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Emily Alison Long Date

Differences in Reasons for Delayed Medical Care between Old (65-79) and Oldest-Old (80+)

By

Emily Alison Long
Master of Public Health

Executive MPH

_____

Shakira Suglia, ScD Date
Committee Chair

_____

Anna Lea Cothron Date
Committee Member

_____

Laura Gaydos, PhD Date
Associate Chair for Academic Addiars, Executive MPH Progarm

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By

Emily Alison Long

B.A., B.S., University of Tennessee, 2009

Thesis Committee Chair: Shakira Suglia, ScD

An abstract of
A thesis submitted to the Faculty of the
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Abstract

Differences in Reasons for Delayed Medical Care between Old (65-79) and Oldest-Old (80+)

By Emily Alison Long

In the United States, the number of older adults is growing at a rate faster than other portions of the population. This demographic shift will have significant consequences on the healthcare system and national economy. In order to decrease cost and improve outcomes, timely medical care is crucial. While most literature investigating delayed healthcare among older adults has groups all individuals ages 65 and older together, this may be too broad of an age range to describe the health, healthcare, and health-related behaviors for older individuals. Therefore, we sought to address the following research question: Among older adults, does age group predict reason for delay seeking medical care?

METHODS: The sample for this study was drawn from 13,172 participants ages 65 and older with valid data to the question "Have you delayed getting needed medical care for any of the following reasons in the past 12 months?" in the 2014 cycle of the Behavioral Risk Factor Surveillance System (BRFSS). Using weighted analyses, univariate and multivariate polytomous logistic regression analyses were conducted to assess differences between old (65-79) and oldest-old (80+).

RESULTS: Analyses show that after accounting for sex, race, education level, language, living alone, veteran status, disability, residence in metro area, income, and primary source of healthcare, reasons for delayed medical care differ significantly by age group. However, income was an effect modifier of the relationship between age group and reasons for delay. Differences between age groups existed in four of the five reasons for delay; however, these differences were seen most frequently within the lowest income level (<$15,000). In this lowest income level, the oldest-old were less likely to attribute their delay in medical care to inability to get appointment soon enough, having to wait too long to see the doctor, the office being closed when they got there, and lack of transportation.

CONCLUSIONS: While many services aimed to increase healthcare access have grouped all individuals ages 65+ in one service category, this may be too broad to effectively target services. Analyses presented indicate that among older adults, reasons for delay seeking medical care vary between old and oldest-old.

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INTRODUCTION

In the United States, the number of older adult ages 65 and older is currently estimated to be over 47 million or 14.9% of the total U.S. population. This older adult age group is growing at a rate much faster than that of other portions of the population By 2040, individuals ages 65 or older will comprise 26% of the total US population(1). Due to the aging "Baby Boomer" population, increasing lifespans, and declining birthrates, this trend is projected to continue over the next several decades. This age group has higher rates of cancer, falls, dementia, arthritis, and other chronic diseases (2-4). The majority of adults ages 65 and older have 2 or more chronic conditions (2). Thus, this demographic shift to an older population will have significant consequences on the healthcare system and national economy.

The healthcare related costs within this population are high. In 2015, the out-of-pocket healthcare costs for older adult averaged $5,756 per person annually, significantly higher than the average expenditures for the overall population(5). Approximately 68% of these costs were for insurance and an additional 13% were for medical services. Older adults spend roughly 13% of their total household income on health related expenses, which is higher than the 8% spent by consumers overall (5).

Costs are significantly higher when care is delayed. Many individuals with lack of access to a general or primary care practitioner utilize Emergency Departments (EDs) for care that could have otherwise been managed in an outpatient or primary care setting (6, 7). One study found that individuals who lack access to timely medical care may visit the ED as an alternative (8). Even among individuals who do not seek care in an ED, prevention and early detection cost less and have better outcomes than delayed care.

In order to ensure timely access to medical care, it is important to understand the factors leading to delayed care among older adults. Most literature investigating delayed healthcare among older adults has grouped all individuals ages 65 and older together (9, 10). However, a wide range of literature surrounding overall health and utilization supports the idea that this is often too broad of an age range to describe the health, healthcare, and health-related behaviors for older individuals. Therefore, we sought to address the following research question: Among older adults, does age group (65-79 vs 80 and older) predict reason for delay seeking medical care?

LITERATURE REVIEW

Rationale

By 2040, individuals ages 65 or older will comprise 26% of the total US population(1). This age group has higher rates of cancer, falls, dementia, arthritis, and other chronic diseases (2-4). The majority of adults ages 65 and older have 2 or more chronic conditions (2). Thus, this demographic shift to an older population will have significant consequences on the individual expenditures, the healthcare system, and national economy.

The healthcare related costs within this population are high. In 2015, the out-of-pocket healthcare costs for older adult averaged $5,756 per person annually, significantly higher than the average expenditures for the overall population(5). Approximately 68% of these costs were for insurance and an additional 13% were for medical services. Older adults spend roughly 13% of their total household income on health related expenses, which is higher than the 8% spent by consumers overall (5). One way to mitigate these costs for individuals, insurance companies, and taxpayers is to ensure older adults have timely access to medical care when needed.

This literature review describes what is currently known about delayed care among older adults and addresses the significant gaps of work in this area. This cross-sectional study aims to examine the non-cost related factors associated with delayed care among older adults in the U.S. Results may inform interventions to increase timely access to preventative and non-emergency medical care.

Rates of delayed care among older adults

A large amount of literature has been published to suggest older adults delay medical care. A great deal of these studies have focused on delayed treatment by age of individuals with specific diagnoses.

Studies have found varying results in regards to delayed care among old and old-est old. Many of these studies have looked age groups and delay of treatment for specific diagnoses. A 2015 study found that individuals 85+ more likely to delay surgery for Melanoma compared to individuals under 65 (11). Another study found that individuals ages 75 and older were more likely to have a delayed diagnosis for chronic lymphocytic leukemia (12). In contrast, for individuals with breast cancer, younger Medicare enrollees were found to delay surgery longer than older Medicare Enrollees (13). While these studies are meaningful for specific diagnoses, literature on overall reasons for delay in care by older adults is lacking.

Delayed care due to insurance and cost - older adults

Lower income and higher healthcare costs are each associated with lower healthcare access among older adults (14). However, older adults are the age group with the highest rates of continuous insurance coverage (15). This was not always the case. The U.S. government introduced Medicare coverage for adults ages 65 and older in 1965,

and dramatically increased the rates of insurance coverage among this population. Before Medicare was enacted, approximately 48% of older adults did not have health insurance (16). In contrast, today less than 2% of individuals ages 65 or older do not have health insurance(17). Overall, older adults are the group most likely to have continuous insurance coverage(15), much of which is attributed to high rates of Medicare coverage. In 2015, 93% of community-dwelling older adults had Medicare, 52% had private insurance, 7% had military-related insurance, and 7% were covered by Medicaid, with some individuals having multiple sources of coverage(5).

Despite this very high rate of insurance coverage, insurance related access problems vary among older adults. The relationship between insurance type, age, and access to care is complex. Often, insurance type is associated with cost related access problems among older adults. For example, individuals with privatized Medicare Advantage plans report higher cost-related access problems when compared to traditional government provided Medicare coverage. In addition, insurance associated access limitations are related factors other than cost including knowledge of benefits. For example, younger Medicare enrollees tend to be more familiar with Medicare benefits (18). Simultaneously, individuals who report poor familiarity with Medicare report more delays in care (19). In contrast, other literature states that the younger Medicare enrollees may be more likely to delay care. Even though Medicare enrollment typically begins at age 65, approximately 12% of individuals delay preventative care within the first two years of Medicare enrollment, despite these services having no cost-share (20). This complex relationship indicates type of insurance may be a potential effect modifier or confounder in the relationship between age and delayed medical care.

Non-cost related reasons for delayed care

Practical, non-cost related barriers to healthcare access are also well studied. Reasons for delayed care are commonly assessed with responses "couldn't get appointment soon enough," "didn't have transportation," "once there, had to wait too long to see doctor," "couldn't get through on telephone" and "the office wasn't open when you got there" (10, 21).

A 2008 study by Rust, Ye, and Baltrus found a relationship between these barriers and ED visits. The authors found that ability to get through on the phone, getting appointment quickly, waiting time, and transportation were all independently associated with increased use in services at emergency department. However, this study only consisted of three age groups, the oldest category being ages 65 and older (10).

Later, a 2015 report released by the Vermont Department of Health studied the results of the same question asked during the 2013 Vermont Behavioral Risk Factor Surveillance System (BRFSS)(21). It asked, "Other than cost…Have you delayed getting needed medical care for any of the following reasons in the past 12 months?" This study found that Vermont residents ages 65 and older are significantly less likely than their younger counterparts to delay medical care for any reason, cost related or non-cost related. However, this study was geographically limited to Vermont residents, and again did not break down age groups beyond age 65 and older. Additionally, it did not compare non-cost related reasons within this population.

While not specifically derived from the specified BRFSS question, transportation has repeatedly been shown to be an important barrier to care for individuals among all ages (22-24) Transportation as a barrier has also been shown to be related to age (24).

Many older adults restrict or eliminate driving, particularly individuals ages 75 and older and those who are female (25). In areas where fixed-route public transportation is available, older adults may have difficulty utilizing it due to mobility issues. Lack of transportation indicates a practical challenge to timely access to medical care.

Other potential covariates

In the literature, reason such as couldn't get appointment soon enough," "didn't have transportation," "once there, had to wait too long to see doctor," "couldn't get through on telephone" and "the office wasn't open when you got there", have not addressed differences between age groups of older adults beyond 65. However, several studies have shown factors other than cost to be associated with delayed care among older adults. These include disability, living alone, race/ethnicity, veteran status, education, and income (26-30).

Education and income are also associated with delayed healthcare (31). Individuals with lower levels of education and lower socioeconomic status are more likely to postpone or delay care when compared to their counterparts.

Among older adults ages 65 and older, individuals with disabilities were significantly more likely to delay healthcare due to cost than older individuals without a disability(26). These differences were found to be significant even after controlling for other demographic, financial, and health related factors. The study was limited to only individuals 65 and older with insurance and did not account for any supplemental insurance; however, it still suggests that disability status may affect access to healthcare (26).

Household composition is also linked to delayed care among older adults. A 2009 study found that individuals who live alone are less likely to use preventative care than individuals who lived with a spouse. Interestingly, individuals who lived with their adult children were no more likely to use preventative care services than those who lived alone. Thus, it may be important to consider household characteristics when assessing reasons for delayed medical care (27).

Additionally, among older Medicare enrollees, disparities exist between racial/ethnic groups. Among Medicare enrollees with a lower number of chronic conditions, non-Hispanic whites have higher access rates and healthcare utilization when compared to other races/ethnicities (32). Non-Hispanic white older adults also have more timely access to healthcare (28, 29).

Veterans have been shown to have significant delays in seeking care, specifically when seeking healthcare through the U.S. Department of Veterans Affairs (VA). Reports indicate veterans may have to wait between 24 and more than 100 days for an appointment at some VA facilities. In fact, the Office of the Inspector General found that some individuals died before they received care (30, 33). This indicates that veteran status and utilization of VA care is associated with delayed medical care.

Timely access to care may also differ between residents residing in metropolitan or rural areas. While rural and urban Medicare beneficiaries use approximately the same amount of healthcare per year (34). However, studies suggest that timeliness or delay of care varies between metropolitan statistical areas and more rural communities (35).

Each of these covariates may impact the relationship between age and delayed care among older adults. For this reason, it is important to consider each of these as covariates in the analysis.

METHODS

Study sample

Data was analyzed from the Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is an ongoing Centers for Disease Control and Prevention (CDC) surveillance system conducted throughout all 50 states and designed to measure behavioral risk factors [1]. Inclusion criteria for the BRFSS includes non-institutionalized adults ages 18 years of age and older with access to a telephone residing in the U.S. Participants were selected using random digit dialing stratified by state of residence and phone number type (cell phone or landline). For this secondary analysis, data was specific to the Health Access module within the 2014 cycle of the BRFSS.

Survey population

The sample for this study was drawn from participants within states conducting the Health Care Access Module during 2014 cycle of BRFSS. This included 158,990 individuals ages 65 and older. Of these, 114,215 had data for the question "Have you delayed getting needed medical care for any of the following reasons in the past 12 months?" From these, 268 were excluded due to having missing data for this questions. Next, 100,775 individuals were excluded due stating they did not delay medical care within the past year. This left a final sample of 13,172 participants ages 65 and older who had delayed medical care within the past for reasons other than cost.

Predictor variable

The primary predictor of interest was age. A wide range of literature surrounding overall health and utilization supports the idea that grouping all individuals ages 65 and older is often too broad of an age range to describe the health, healthcare, and health-related behaviors for older individuals. Therefore, for the purposes of this study, respondents' ages were categorized into old (65-79) and oldest-old (80 years or more) as done in prior literature

Outcome variable

The primary outcome of interest was reasons for delayed medical care within the past year, as measured using the participant's responses to "Have you delayed getting needed medical care for any of the following reasons in the past 12 months? Select the most important reason." Participants were asked to choose of the following answers: 1) You couldn't get through on the telephone, 2) You couldn't get an appointment soon enough, 3) Once you got there, you had to wait too long to see the doctor, 4) The clinic/doctor's office wasn't open when you got there, 5) You didn't have transportation, 6) Other, 7) Don't know/ Unsure, 8) No, I did not delay getting medical care/did not need medical care.

Covariates

In addition to considering age group, information for sex, race/ethnicity, education level, living alone, disability, veteran status, whether respondents live in a metropolitan area, income, and primary type of healthcare coverage were also assessed in the analysis.

Sex was defined as dichotomous male/female with male as the reference group. The original variable for race and ethnicity was defined as White only, non-Hispanic;

Black only, non-Hispanic; Other Race, non-Hispanic; Multiracial, non-Hispanic; and Hispanic. However, due to limited sample sizes within each age group (65-79 and 80+), this variable was recoded to a binary variable of White and Non-White. White was chosen as the referent group.

Veteran status was classified into two categories (yes/no) based upon the question "Have you ever served on active duty in the United States Armed Forces, either in the regular military or in a National Guard or military reserve unit?"

Participant education level, was categorized into four categories; did not graduate high school, graduated high school, attended college or technical school, and graduated from college or technical school. "Graduated from college or technical school" was classified as the referent group.

Language spoken was categorized as a dichotomous variable due to limited number of individuals speaking language other than English and Spanish. While 94.5% of the weighted sample population spoke English, 5.5% spoke Spanish, and less than 1% spoke another language. Therefore, Spanish and other languages were combined into one non- English speaking category. English speaking was classified as the referent group so as to draw comparisons to those individuals who spoke English as a primary language.

Consistent with prior literature, disability status was defined using a set of five questions [2]. This set of questions includes one question on each vision and cognitive difficulty, and 3 questions related to Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). Individuals were classified as having a disability if they answered "yes" to any of the following: 1) "Are you blind or do you have serious

difficulty seeing, even when wearing glasses?" 2) "Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering, or making decisions?" 3) "Do you have serious difficulty walking or climbing stairs?" 4) "Do you have difficulty dressing or bathing?"; and 5) "Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone, such as visiting a doctor's office or shopping?". "No disability" was set as referent group.

Living alone was considered based upon total number of adults living in household including respondent, with two or more adults being categorized as "not living alone." "Not living alone" was set as referent group.

Metropolitan status was defined based upon the Metropolitan Statistical Area (MSA) as defined by the United States Office of Management and Budget. This included four categories: 1) In the center city of an MSA; 2) Outside the center city of an MSA, but inside the county containing the center city; 3) Inside a suburban county of the MSA; 5) Not in an MSA. "In the center city of an MSA" was established as the referent group so as to draw comparison to individuals living with highest geographic access to medical facilities.

Income was based upon annual household income from all sources and categorized into five levels: 1) Less than $15,000; 2)$15,000 to less than $25,000; 3) $25,000 to less than $35,000; 4) $35,000 to less than $50,000); 5)$50,000 or more. The referent group was set to "$5,000 or more" to draw comparisons to the highest income group.

The original BRFSS data categorized primary type of healthcare coverage was categorized into 8 categories: 1) A plan purchased through an employer or union; 2) A plan that you or another family member buys on your own; 3) Medicare; 4) Medicaid or other state program; 5) TRICARE, VA, or Military; 6) Alaska Native, Indian Health Service, Tribal Health Service; 7) Some other source; 8) None. However, there were limited numbers of individuals within each age group who had had primary sources of healthcare other than Medicare. For this reason, this variable was reclassified into a binary variable to allow for a more direct comparison between individuals relying on Medicare for a primary source of healthcare coverage and individuals for whom Medicare was not the primary source of health coverage. Medicare as a primary source of healthcare coverage was set as the referent group as this was the most common response.

Sample weighting

In order to reduce bias within the sample, BRFSS data is weighted through both design and raking, also known as iterative proportional fitting. Design weighting takes into account the total number of records available, number of records selected within geographic region, and population density. Raking weight takes into account sex, age, race, education, marital status, home ownership, phone ownership, and region within each region. Using this method, each respondent is assigned a final weight to be used in analyses [1]. All analyses conducted within this study were weighted analyses.

Statistical analysis

Using a chi-square test at $\alpha=0.05$, descriptive analyses were conducted by age group and sex, race/ethnicity, education level, living alone, difficulty seeing, difficulty walking, difficulty dressing/bathing, difficulty remembering, veteran status, whether

respondents live in a metropolitan area, living in rural/urban area, income, and primary type of healthcare coverage using a weighted analysis.

Next, unadjusted logistic regression was conducted using *proc surveylogistic*in order to understand the association between predictor variable (age group) and primary outcome variable (reasons for delayed medical care). Univariate polytomous logistic regression was then conducted to assess relationships between potential confounders or effect modifiers and the primary outcome variable (reason for delayed medical care) and the primary predictor variable (age group). Potential covariates were selected based upon prior literature, crude odds ratios, and a priori criteria. A fully adjusted model was developed to provide a gold standard model adjusting for all potential covariates in analysis, including, sex, race/ethnicity, education level, living alone, veteran status, living in rural/urban area, income, and type of healthcare coverage. English was removed from analysis due to collinearity, as more than 99% of individuals who identified as White spoke English. Among all individuals who spoke English 95% identified as white. In contrast, among individuals who spoke a language other than English, 97% identified as a non-white, minority.

Next, interaction was assessed for all two-way cross product terms between age group and each of the following covariates: sex, race/ethnicity, education level, living alone, disability, veteran status, whether respondents live in a metropolitan area, income, and primary type of healthcare coverage. Using backward elimination modeling at $\alpha=0.05$, all interaction terms which were not statistically significant were then removed in order to develop the most parsimonious mode. The only interaction term remaining after

this process was AgeGroup*IncomeGroup. The inclusion of this interaction term is in line with theoretical framework as well as statistical analyses.

Afterwards, confounding was assessed for all covariates by comparing crude and adjusted odds ratios using the "10% rule" wherein any non-confounders were subsequently eliminated from the most parsimonious model if they were not shown to alter the unadjusted odds ratio of primary exposure variable (age group), by more than 10%. When this process was complete, Primary Source of Health Coverage, Race/Ethnicity, and Disability were all retained in the model as confounding variables.

Although, any covariate found to not be an effect modifier or confounder using the "10% rule" was removed from the most parsimonious model, significant predictors that met a priori criteria were reintroduced in the final model. While the most parsimonious model included only age, income, race/ethnicity, Medicare, and disability as exposure variables, for the final model education and race were added back in since they met a priori criteria and had shown a strong relationship to outcome variable in earlier analyses. This final model was chosen as the most effective prediction model for the chosen outcome variable, reasons for delayed medical care.

All survey questions that were answered by 'refused' or 'don't know' were treated as missing information. All data presented was collected during 2014 cycle of BRFSS and analyzed using SAS 9.4.

RESULTS

Descriptive

Initial weighted characteristics of the old (65-79) and oldest-old (80+) age groups are seen in table 1. Weighted analysis found that the total sample population was 38.6% male, 61.4% female. The sample was 88% white and 12%, non-white minorities.

Education levels were varied, with 22.1% not graduating from high school, 31.1% graduating high school, 28.1% attending some college or technical school, and 18.7% college or technical school graduates. Most (94.5%) spoke English as a primary language. Overall, 20.2% were veterans. The majority (55.1%) had a disability. The sample was geographically diverse with 38.5% residing in the center of a metropolitan statistical area (MSA), 20.3% residing outside the center of an MSA but inside the county containing the city center, 18.8% residing inside a suburban county, and 22.5% residing outside of an MSA. Incomes were also diverse and distributed as follows: 21.0% had incomes below $15,000; 28.3% had incomes between $15,000 to less than $25,000; 14.7% had incomes between $25,000 to less than $35,000; 13.9% had incomes between $35,000 to less than $50,000; and 22.1% had household incomes of $50,000 or more per year. The majority of the sample (81.1%) relied on Medicare as their primary source of healthcare coverage.

Using *proc surveyfreq*, a weighted chi-square analysis at significance level of p=0.05 was conducted to assess differences between the old (65-79) and oldest-old (80+) age groups. After comparing distributions between age groups, living alone, household income, and residence within MSA all show significant differences between age groups (Table 1). Individuals ages 80 and older were more likely to live alone and have lower incomes. Individuals ages 80 and older were also slightly more likely than their younger counterparts to live in the city center(39.1% vs 38.2%) or county containing a MSA (21.7% vs 19.7%); however, this difference was marginal (p=0.044).

Using *proc surveyfreq*, a weighted chi-square analysis at a significance level of p=0.05, it was determined that reasons for delayed medical care varied significantly by

age group ($p<0.0001$). Individuals within the oldest-old age group were less likely to delay medical care due to being unable to get an appointment soon enough. In contrast the likelihood of delaying medical care due to lack of transportation was significantly higher in the oldest-old age group (62.4%) when compared to individuals aged 60 to 69 (24.6%).

Using *proc surveyfreq,*an additional weighted chi-square analysis at a significance level of $p=0.05$ was conducted to determine if reasons for delayed medical care varied by income level. After comparing distribution of reasons for delayed care by income groups, it was determined that there were significant differences between income categories (Table 3). The likelihood of reporting "couldn't get an appointment soon enough" increased with income; higher incomes were more likely to report "couldn't get an appointment soon enough" as the primary reason for delayed care. In contrast, when looking at unadjusted, crude odds ratios, income level and "didn't have transportation" were inversely rated. As income increased, the likelihood of reporting lack of transportation as the primary reason for delayed care decreased. Conversely "other" reasons for delayed care increased across income categories; as income bracket increased, so did the likelihood of attribute delayed in medical care to "other" reasons.

Next, unadjusted, crude odds ratios were assessed for each covariate and response variable (Table 4). For "Couldn't get through on the telephone" associations was significant for residence outside of MSA. For "couldn't get an appointment soon enough" crude odds ratios were significant for the lowest two income levels, living alone, and disability. For "once you got there, you had to wait too long to see the doctor," crude odds ratios were significant at the lowest income level, lowest two education levels, and

race. For "Once you got there, you had to wait too long to see the doctor, crude odds ratios were significant for lowest two education levels. For "the clinic wasn't open when you got there" crude odds ratios were significant for age group and the highest income group (attended college or technical school). Lastly for lack of transportation, crude odds ratios were significant for age group, income group, living alone, disability, education, race, insurance, veteran, and sex (9 of 10 possible variables).

Polytomous Logistic Regression

A fully adjusted model (Table 5) was used to assess the model including all possible two-way effect modifiers and confounders. Using backward elimination modeling, all interaction terms which were not statistically significant were then removed in order to develop the most parsimonious mode. The only interaction term remaining after this process was AgeGroup*IncomeGroup. The inclusion of this interaction term is in line with the theoretical framework data as well as presented in previous tables. The most parsimonious model (Table 6) included age, income, disability, race/ethnicity, and primary source of health coverage. However, for the final model (Table 7) education level was added back in since it met a priori criteria and had shown a strong relationship to outcome variable in earlier analyses.

This final model indicates that after controlling for disability, education, race, and primary insurance, reasons for delayed medical care differ significantly between the old and oldest-old. However, income level is an effect modifier of this relationship. The relationship between age group and reason for delayed care varies significantly by income level. This is particularly true for the lowest income group, in which oldest-old are significantly less likely to delay care due to not being able to get an appointment soon

enough, having to wait too long to see the doctor, the office being closed when they got there, and lack of transportation. This was different than the results shown in unadjusted, crude odds ratios in Table 4.

Factors to Reasons for Delay in Medical Care

Analyses show that after accounting for sex, race, education level, language, living alone, veteran status, disability, residence in metro area, income, and primary source of healthcare, reasons for delayed medical care differ significantly by age group (old vs. oldest-old). However, income was an effect modifier of the relationship between age group and reasons for delayed medical care. Across all income categories, after controlling for interaction and potential confounders, there was no category in which oldest-old were more likely to delay medical care. Instead, they were often less likely to do so.

The only reason which saw no significant difference between the two age groups was "couldn't get through on the telephone." Differences between age groups existed in remaining four of the five categories analyzed; however, these differences were seen most frequently within the lowest income level (<$15,000). In this lowest income level, the oldest-old were less likely to attribute their delay in medical care due to inability to get appointment soon enough, having to wait too long to see the doctor, the office being closed when they got there, and lack of transportation. While there was no significance between age groups at the second income level ($15,000 to less than $25,000), the two age groups differed in the third income level ($25,000 to less than $35,000). At this income level, individuals within the oldest-old age group were significantly less likely to

report delay in medical care was due to inability to get appointment soon enough and having to wait too long to see doctor.

Covariates other than primary predictor variable of interest (age group) were found to have significant relationship on the reasons for delayed medical care. Individuals with disability were 28% less likely to report they couldn't get an appointment soon enough. However, they were 98% more likely to report lack of transportation than individuals without a disability.

Education level was also related for delayed care. For both "couldn't get through on telephone" and "once you got there, you had to wait too long to see the doctor," the odds of classifying this as the reason for delayed care was inversely related to education. As education level increased, it was less likely that this was the reason for delayed care. When compared to individuals with higher education level, individuals with lower education level were also more likely to attribute delayed care was due to lack of transportation.

Race was also significantly related to reasons for delayed care. Individuals who were a non-white minority were 77% less likely to attribute their delay in medical care to inability to get through on telephone and 76% less likely to attribute the delay to the clinic being closed once they got there.

The only covariate which significantly related to reason for delay across all categories was primary insurance. Individuals who reported Medicare as their primary source of healthcare were significantly less likely to report delays due to each of the responses. This difference was significant in each of the response categories.

As presented in the final table (Table 6), after accounting for sex, race, education level, language, living alone, veteran status, disability, residence in metro area, income, and primary source of healthcare, there is sufficient evidence to reject the null hypothesis that reasons for delayed medical care do not significantly differ between the old and oldest-old. Therefore, we conclude that reasons for delayed medical care differ among older adults between the two age groups.

DISCUSSION

Analyses indicate that old (65-79) and oldest-old (80 and older) differ in four of the five reasons for delayed medical care. Income was an effect modifier of this relationships with differences most frequently seen within the lowest income level (<$15,000). In addition, disability, education level, race, and primary insurance were all significantly related to reasons for delayed medical care. These findings align with prior literature (26, 28, 29, 31, 32)

Strengths and Limitations

One strength of this study is that BRFSS data survey allows for the examination of the relationship between age and reasons for delayed medical care in a diverse population of older adults across the United States. Due to the nationally representative nature of BRFSS, the sample size was large allowing for comparison between the two smaller age group as well as precision of estimates. Another strength of this study, due to the robust dataset provided by BRFSS, was the ability to adjust for many potential effect modifiers across both age categories.

Despite these strengths, this study does have several limitations. One limitations of this study was the exclusion of who did not have a telephone. Thought it is estimated that over 98% of older adults have a telephone in their household, there may be significant differences between individuals with/without a telephone. Similarly, a major limitation is the exclusion of older adults living in institutionalized settings such as a long-term care facility. While these individuals would be under constant medical care presently, they may have had incidents of delayed medical care prior to long-term care admission. These institutionalized individuals, particularly those admitted to long-term care within the past year, may have relevant data to this study. There was also a large number of individuals who reported they did delay care, but it was due to "other" reasons. Data was unable to be analyzed for these individuals, so it is unclear what reasons classified as "other" were. Lastly, a limitation of this study is the reliance on self-reported data, which may introduce recall bias. Individuals may not accurately remember the reason which lead to delayed medical care, particularly if there has been a significant time lapse since the occurrence.

One major limitation of this study was the lack of data on multiple insurances or presence of coinsurance. Lower income older adults are likely to be dual eligible or have both Medicare and Medicaid. However, the variable used to measure insurance coverage simply asked for "primary source of health coverage." In dual eligible individuals, Medicare is considered their primary insurance with Medicaid serving as a secondary; therefore, it is unclear if differences between groups is related to the presence of coinsurance. This may be particularly true among the oldest-old, an age category in which Medicaid enrollment may become more likely due to decreased income, increased

healthcare costs, and reduction in household size due to death of a spouse. Enrollment in Medicaid is particularly important in relation to transportation as a reason for delayed medical care, as federal law mandates that state Medicaid agencies must ensure that beneficiaries have non-emergency transportation to and from medical providers. [1]

Public Health Implications and Recommendations

Many services aimed to increase healthcare access have grouped all individuals ages 65 and older together in one service category; however, this may be too broad of a category by which to effectively target services. Analyses presented indicate that among older adults, reason for delay seeking medical care varies between old (65-79) and oldest-old (80 and older).

Though this study analyzed differences between old and oldest-old in relation to delayed medical care, further in-depth studies are needed. Although the BRFSS questionnaire asks participants their primary source of healthcare, it would be a valuable addition to include an additional question to assess the presence/absence of any coinsurance. This additional data would allow researchers to determine the effect of this coinsurance on decreasing barriers to healthcare when compared to traditional Medicare.

This study was one of few designed to examine the differences in delayed medical care between old and oldest-old adults. Despite the study limitations, these data gives an overview of the barriers older adults face when accessing healthcare. As this population continues to comprise a larger proportion of the overall population, it is important to gain a deeper understanding of these barriers in order to more effectively target services.

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APPENDIX A – TABLES AND FIGURES

Table 1. Weighted Characteristics of individuals 60-79 and 80+

Characteristic	Total		Ages 60 to 79		Ages 80+		
	n	%*	n	%*	n	%*	p-value
Sex							
Male	1,371,450	*38.6%*	1,034,978	*39.6%*	336,472	*36.6%*	0.055
Female	2,185,205	*61.4%*	1,576,493	*60.4%*	608,712	*64.4%*	
Race / Ethnicity							
White	2,523,681	*88.0%*	1,855,255	*88.1%*	668,425	*87.5%*	0.190
Non-White, Minority	345,532	*12.0%*	250,031	*11.9%*	95,502	*12.5%*	
Education							
Did not graduate High School	780,215	*22.1%*	562,769	*21.6\%*	217,447	*23.4%*	0.132
Graduated High School	109,724	*31.1%*	795,618	*30.6%*	301,623	*32.5%*	
Attended College or Technical School	990,806	*28.1%*	758,618	*29.2%*	232,188	*25.0%*	
Graduated from College or Technical School	657,570	*18.7%*	480,286	*18.5%*	177,284	*19.1%*	
English as primary Language	3,359,902	*94.5%*	2,471,300	*94.6%*	888,602	*94.1%*	0.750
Lives Alone	1,000,687	*37.5%*	648,894	*33.3%*	351,793	*48.3%*	<0.001**
Veteran	716,825	*20.2%*	516,685	*19.8%*	200,140	*21.2%*	0.330
Disability	1,958,925	*55.1%*	1,421,978	*54.5%*	536,947	*56.8%*	0.222
MS Code							
In the center city of an MSA	1,013,082	*38.5%*	733,902	*38.2%*	279,180	*39.1%*	0.044**
Outside the center city of an MSA but inside the county containing the center city	532,548	*20.3%*	377,490	*19.7%*	155,058	*21.7%*	
Inside a suburban county of the MSA	493,827	*18.8%*	352,058	*18.4%*	141,769	*19.9%*	
Not in an MSA	590,840	*22.5%*	453,622	*23.7%*	137,218	*23.2%*	
Income Level							
< $15,000	595,896	*21.0%*	444,143	*20.5%*	151,753	*22.9%*	0.012**
$15,000 to <$25,000	801,407	*28.3%*	584,726	*27.0%*	216,681	*32.7%*	
$25,000 to <$35,000	415,084	*14.7%*	331,127	*15.3%*	83,957	*12.7%*	
$35,000 to < $50,000	394,648	*13.9%*	314,502	*14.5%*	80,147	*12.1%*	
$50,000 or more	624,900	*22.1%*	494,621	*22.8%*	130,279	*19.7%*	
Primary Source of Health Care Coverage							
Medicare	1,983,868	*81.1%*	152,566	*81.4%*	454,302	*80.1%*	0.517
Other	463,460	*18.9%*	350,698	*18.7%*	112,762	*19.9%*	

*Valid Percent

** Significant at p=0.05

Table 2. Weighted Analysis of Reasons for delayed Medical care among individuals ages 60-79 and 80+

	Ages 60 to 79		**Ages 80+**		
	n	%	n	%	p-value
You couldn't get through on the telephone	148,639	*5.8%*	46,504	*4.9%*	<0.0001
You couldn't get an appointment soon enough	788,697	*30.5%*	217,358	*23.0%*	
Once you got there, you had to wait too long to see the doctor	413,794	*16.0%*	155,682	*16.5%*	
The (clinic/doctor's) office wasn't open when you got there.	61,820	*2.4%*	34,398	*3.6%*	
You didn't have transportation	614,125	*23.8%*	306,561	*32.4%*	
Other	557,396	*21.6%*	184,682	*19.5%*	

Table 3. Weighted Analysis of Reasons for delayed Medical Care by Income Group

	<15,000		**$15,000 to <$25,000**		**$25,000 to <$35,000**		**$50,000**		**> $50,000**		
	n	*%*	n	*%*	n	*%*	n	*%*	n	*%*	p-value
You couldn't get through on the telephone	18,944	*3.2%*	35,411	*4.4%*	30,243	*7.3%*	26,933	*6.8%*	33,121	*5.3%*	<0.0001
You couldn't get an appointment soon enough	97,498	*16.4%*	183,657	*22.9%*	124,780	*30.1%*	129,133	*37.7%*	265,812	*42.5%*	
Once you got there, you had to wait too long to see the doctor	35,469	*16.0%*	122,123	*15.2%*	63,648	*15.3%*	71,694	*18.2%*	111,477	*17.8%*	
The (clinic/doctor's) office wasn't open when you got there.	12,889	*2.2%*	19,866	*2.5%*	12,613	*3.0%*	13,186	*3.3%*	20,242	*3.2%*	
You didn't have transportation	292,768	*49.1%*	277,991	*34.7%*	84,884	*20.5%*	57,438	*14.6%*	42,924	*6.9%*	
Other	78,329	*13.1%*	162,359	*20.3%*	98,916	*23.8%*	96,263	*24.4%*	151,324	*24.2%*	

Table 4. Unadjusted Reasons for Delayed Medical care

Characteristic	You couldn't get through on the telephone Crude			You couldn't get an appointment soon enough Crude			Once you got there, you had to wait too long to see the doctor Crude			The (clinic/doctor's) office wasn't open when you got there. Crude			You didn't have transportation Crude		
	Odds Ratio	95% C.I.	p-value	Odds Ratio	95% C.I.	p-value	Odds Ratio	95% C.I.	p-value	Odds Ratio	95% C.I.	p-value	Odds Ratio	95% C.I.	p-value
Age															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.94	(0.68, 1.31)	0.73	0.83	(0.68, 1.02)	0.08	1.14	(0.90, 1.43)	0.28	1.68	(1.06, 2.65)	0.03	1.44	(1.14, 1.81)	0.00
Income															
< $15,000	1.11	(0.67, 1.83)	0.85	0.71	(0.51, 0.98)	0.58	1.65	(1.15, 2.37)	0.00	1.23	(0.53, 2.82)	0.53	13.18	(8.93, 18.43)	<0.001
$15,000 to <$25,000	1.00	(0.65, 1.53)	0.35	0.64	(0.50, 0.83)	0.07	1.02	(0.75, 1.40)	0.57	0.92	(0.60,1.68)	0.59	0.92	(0.50, 1.68)	<0.001
$25,000 to <$35,000	1.40	(0.81, 2.42)	0.32	0.72	(0.52, 1.00)	0.66	0.87	(0.59, 1.30)	0.13	0.95	(0.50, 1.82)	0.76	3.03	(1.93, 4.76)	0.35
$35,000 to < $50,000	1.28	(0.73, 2.25)	0.59	0.76	(0.57, 1.03)	0.95	1.01	(0.69, 1.48)	0.61	1.02	(0.54, 1.93)	0.98	2.10	(1.34, 3.30)	0.00
$50,000 or more	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Live Alone															
Yes	0.80	(.58, 1.10)	0.18	0.68	(0.56, 0.82)	<0.001	0.85	(0.69,1.06)	0.15	0.79	(0.52, 1.18)	0.25	1.62	(1.33, 1.97)	<0.0001
No	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Residence in Metropolitan Area															
In the center city of an MSA	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Outside the center city of an MSA but inside the county containing the center city	1.20	(0.74, 1.94)	0.20	1.10	(0.81, 1.48)	0.77	0.85	(0.60, 1.20)	0.46	0.71	(0.33, 1.55)	0.38	0.99	(0.73, 1.93)	0.92
Inside a suburban county of the MSA	1.18	(0.72, 1.93)	0.23	1.11	(0.81, 1.51)	0.70	0.90	(0.64, 1.27)	0.82	1.01	(0.55, 1.84)	0.60	1.06	(0.77, 1.46)	0.47
Not in an MSA	0.60	(0.42, 0.86)	0.00	1.05	(0.83, 1.33)	0.87	0.96	(0.73, 1.26)	0.67	0.93	(0.55, 58)	0.86	0.87	(0.69, 1.10)	0.15
Disability															
Yes	0.84	(0.62, 1.13)	0.25	0.73	(0.61, 0.87)	0.00	0.93	(0.75, 1.14)	0.48	0.75	(0.50, 1.11)	0.15	3.17	(2.58, 3.90)	0.00
No	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Education Group															
Did not graduate High School	1.41	(0.90, 2.23)	0.64	0.73	(0.53, 0.99)	0.08	1.56	(1.10, 2.22)	0.05	1.31	(0.74, 2.32)	0.97	4.88	(3.49, 6.83)	<0.0001
Graduated High School	1.53	(1.07, 2.20)	0.21	0.89	(0.71, 1.11)	0.92	1.52	(1.17, 1.99)	0.02	1.44	(0.92, 2.26)	0.58	2.85	(2.21, 3.67)	0.01
Attended College or Technical School	1.36	(0.95, 1.96)	0.76	0.95	(0.76, 1.17)	0.37	1.00	(0.76, 1.33)	0.02	1.61	(1.00 2.58)	0.24	2.10	(1.63, 2.72)	0.21
Graduated from College or Technical School	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Race / Ethnicity															
White	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Non-White Minority	1.26	(0.55, 2.85)	0.59	0.74	(0.50, 1.08)	0.11	0.59	(0.38, 0.90)	0.02	0.72	(0.25, 2.04)	0.54	0.42	(0.27, 0.67)	0.00
Primary Insurance															
Medicare	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Other	1.26	(0.77, 2.08)	0.35	1.35	(0.97, 1.88)	0.08	1.42	(0.97, 2.06)	0.07	1.28	(0.68, 2.42)	0.45	1.80	(1.26, 2.58)	0.00
Veteran															
Yes	1.04	(0.69, 1.55)	0.87	1.15	(0.93,1.42)	0.21	1.03	(0.802, 1.33)	0.80	1.24	(0.81, 1.91)	0.32	0.61	(0.47,0.78)	0.00
No	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
Sex															
Male	0.85	(0.61, 1.17)	0.31	1.15	(0.96, 1.39)	0.13	1.08	(0.87, 1.34)	0.46	1.06	(0.72, 1.56)	0.76	0.70	(0.55, 0.88)	0.00
Female	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	

Table 5. Fully Adjusted Model

	Fully Adjusted Model														
	You couldn't get through on the telephone			You couldn't get an appointment soon enough			Once you got there, you had to wait too long to see the doctor			The (clinic/doctor's) office wasn't open when you got there.			You didn't have transportation		
	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^
Age															
< $15,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.60	(0.11, 3.30)		0.11	(0.03, 0.37)		0.22	(0.10, 0.84)		0.07	(0.01, 0.57)		0.19	(0.06, 0.57)	
$15,000 to <$25,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.87	(0.22, 3.38)		0.50	(0.22, 1.13)		0.46	(0.17, 1.24)		0.24	(0.03, 1.77)		0.51	(0.20, 1.28)	
$25,000 to <$35,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.24	(0.05, 1.15)		0.38	(0.15, 0.95)		0.24	(0.08, 0.78)		0.65	(0.07, 6.52)		1.13	(0.29, 2.67)	
$35,000 to < $50,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	2.54	(0.07, 2.21)		1.61	(0.23, 1.73)		2.53	(0.12, 1.26)		0.81	(0.08, 8.26)		1.54	(0.45, 5.31)	
Age*Income Group			0.96			0.00			0.08			0.02			0.00
Live Alone															
Yes	0.62	(0.39, 1.00)		0.77	(0.58, 1.02)		0.72	(0.40, 1.04)		0.84	(0.46, 1.51)		1.01	(0.74, 1.37)	
No	1.00	--	0.05	1.00	--	0.07	1.00	--	0.08	1.00	--	0.55	1.00	--	0.97
MSCode															
In the center city of an MSA	1.00	---	0.05	1.00	---	0.50	1.00	---	0.41	1.00	---	0.15	1.00	---	0.01
Outside the center city of an MSA but inside the county containing the center city	1.66	(0.914-3.003)		0.99	(0.693-1.416)		0.90	0.575-1.422)		0.58	(0.265-1.254)		1.11	(0.753-1.641)	
Inside a suburban county of the MSA	1.29	(0.658-2.520)		0.87	(0.581-1.297)		0.82	0.505-1.345)		0.84	(0.368-1.899)		0.91	(0.576-1.422)	
Not in an MSA	0.66	(0.387-1.113)		1.13	(0.824-1.549)		0.84	0.580-1.238)		0.55	(0.288-1.068)		0.66	(0.474-0.930)	
Disability															
Yes	0.67	(0.42, 1.08)		0.72	(0.55, 0.95)		0.77	(0.54, 1.10)		0.57	(0.315, 1.02)		1.98	(1.42, 2.75)	
No	1.00	--	0.10	1.00	--	0.02	1.00	--	0.15	1.00	--	0.06	1.00	--	<0.0001
Education Group			0.01			0.83			0.00			0.21			0.01
Did not graduate High School	3.75	1.713-8.196		1.14	(0.684-1.908)		2.48	1.359-4.525)		2.20	(1.0-4.829)		2.06	(1.258-3.371)	
Graduated High School	1.80	(0.924-3.491)		0.98	(0.685-1.399)		1.97	1.274-3.054)		2.20	(1.00-4.829)		1.55	(1.06-2.27)	
Attended College or Technical School	1.85	(1.05-3.23)		1.07	(0.768-1.48)		1.59	(1.012-2.50)		2.82	(1.318-6.041)		1.43	(0.992-2.069)	
Graduated from College or Technical School	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
Race / Ethnicity															
White	1.00	--	0.02	1.00	--	0.31	1.00	--	0.75	1.00	--	0.01	1.00	--	0.91
Non-White Minority	0.21	(0.059-0.783)		1.42	(0.692-2.921)		1.18	0.494-2.819)		0.19	(0.05-0.67)		0.95	(0.421-2.122)	
Primary Insurance															
Medicare	1.00	--	0.02			0.00	1.00	--	0.01	1.00	--	0.06	1.00	--	0.02
Other	2.13	(1.01-4.125)		1.95	(1.348-2.827)		1.77	(1.138-2.74)		2.07	(0.961-4.45)		1.61	(1.06-2.45)	
Veteran															
Yes	1.15	(0.491-2.677)	0.75	0.89	(0.574-1.377)	0.57	0.95	0.557-1.610	0.88	0.80	(0.329-1.957)	0.72	0.66	(0.397-1.092)	0.10
No	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
Sex															
Male	1.00	--	0.10	1.00	--	0.46	1.00	--	0.72	1.00	--	0.55	1.00	--	0.95
Female	0.57	(0.297-1.08)		1.14	(0.776-1.682)		1.11	(0.685-1.81)		1.34	(0.663-2.694)		0.99	(0.637-1.527)	

All logistic regression models included age by group (60-79 and 80+) as well as the other indicated variables

*OR=Odds Ratio

†95% C.I. = 95% Confidence Interval

^Wald p-value = chunk test for overall significance of variable

Table 6. Most Parsimonious Model

	Most Parsimonious Model														
	You couldn't get through on the telephone			You couldn't get an appointment soon enough			Once you got there, you had to wait too long to see the doctor			The (clinic/doctor's) office wasn't open when you got there.			You didn't have transportation		
	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^	OR*	95% C.I.†	Wald p-value ^
Age															
< $15,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.56	(0.10, 3.05)		0.11	(0.03, 0.34)		0.19	(0.05, 0.73)		0.07	(0.01, 0.56)		0.19	(0.07, 0.56)	
$15,000 to <$25,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.91	(0.23, 3.62)		0.47	(0.21, 1.05)		0.42	(0.15, 1.14)		0.22	(0.03, 1.65)		0.53	(0.21, 1.32)	
$25,000 to <$35,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.21	(0.03, 1.65)		0.35	(0.14, 1.11)		0.22	(0.07, 1.45)		0.60	(0.06, 6.15)		0.86	(0.29, 2.55)	
$35,000 to < $50,000															
65-79	1.00	---		1.00	---		1.00	---		1.00	---		1.00	---	
80+	0.36	(0.07, 1.99)		1.70	(0.21, 1.63)		0.34	(0.11, 1.10)		1.49	(0.78, 5.05)		1.48	(0.44, 5.00)	
Age*Income Group			0.95			0.00			0.06			0.01			0.00
Disability															
Yes	0.70	(0.43, 1.12)		0.72	(0.55, 0.94)		0.78	(0.55, 1.11)		0.59	(0.33, 1.06)		2.00	(1.44, 2.78)	
No	1.00	--	0.01	1.00	--	0.02	1.00	--	0.16	1.00	--	0.08	1.00	--	<0.0001
Race / Ethnicity															
White	1.00	--	0.03	1.00	--	0.25	1.00	--	0.36	1.00	--	0.02	1.00	--	0.74
Non-White Minority	0.27	(0.084-0.872)		1.54	(0.752-3.142)		1.44	(0.594-3.480)		0.24	(0.072-0.809)		1.15	(0.508-2.580)	
Primary Insurance															
Medicare	1.00	--	0.03	1.00	--	0.00	1.00	--	0.00	1.00	--	0.04	1.00	--	0.04
Other	2.10	(1.091-4.037)		1.96	(1.374-2.80)		1.79	(1.177-2.716)		2.16	(1.047-4.442)		1.51	(1.013-2.240)	

All logistic regression models included age by group (60-79 and 80+) as well as the other indicated variables

*OR=Odds Ratio

†95% C.I. = 95% Confidence Interval

^Wald p-value = chunk test for overall significance of variable

Table 7. Final Model

	Final Model														
	You couldn't get through on the telephone			You couldn't get an appointment soon enough			Once you got there, you had to wait too long to see the doctor			The (clinic/doctor's) office wasn't open when you got there.			You didn't have transportation		
	OR*	95% C.I.†	*Wald p-value* ^	OR*	95% C.I.†	*Wald p-value* ^	OR*	95% C.I.†	*Wald p-value* ^	OR*	95% C.I.†	*Wald p-value* ^	OR*	95% C.I.†	*Wald p-value* ^
Age															
< $15,000															
65-79	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
80+	0.58	(0.10, 3.18)		0.11	(0.03, 0.35)		0.20	(0.05, 0.77)		0.07	(0.01, 0.57)		0.19	(0.06, 0.58)	
$15,000 to <$25,000															
65-79	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
80+	0.90	(0.22. 3.60)		0.44	(0.21, 1.06)		0.42	(0.15, 1.15)		0.24	(0.03, 1.70)		0.53	(0.21, 1.32)	
$25,000 to <$35,000															
65-79	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
80+	0.23	(0.05, 1.12)		0.36	(0.14, 0.92)		0.23	(0.07 , 0.73)		0.64	(0.06, 6.43)		0.89	(0.30, 2.68)	
$35,000 to < $50,000															
65-79	1.00	--		1.00	--		1.00	--		1.00	--		1.00	--	
80+	0.39	(0.07, 2.18)		0.58	(0.21, 1.62)		0.37	(0.12, 1.19)		0.80	(0.08, 8.30)		1.55	(0.46, 5.23)	
Age*Income Group			0.95			0.00			0.06			0.01			0.00
Disability															
Yes	0.68	(0.42, 1.09)		0.72	(0.55, 0.94)		0.77	(0.55, 1.10)		0.59	(0.33, 1.05)		1.98	(1.42, 2.75)	
No	1.00	--	0.11	1.00	--	0.02	1.00	--	0.15	1.00	--	0.07	1.00	--	<0.0001
Education Group															
Did not graduate High School	3.64	(1.65, 8.03)		1.21	(0.73, 2.01)		2.52	(1.40, 4.54)		2.05	(0.79, 5.30)		1.97	(1.00 - 3.89)	
Graduated High School	1.97	(1.00 - 3.89)		1.00	(0.70, 1.43)		1.96	(1.27, 3.01)		1.98	(0.94, 4.20)		1.54	(1.05, 2.25)	
Attended College or Technical School	1.93	(1.09, 3.40)		1.09	(0.79, 1.51)		1.58	(1.01, 2.48)		2.65	(1.28, 5.50)		1.41	(0.98, 2.03)	
Graduated from College or Technical School	1.00	--	0.01	1.00	--	0.68	1.00	--	0.00	1.00	--	0.27	1.00	--	0.01
Race / Ethnicity															
White	1.00	--	0.02	1.00	--	0.30	1.00	--	0.53	1.00	--	0.02	1.00	--	0.89
Non-White Minority	0.23	(0.07, 0.77)		1.47	(0.71, 3.05)		1.32	(0.55, 3.16)		0.24	(0.07, 0.83)		1.06	(0.47, 2.39)	
Primary Insurance															
Medicare	1.00	--	0.03	1.00	--	0.00	1.00	--	0.01	1.00	--	0.04	1.00	--	0.05
Other	2.02	(1.07, 3.83)		1.95	(1.36, 2.78)		1.78	(1.17, 2.71)		2.10	(1.03, 4.28)		1.50	(1.01, 2.22)	

All logistic regression models included age by group (60-79 and 80+) as well as the other indicated variables

*OR=Odds Ratio

†95% C.I. = 95% Confidence Interval

^Wald p-value = chunk test for overall significance of variable