71	1.44

In addition to demographic attributes – shown in Table 2 – survey provided data which were needed for identifying people's media consumptions and preferences. The key attributes, derived from survey are: internet, social media, and smartphone usage; likelihood of news tracking; media types used for news (e.g. newspaper, TV news, online sources, radio, etc.); Knowledgeability of being eligible for Medicare; and the sources that were used to receive information about Medicare (e.g. family/friends, mass media, online sources, government's agencies, community events, etc.). People's susceptibility to illness (e.g. whether people perceive themselves as healthy or whether they need health insurance) and their perception of government (e.g. whether people trust government and its services), are other factors that were taken into consideration. These two attributes were used as indicators for people's need for health insurance and people's tendency to enroll in Medicare, accordingly.

Survey's participants were asked to answer questions using a rating scale of 1 to 7, with 1 being the least and 7 being the most "likely". The responses for some of the factors were merged, to create composite attributes (e.g. TV consumption can stand for local TV, cable TV, and network TV consumption). Table 3 demonstrates descriptive statistics of variables - other than demographic factors - that have been considered in this study. Appendix A provides more information about survey's questions and structure.

Table 3. Other variables from survey, individual-based

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Internet use	983	1	7	6.07	1.26
Smartphone use	983	1	7	4.29	2.41
Social media use	983	1	7	4.51	2.21
News tracking	983	1	7	6.07	1.28
News source: newspaper	983	1	7	3.86	2.31
News source: online newspaper	983	1	7	4	2.13
News source: local TV	983	1	7	5.92	1.56
News source: network TV	983	1	7	5.62	1.82
News source: Spanish TV	983	1	7	1.36	1.13
News source: cable TV	983	1	7	4.68	2.25
News source: online news aggregator	983	1	7	3.71	2.21
News source: email from friend	983	1	7	3.48	2.08
News source: email from news sites	983	1	7	3.07	2.07
News source: news site on mobile	983	1	7	3.25	2.27
News source: radio	983	1	7	3.65	2.22
News source: social media on computer	983	1	7	3.63	2.25
News source: social media on mobile	983	1	7	3.08	2.26
News source: alternative site	983	1	7	1.96	1.61
News source: political website	983	1	7	2.24	1.81
News source: news blog	983	1	7	2.63	2
Medicare eligibility knowledge (binary)	983	0	1	0.75	0.44
Medicare information source: news	983	1	7	4.46	2.15
Medicare information source: local shop	983	1	7	2.39	1.77
Medicare information source: family	983	1	7	4.7	2.1
Medicare information source: friend	983	1	7	4.49	2.07
Medicare information source: radio	983	1	7	2.91	2.03
Medicare information source: doctor	983	1	7	3.95	2.13
Medicare information source: clinic	983	1	7	2.7	1.1
Medicare information source: online	983	1	7	4.28	2.2
Medicare information source: social media	983	1	7	2.93	2.07
Medicare information source: health website	983	1	7	4.67	2.166
Medicare information source: government's office	983	1	7	4.86	2.12
Medicare information source: phonebook	983	1	7	2.05	1.63
Medicare information source: phone call	983	1	7	2.09	1.67
Medicare information source: letter	983	1	7	4.03	2.19
Medicare information source: insurance representative	983	1	7	2.34	1.91
Medicare information source: Medicare representative	983	1	7	2.25	1.88
Medicare information source: community event	983	1	7	2.02	1.71
Medicare information source: other ways	983	1	7	1.81	1.61
Medicare information source: pharmacy	983	1	7	2.63	1.99
Perception of government (composite of 5 questions)	983	5	35	18.89	5.67
Susceptibility to illness (composite of 6 questions)	983	6	42	28	6.92

METHODOLOGY

In addition of statistical analyses, this study used GIS methodologies to locate elderly population in Texas, to identify spatial correlation between their socio-demographic characteristics, and their media consumption. ArcGIS and SPSS were the primary tools that were used for geographical and statistical analyses, accordingly. In the very first step, population characteristics in general - regardless of their location - were studied. General statistical analyses, linear correlation (i.e. Pearson), and in some cases, non-parametric correlations (i.e. Spearman's rank) were performed in SPSS.

The Spatial Autocorrelation (Global Moran's I) tool in ArcGIS package, was used to measure spatial autocorrelation based on both feature locations and feature values simultaneously. Given a set of features and an associated attribute, it evaluates whether the pattern expressed is clustered, dispersed, or random (Esri). Different types of cluster analyses were used for each spatial unit of analysis (e.g. zip code) and to detect any significant patterns and spatial associations, by performing cluster analyses. Mapping clusters, including Cluster and Outlier Analysis (Local Moran's I), Hot Spot Analysis (Getis-Ord Gi*), and Grouping Analysis (K-mean clustering) are some other common spatial statistics tools, available in ArcGIS software.

Since this study intends to optimize the number of methodologies that can be used for some clusters of people, to use grouping analysis (K-means clustering) has been recommended. K-means clustering tool groups features based on feature attributes and optional spatial/temporal constraints (Esri). This method is recommended for dealing with several variables and is useful for categorization and analysis of data, to determine the similarity or dissimilarity of variables' characteristics. K-mean clustering algorithm is used to find groups, based on cluster resemblance (Wu, et al., 2010). In other words, it considers the similarity of contents within the same clusters as large as possible, and the similarity between different clusters as small as possible (Xiande, et al., 2014). Number of groups depended on the number of attributes that were involved in each analysis – not necessarily the same. Since survey data do not cover all counties in the Texas and some of the counties are disconnected, no spatial constraints were included in this analysis.

RESULTS

The visualization of Census data shows that elderly population of Texas is mainly concentrated in Central areas of the state. The larger map in Figure 1 depicts the population of age 60 and older, as a percent of total population in each zip code; while, the smaller map shows the clusters of high and low percent of older population, at different significance level – the more saturated colors (i.e. blue and red) show higher level of significance. It is not surprising that elderly live in more suburban and rural areas; and younger population is instead, mostly concentrated in major cities. Studies, however, suggest that less minority

elderly (e.g. Latinos) concentrated in rural areas. The spatial autocorrelation analysis performed on Census 2010 elderly population, shows that elderly population has significant clustered patterns – given the positive z-score of 46.64, there is also much less than 1% likelihood that clustered pattern could be the result of random chance. The distribution of our survey's older population, however, does not follow any specific pattern. In general, our survey's respondents are mostly from urban and suburban areas of Texas – you can find the map of survey participants' distribution in Appendix B. A reason for such outcome may be that the survey was distributed online and only people who had access to the internet could participate. Since older people typically use less internet, only 38% of our respondents were 65-year-old or older (i.e. Medicare beneficiaries).

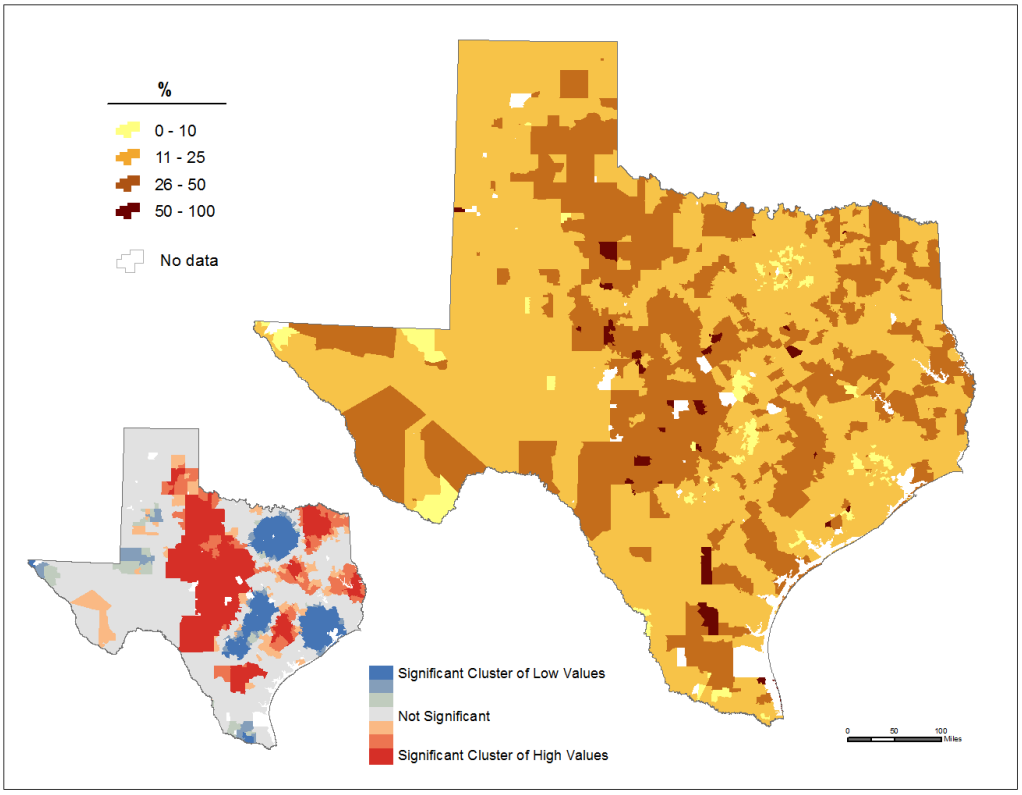


Figure 1. Population of age 60 and older, U.S. Census 2010

The statistical and spatial analyses of both Census and survey shows different results and patterns for people of different ethnicities (i.e. Hispanics/Latinos versus Non-Hispanic/Latinos). Approximately 39% of total population of Texas were Hispanics/Latinos in 2015, which had more than 1% increase since 2010 (U.S. Census, 2015). Also, nearly 30% of older population of Texas are Hispanics. Statistics tell us that Hispanic residents of Texas are generally younger, compared to total population. Our survey's Hispanic participants also had a lower average of age (61-year-old), compared to non-Hispanics (64-year-old).

However, the survey was available only in English and thus, only 8% of respondents were Hispanics. As it is shown in Figure 2, Hispanic population (Census 2010) is highly concentrated along the U.S.-Mexico and Texas-New Mexico borders. Spatial autocorrelation's results also show that Hispanic/Latino population is very significantly clustered – with the z-score of 90.1 and p-value of 0.00, there is much less than 1% likelihood that this clustered pattern could be the result of random chance. Map of survey's Hispanic is available in Appendix B.

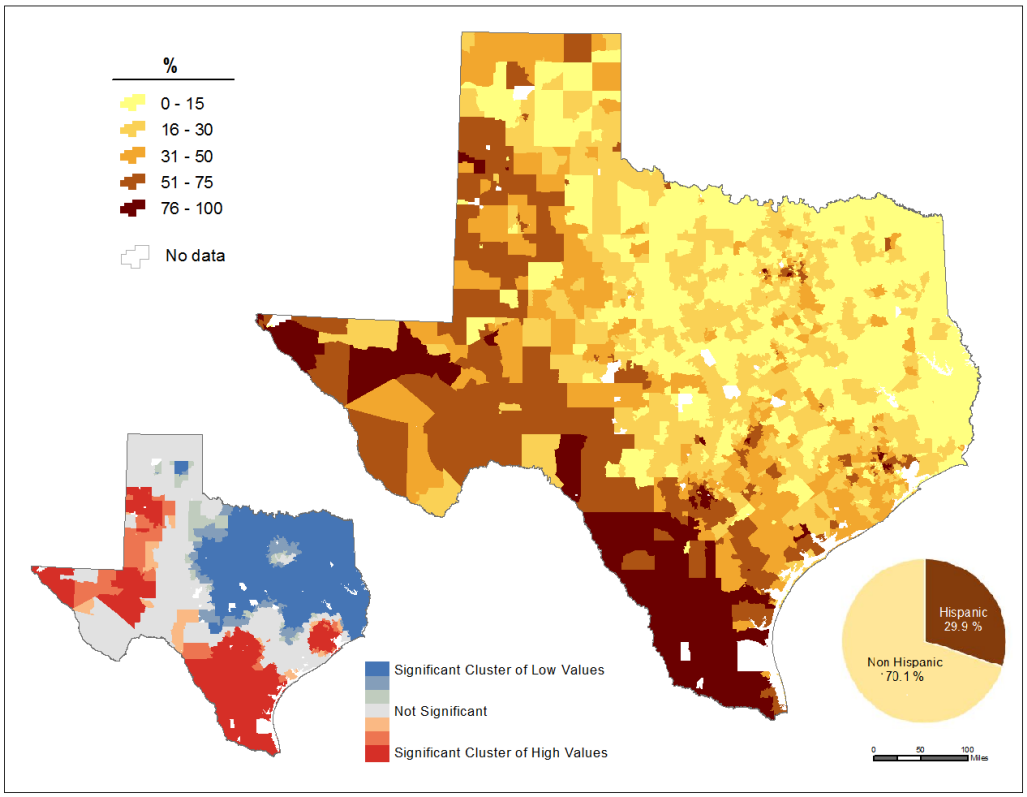


Figure 2. Hispanic population, U.S. Census 2010

Clusters of low income families (families under poverty level), elderly with disability, and elderly with no health insurance (maps are added to appendix B), follow slightly similar patterns that exist for Hispanic/Latino population. There are also positive correlations between all these three attributes and being Hispanic – see Table 4. Therefore, regardless of their average age, Hispanics are one of the most susceptible groups of society and it is not surprising that they perceive themselves as being more susceptible to illness and more in need of health insurance – see Table 4. The results of survey show also negative correlation between being Hispanic/Latino and the awareness of being eligible for Medicare. In other words, there are lack of knowledge about health and health insurance among Hispanic population of Texas. As it is shown in Table 4, the lower level of education among Hispanics, can also result the lower knowledgeability. Moreover, studies suggest that there are several factors affecting people's motivation for community

engagement, which is an important factor that puts people in information's exposure. In addition to immigration background and language proficiency, having lower levels of income and education make Hispanics be less encouraged to participate in social activities. Therefore, they will be less exposed to the health information. With all being said, Hispanics seems to need more consideration and must be better informed about their health and the available health services; hence, they can be one of the main target population in this research.

Table 4. Correlations with being Hispanic/Latino

	Poverty	No health insurance	Elderly people with disability	Awareness of Medicare eligibility	Susceptibility to illness	Education
Being Hispanic	0.530**	0.135**	0.122**	- 0.161**	0.084*	- 0.093**

** p-value < 0.01, * p-value < 0.05

Table 5 shows the significant correlations that exist between age and factors such as news tracking and digital media usage. There is positive correlation between age and likelihood of following the news, but it is less likely to happen through digital media sources. Our survey's Hispanics are not significantly associated with news tracking in general; however, they have significant correlation (r = 0.197, p-value < 0.01) with the composite TV news usage (i.e. local, network, cable, and Spanish TV news). There is also significant positive correlation between being aware of Medicare eligibility and following the news (r=112, p-value < 0.01). We can conclude that TV news can be considered as an effective methodology for informing people, especially in Hispanic communities.

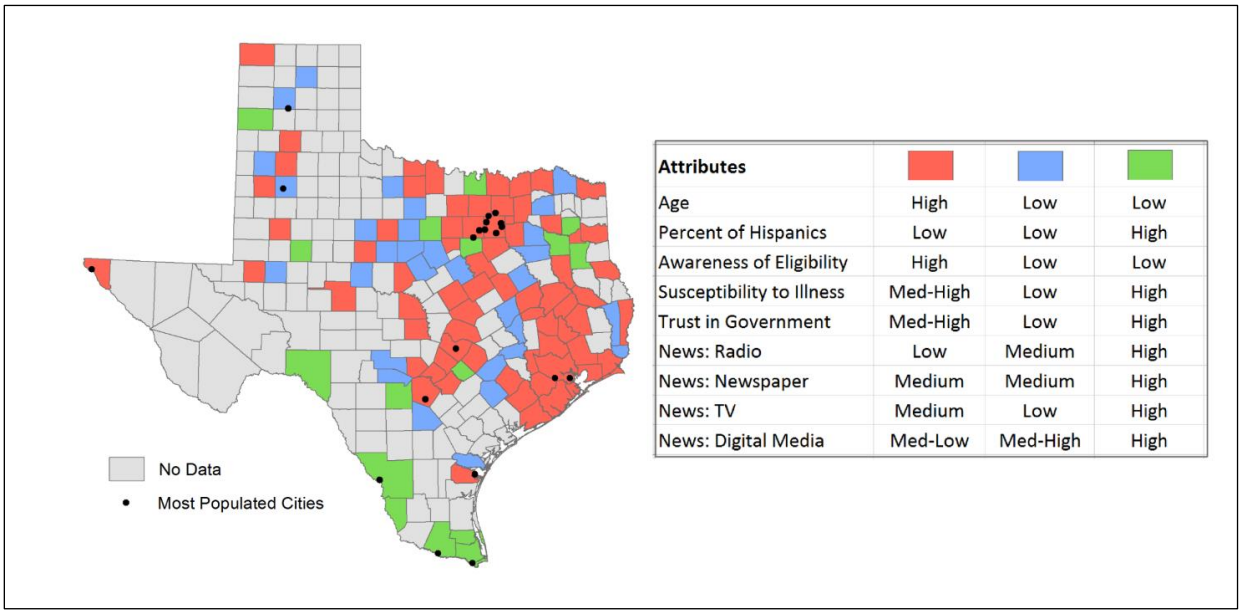
Table 5. Correlations between age and media usage

	News tracking	Internet usage	Smartphone usage	Social media usage	Composite digital media	Composite digital media news
Age	0.073*	- 0.068*	-0.305**	- 0.165*	-0.261**	- 0.182**

** p-value < 0.01, * p-value < 0.05

Hispanics have also positive attitude towards government and there is a positive correlation (r = 13, p-value < 0.01) between being Hispanic and perception of government. This means that they trust government and they are open to collaborating with government's agents. Therefore, the other possible methodology to use for notifying Hispanics about Medicare, is through Medicare representatives, health insurance representatives, or government's offices. The composite factor of these sources, had significant positive correlation (r=102, p-value < 0.01) with Hispanics' awareness of Medicare eligibility. This factor, however, is not significantly correlated with non-Hispanic elderly population.

K-means clustering has been performed with different attributes and number of groups. Based on the results of other spatial and statistical analyses, that patterns were more significant for some attributes – such as age and ethnicity – more than others. In addition to these key variables, some more attributes have been included in the final grouping analysis, which categorized variables into 3 groups with maximum similarities within and minimum similarities between them. No spatial constraints were used in the analysis. Figure 3 is the result of grouping analysis, using attributes such as age, Hispanic population, awareness of eligibility, susceptibility to illness, perception of government, and news consumption – radio, newspaper, TV, and digital media.



Attributes			
Age	High	Low	Low
Percent of Hispanics	Low	Low	High
Awareness of Eligibility	High	Low	Low
Susceptibility to Illness	Med-High	Low	High
Trust in Government	Med-High	Low	High
News: Radio	Low	Medium	High
News: Newspaper	Medium	Medium	High
News: TV	Medium	Low	High
News: Digital Media	Med-Low	Med-High	High

Figure 3. Grouping Analysis

As shown in this map, green counties have typically higher percentage of Hispanic population, compared to red and blue counties. Survey's participants of green counties are also younger, less knowledgeable about their eligibility for Medicare, and more susceptible to illness. However, since they are active news – in any form of it – users and since they are open to receiving services from government, we can assume that they can be reached through any news media, especially Spanish TV. This study also suggests the use of direct client assistance (e.g. Medicare agents), preferably in Spanish for older Hispanics, and English for non-Hispanic residents. Still, as stated earlier, only people who had access to internet could participate in our survey. Another unexpected result is in blue counties – which are mostly rural – and we expected older participants; however, only those younger people who had access to the internet or are generally more digital media users, participated. That can explain different patterns in our survey's results, compared to the actual elderly population – as shown in Figure 1. In blue counties, the news does not seem to be followed through TV as significant as other news media. We can conclude that younger residents of

rural areas can be reached through digital media and older rural residents through radio or newspaper. Yet, the direct client assistance – in English – can be another effective option.

The patterns seem different in red counties, which are mostly urban/suburban areas. Unexpectedly, the findings show that urban/suburban residents are older, compared to other two groups. They also are not very active users of any types of news media, especially digital media. In addition to their slight newspaper, TV news, and digital media news consumption, the higher knowledgeability of being eligible for Medicare among them, may be explained by their higher level of education and possibly by their stronger social ties. The latter factor seems to be less probable; since it is in contradiction to what previous studies suggest. People in larger communities are typically less attached to their community and need to be more news media dependent to receive information. In addition, this study's findings show that it is not very likely that people hear of Medicare through interpersonal communications (e.g. from family, friends, community events, etc.). Their awareness, however, is correlated with likelihood of hearing of Medicare from media, especially online media – the strongest correlation was with online health websites. Therefore, younger people (i.e. Medicare pre-beneficiaries) in larger communities can be informed mainly through online sources, and older residents through TV news and newspaper.

In short, Medicare pre-beneficiaries and Hispanics – who are generally younger compared to non-Hispanics – are active users of digital media. Health news and information can be delivered to younger population through online news and online health websites. Radio news and newspaper, that were expected to be commonly used by elderly, seemed to be rarely preferred. Radio news consumption was randomly distributed over the state of Texas, and Newspaper was spatially dispersed. Older population in rural areas may be possibly reached through direct client assistance – this service can be provided both in English and Spanish for different ethnicities/language speakers. Older urban/suburban areas' residents, however, can be informed by TV news. Again, Spanish TV news also can be effective for older Hispanic residents. According to my findings and what previous studies suggest, some of the news media types – such as local TV news – play an important role, not only in directly delivering health information, but also to increase trust between people and government, and to encourage people to build stronger social ties – people in communities with richer social capital, are usually more exposed to information and more open to enrolling in services that are offered by the government, including Medicare. Hence, TV can be generally considered as an effective health delivery method and can be a supplementary communication strategy that works for almost any group of society. To sum up the findings of this research, preferred media vary by age, ethnicity, and geography. Considering the spatial distributions of 4 groups of people (i.e. young Non-Hispanics, old Non-Hispanics, young Hispanics, and old Hispanics), this study suggests different communication strategies for different regions of the state – urban/suburban and Rural areas. Table 6 demonstrates 8

combinations of spatial and demographic characteristics, along with suggested communication strategies. Clusters of different news media types are depicted in a single map, which is available in Appendix B.

Table 6. Communication Strategies Suggested for Each Community

	Young Non-Hispanics	Old Non-Hispanics	Young Hispanics	Old Hispanics
Urban/Suburban	Digital Media, TV	TV, Newspaper	Digital Media, TV	TV, Client Assistance
Rural	TV, Digital Media	Client Assistance, TV	TV, Digital Media	Client Assistance, TV

DISCUSSION

This study was an explanatory research with some limitations of data – with some areas being over- or under-represented. In other words, the distribution of response variables, did not represent the population distribution (i.e. non-response problem). Further study can overcome this issue by applying correction techniques such as weighting adjustment that must be done prior performing any analysis. Weighting adjustment technique uses as many auxiliary data (e.g. age, gender, region, etc.) as possible and fixes irregularities that exist in data distribution. Although the data used in this research were not distributed evenly throughout the state, moderate spatial patterns and differentiation were found. This research can be also extended to approve and improve the results by using different techniques, such as Randomized Control Trial (RCT). In this methodology, the suggested communication strategies by this study will be assigned to randomly selected counties in each of 3 groups of regions, while remaining counties receive typical strategies. RCT is only an example of methodologies that help approving the effectiveness of communication strategies that this study suggests for different areas of the state. According to the results of clustering analyses, counties of Texas can be categorized into three groups of urban/suburban, rural, and counties with majority of Hispanics. Dividing the state of Texas into groups is an optimal way for proposing effective communication strategies – based on people's socio-demographic characteristics which are also tied with their locations in many aspects. Although these groups share similarities, they have some distinct characteristics that can help us identify the effective outreach method/s for that specific region.

In general, this study focused on disparities that are caused by either lack of services or lack of information. Public health is one of the main concerns of public policy makers and significantly depends on and varies by geography. Government officials have invested in Geographic Information Systems to improve the quality of their products, processes, and services by using resources more efficiently (O'Looney, 2000). GIS is a handful tool not only for locating underprivileged communities, but also for identifying the causes for such disparities due to geography, and for proposing effective solutions based on people's area of residence. However, the aim of this research has not been to propose policies that combat the inequalities of services in different areas. This study, instead, used GIS to identify causes and solutions of lack of health information. Reformed communication policies are needed to increase the awareness

among people. If the quality and quantity of media vary only based on the size of market, negative outcomes may occur – it will not help eliminating the gaps in awareness of services. Health information delivery will happen more efficiently, if in addition to demographic and geographic characteristics of target audiences, their media preferences are also considered by media practitioners. Healthier communities are the result of equally distributed health services and equally delivered health information. The latter happens when using different communication strategies, for different target population.

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APPENDIX A

All 9 pages of survey questionnaire are appended to this section as follows.

Default Question Block

Are you a resident of Texas?

Yes ○ No ○

Please tell us your age:

Please tell us which Texas county you live in?

Block 1

Do you have Internet access at home?

Yes ○ No ○ I don't know/refused ○

If so, how do you access the Internet at home?

High-speed cable or DSL ○ Dial-up ○ Cell phone ○ Other ○ I don't have Internet access at home ○ I don't know/refused ○

Who is the primary user of Internet-connected devices in your home?

Myself ○ My spouse/partner ○ My children ○ My grandchildren ○ Other ○

Do you own a smartphone (like an iPhone or Android with Internet access)

Yes ○ No ○ I don't know/refused ○

Now we'd like to find out a little more about how you use media

	Not at all active			Neither active nor inactive			Very active
How active are you on the Internet?	○	○	○	○	○	○	○
How active are you on a smartphone?	○	○	○	○	○	○	○
How active are you on social media, like Facebook?	○	○	○	○	○	○	○

Now, we'd like to learn a little more about your news habits.

	Not at all likely			Neither likely nor unlikely			Very likely
How likely are you to follow the news?	○	○	○	○	○	○	○

How likely are you to get news or information from any of the following?

	Not at all likely			Neither likely nor unlikely			Very likely
Print newspaper	○	○	○	○	○	○	○
Online newspaper	○	○	○	○	○	○	○
Local TV news	○	○	○	○	○	○	○
Network TV news (like ABC, CBS, NBC)	○	○	○	○	○	○	○
Spanish-language TV news (like Telemundo or Univision)	○	○	○	○	○	○	○
Cable TV news (like CNN, Fox, MSNBC)	○	○	○	○	○	○	○
Online news aggregator (like Yahoo News)	○	○	○	○	○	○	○
By email from a friend or relative	○	○	○	○	○	○	○
By email from a news outlet	○	○	○	○	○	○	○
From a news site on a mobile device (like a smartphone or tablet)	○	○	○	○	○	○	○
News/talk radio	○	○	○	○	○	○	○
Social media (like Facebook) on a COMPUTER	○	○	○	○	○	○	○
Social media (like Facebook) on a MOBILE DEVICE (like a smartphone or tablet)	○	○	○	○	○	○	○
Alternative news sites (like InfoWars)	○	○	○	○	○	○	○
Political website (like Politico or National Review)	○	○	○	○	○	○	○
Online news blog (like Drudge Report or Huffington Post)	○	○	○	○	○	○	○

Did you know you were eligible to enroll in Medicare starting three months before you turn 65?

Yes No

Yes ○ No ○

How did you find out that you were eligible for Medicare?

Have you discussed Medicare with a family member?

Yes ○ No ○

Have you discussed Medicare with a friend?

Yes ○ No ○

Who are you most likely to talk with about programs like Medicare and healthcare in general? Choose all that apply:

Spouse	Child	Parent	Sibling	Friend	Doctor or nurse	Pharmacist	Medicare/Social Security employee	Health insurance provider (like Aetna or United)	An advocacy group for seniors (like AARP or AMAC)	Other
☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Do you have a place or activity where you get information (like a grocery store, church, post office, beauty salon, book club, etc.)?

Yes ○ No ○

If so, what kind of place is that?

What kind of information are you most likely to learn or share there...in other words, what do you mostly talk about there?

Block 5

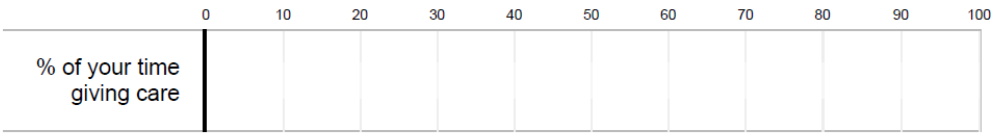
Block 2

Where or how are you most likely to have heard about or discussed Medicare or paying for health care?

	Not at all	Neither likely nor

	likely			unlikely			Very likely
In the news (like radio, TV, newspaper)	○	○	○	○	○	○	○
Local shop/store	○	○	○	○	○	○	○
Family member	○	○	○	○	○	○	○
Friend	○	○	○	○	○	○	○
Talk radio	○	○	○	○	○	○	○
Doctor's office	○	○	○	○	○	○	○
Community clinic	○	○	○	○	○	○	○
Online through a search (like Google)	○	○	○	○	○	○	○
Online through social media (like Facebook)	○	○	○	○	○	○	○
Health websites (like Medicare.gov)	○	○	○	○	○	○	○
From a government office (like Medicare or Social Security)	○	○	○	○	○	○	○
Searching the phonebook	○	○	○	○	○	○	○
Phone call or directory assistance	○	○	○	○	○	○	○
By a letter in the mail (like from AARP or AMAC)	○	○	○	○	○	○	○
In-home visit from insurance representative	○	○	○	○	○	○	○
In-home visit from Medicare repesentative	○	○	○	○	○	○	○
Local community event	○	○	○	○	○	○	○
Other	○	○	○	○	○	○	○
Pharmacy	○	○	○	○	○	○	○

What percentage of your time do you spend providing care for an ill or disabled loved one in your home?



Think about a time you had a question about something related to healthcare. First, where did you go, in person or online, or who did you ask to get information? (Please list all sources that come to mind)

Second, what words did you search for or ask about?

Did you know there is a toll-free number you can call about health insurance for aging and disabled Texans?

Yes ○ No ○

Have you heard of the State Health Insurance Assistance Program (SHIP)?

Yes ○ No ○

Have you heard of the Health Information Counseling and Advocacy Program (HICAP)?

Yes ○ No ○

Have you heard of an Area on Aging (AAA)?

Yes ○ No ○

Have you heard of an Aging and Disability Resource Center (ADRC)?

Yes ○ No ○

Are you a member of a senior citizen advocacy group (like AARP or AMAC)?

Yes ○ No ○

Out of all the possible information resources available to you, what has been the most beneficial method of receiving information about your Medicare benefits?

If you could change anything about signing up for Medicare, what would it be?

For this item, please just select "C," thanks

A ○ B ○ C ○

Block 3

Now we'd like to ask you some questions about your views of government services. Please tell us how

Now we'd like to ask you some questions about your views of government services. Please tell us how you feel about each of the following:

	Strongly disagree			Neither agree nor disagree			Strongly agree
The federal government spends too much money	○	○	○	○	○	○	○
I feel like the federal government can be trusted	○	○	○	○	○	○	○
I support the idea of Medicare	○	○	○	○	○	○	○
I'm glad that Medicare is there for retirees	○	○	○	○	○	○	○
I feel like taking Medicare and other social services is a "handout"	○	○	○	○	○	○	○
People who work for federal agencies are generally concerned for citizens	○	○	○	○	○	○	○
I am open to working with federal government employees	○	○	○	○	○	○	○
I am open to accepting federal government services	○	○	○	○	○	○	○
My family generally feels the same way I do about the federal government	○	○	○	○	○	○	○
My friends generally feel the same way I do about the federal government	○	○	○	○	○	○	○

Now we'd like to ask you how you feel about healthcare and health insurance. We are not asking about any medical conditions, just how you feel about healthcare and health insurance coverage.

	Strongly disagree			Neither agree nor disagree			Strongly agree
I am in pretty good health	○	○	○	○	○	○	○
I feel like I don't currently need anything in the way of health care	○	○	○	○	○	○	○
I feel like I won't need healthcare anytime soon	○	○	○	○	○	○	○
My loved ones/family members are in pretty good health	○	○	○	○	○	○	○
My loved ones/family won't need healthcare anytime soon	○	○	○	○	○	○	○
My health is of great	○	○	○	○	○	○	○

concern to me	○	○	○	○	○	○	○
I often talk about my health with friends and family	○	○	○	○	○	○	○
It is important to me to get information about healthcare	○	○	○	○	○	○	○

How do you feel about healthcare and health insurance (continued)?

	Strongly disagree			Neither agree nor disagree			Strongly agree
Discussing my health is comfortable for me	○	○	○	○	○	○	○
Discussing my health coverage/insurance is comfortable for me	○	○	○	○	○	○	○
My health insurance is nobody's business but mine	○	○	○	○	○	○	○
I worry that people will learn about my medical conditions	○	○	○	○	○	○	○
Insurance/Medicare is too complicated	○	○	○	○	○	○	○
Government agencies don't do enough to explain programs like Medicare	○	○	○	○	○	○	○
Insurance is too expensive	○	○	○	○	○	○	○
Medicare is too expensive	○	○	○	○	○	○	○
I don't trust the government to administer Medicare	○	○	○	○	○	○	○
Medicare isn't for people like me	○	○	○	○	○	○	○
Other options would be better than Medicare	○	○	○	○	○	○	○
Medicare is a government handout	○	○	○	○	○	○	○

How do you feel about healthcare and health insurance (continued)?

	Strongly disagree			Neither agree nor disagree			Strongly agree
Medicare will help me afford health coverage	○	○	○	○	○	○	○
Medicare will give me access to health care that	○	○	○	○	○	○	○

I don't have now							
Medicare will save me a lot of money	○	○	○	○	○	○	○
I've earned my Medicare through my years of work	○	○	○	○	○	○	○
Medicare is good for society	○	○	○	○	○	○	○
Medicare helps many Americans afford health coverage	○	○	○	○	○	○	○
Medicare saves lives	○	○	○	○	○	○	○

Block 4

Please tell us your gender:

Male ○ Female ○

Are you a military veteran?

Yes ○ No ○

Please tell us your Zip code:

Would you consider the community where you live to be more urban, suburban, or rural?

Urban ○ Suburban ○ Rural ○

Which best describes your annual income

Less than $20,000 ○ | $20,000 to $34,999 ○ | $35,000 to $49,999 ○ | $50,000 to $74,999 ○ | $75,000 to $99,999 ○ | $100,000 or above ○

Which best describes your level of education?

Less than high school diploma ○ | High school graduate or equivalent (GED) ○ | Some college but no degree ○ | Associate's degree ○ | Bachelor's degree ○ | Graduate degree ○

Which best describes your race or ethnicity?

Asian ○ | Black or African American ○ | White ○ | American Indian or Alaska Native ○ | Native Hawaiian or Pacific Islander ○

Are you Hispanic?

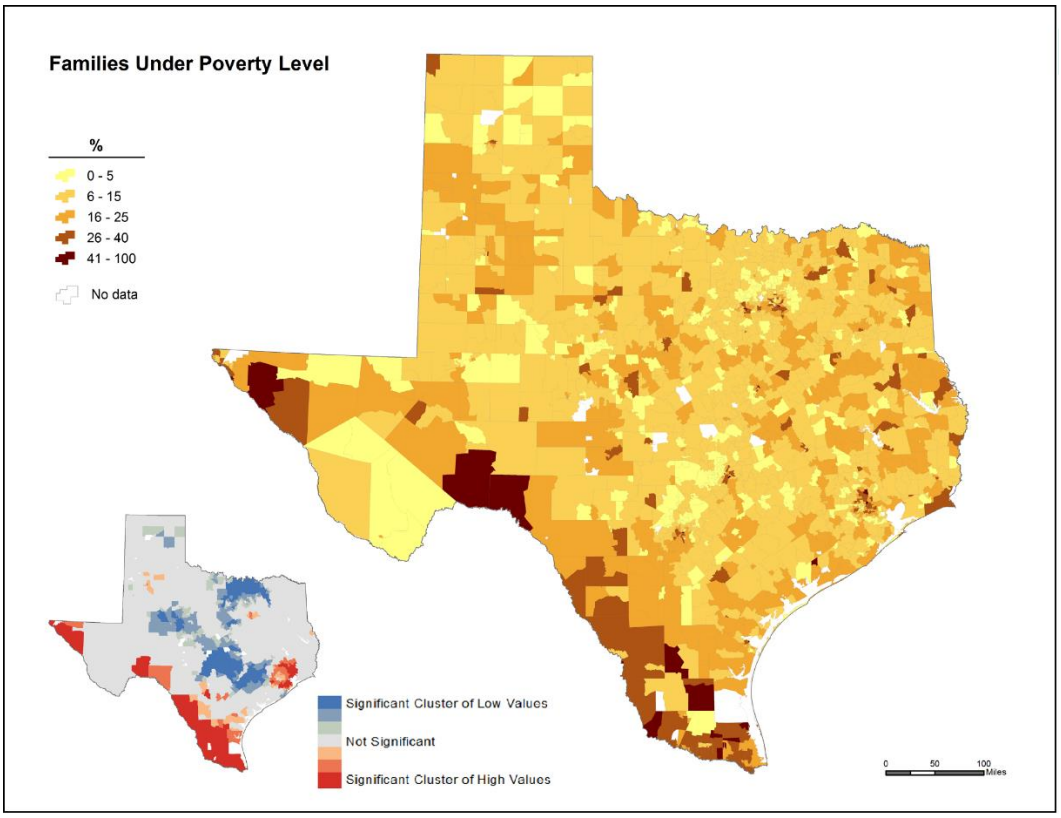
Yes	No
○	○

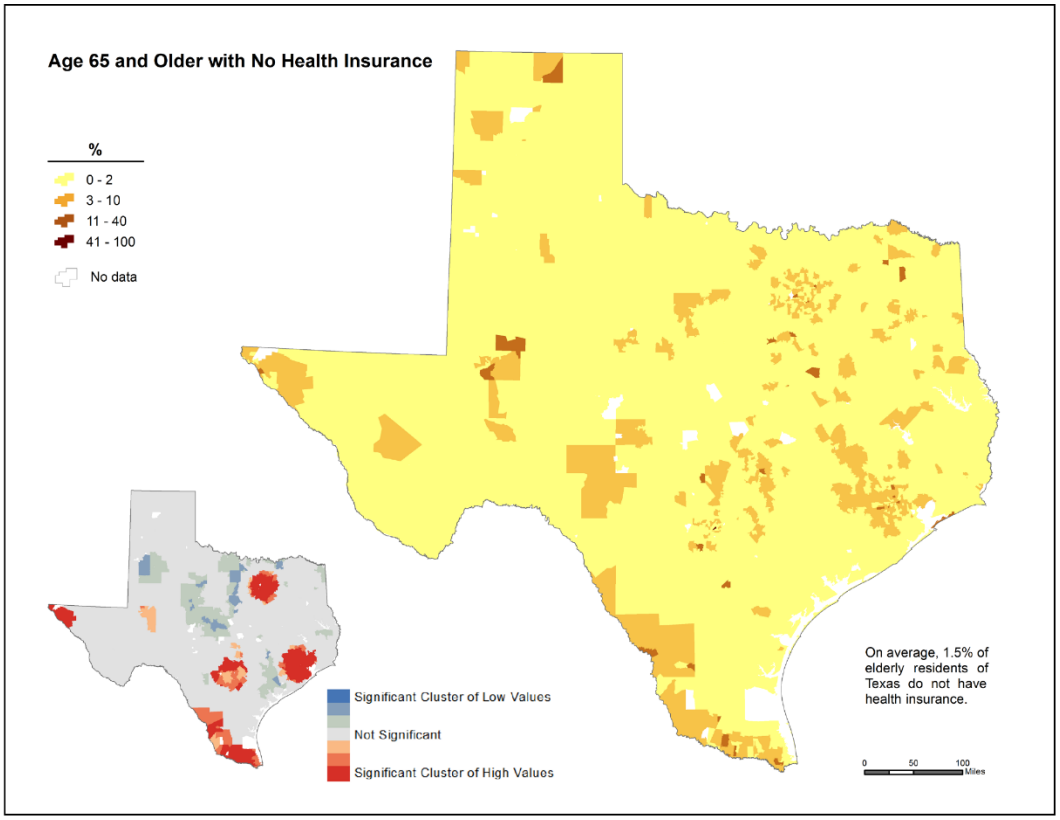
Please select how often you personally use Spanish and English.

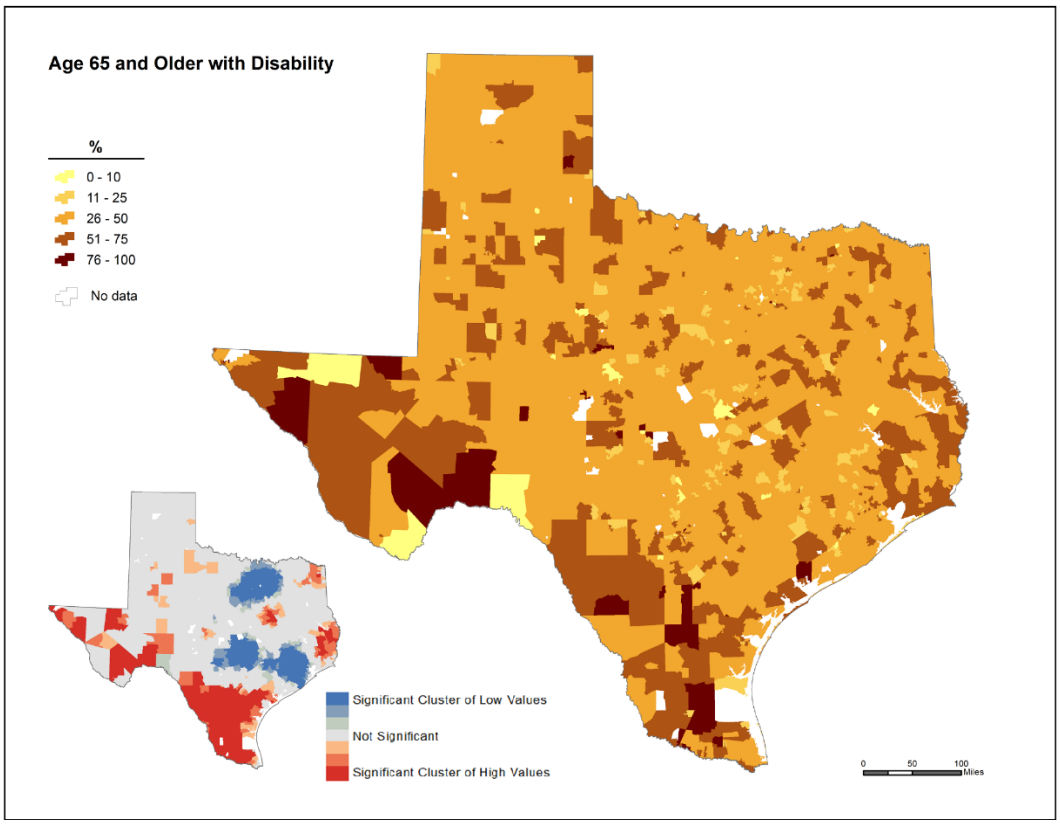
	Only English	English more than Spanish	Spanish and English equally	Spanish more than English	Only Spanish
Talking with family	○	○	○	○	○
Talking with friends or neighbors	○	○	○	○	○
Talking with co-workers or acquaintances	○	○	○	○	○
Listening to radio	○	○	○	○	○
Watching TV	○	○	○	○	○
Reading a newspaper or magazine	○	○	○	○	○
Using the Internet	○	○	○	○	○

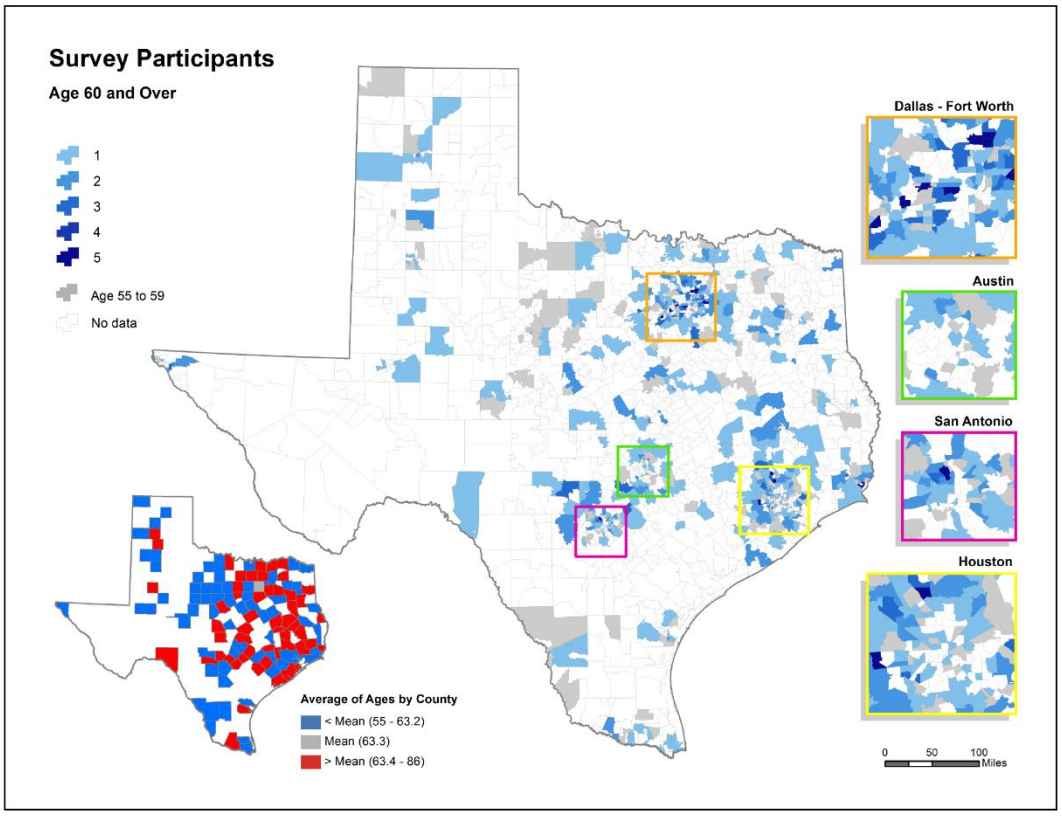
That's it, you're finished! Thank you so much for participating - we really appreciate your time!

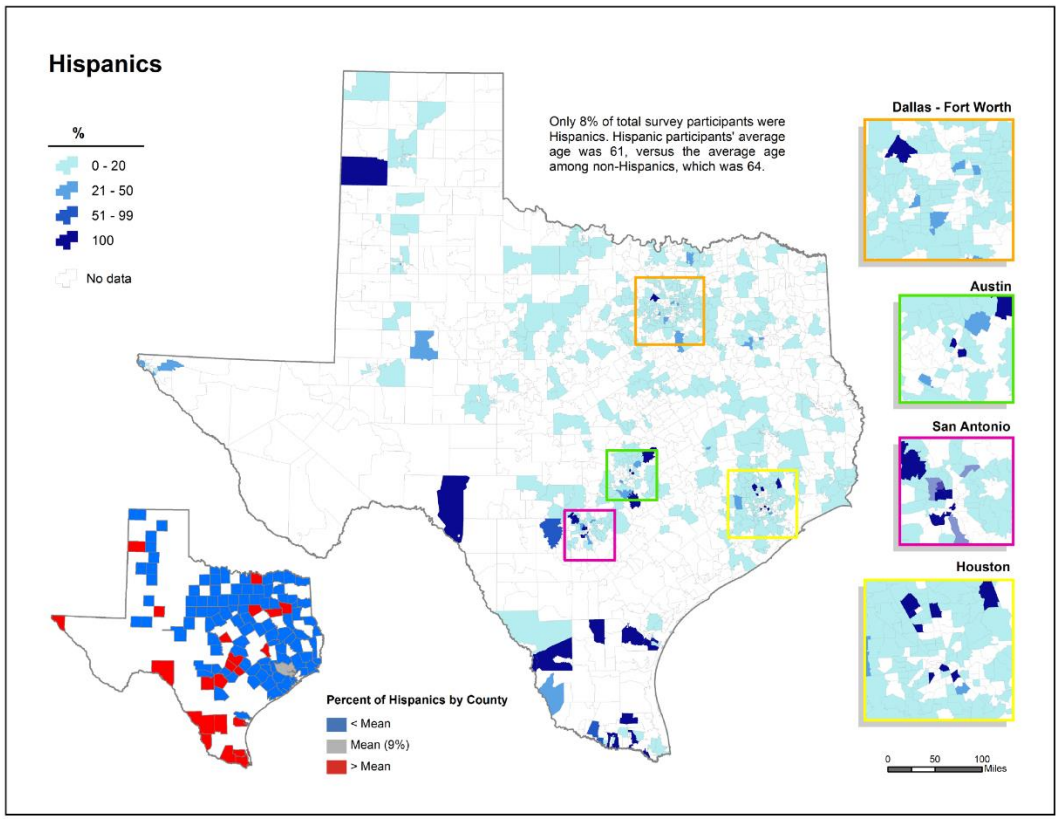
APPENDIX B

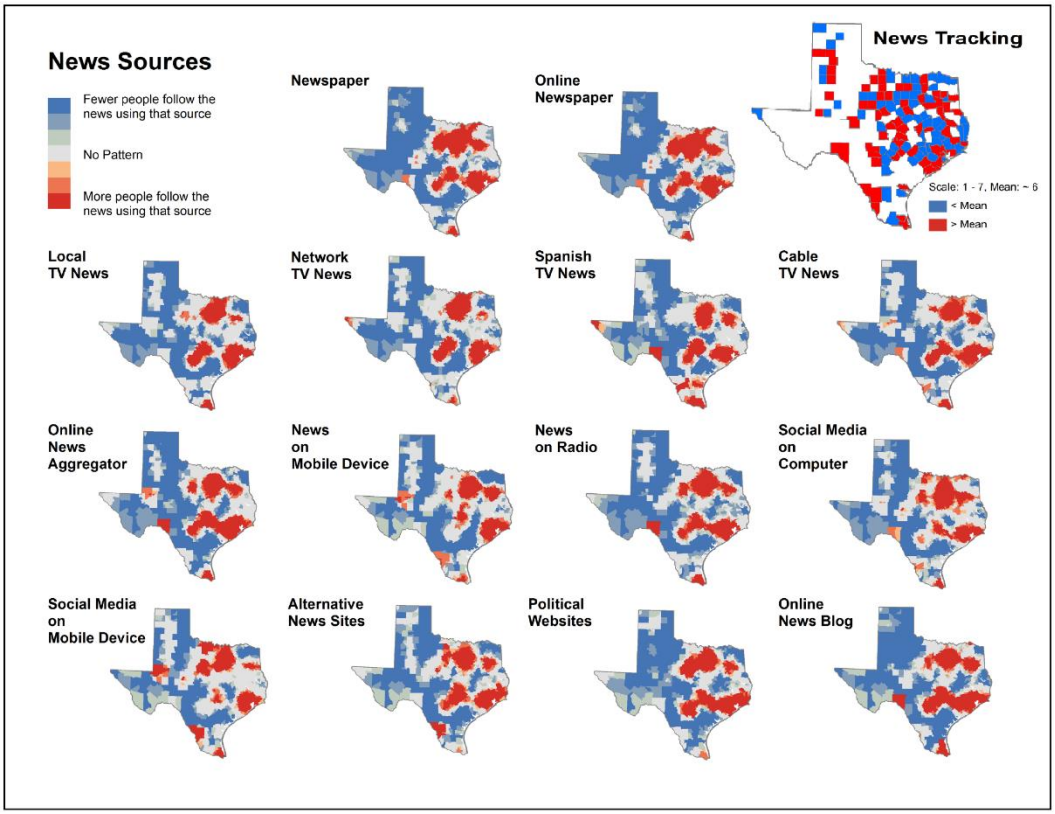

Families Under Poverty Level
%
0 - 5
6 - 15
16 - 25
26 - 40
41 - 100
No data
Significant Cluster of Low Values
Not Significant
Significant Cluster of High Values
0 50 100
Miles


Age 65 and Older with No Health Insurance
%
0 - 2
3 - 10
11 - 40
41 - 100
No data
Significant Cluster of Low Values
Not Significant
Significant Cluster of High Values
On average, 1.5% of elderly residents of Texas do not have health insurance.
0 50 100
Miles


Age 65 and Older with Disability
%
0 - 10
11 - 25
26 - 50
51 - 75
76 - 100
No data
Significant Cluster of Low Values
Not Significant
Significant Cluster of High Values
0 50 100 Miles


Survey Participants
Age 60 and Over
1
2
3
4
5
Age 55 to 59
No data
Dallas - Fort Worth
Austin
San Antonio
Houston
Average of Ages by County
< Mean (55 - 63.2)
Mean (63.3)
> Mean (63.4 - 86)
0 50 100 Miles


Hispanics
%
0 - 20
21 - 50
51 - 99
100
No data
Only 8% of total survey participants were Hispanics. Hispanic participants' average age was 61, versus the average age among non-Hispanics, which was 64.
Dallas - Fort Worth
Austin
San Antonio
Houston
Percent of Hispanics by County
< Mean
Mean (9%)
> Mean
0 50 100
Miles


News Sources
Fewer people follow the news using that source
No Pattern
More people follow the news using that source
Newspaper
Online Newspaper
News Tracking
Scale: 1 - 7, Mean: ~ 6
< Mean
> Mean
Local TV News
Network TV News
Spanish TV News
Cable TV News
Online News Aggregator
News on Mobile Device
News on Radio
Social Media on Computer
Social Media on Mobile Device
Alternative News Sites
Political Websites
Online News Blog