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Entitled

RISKS AND HEALTH CONSEQUENCES OF FORGOING, DELAYING, OR HAVING TROUBLE ACCESSING NEEDED HEALTH CARE AMONG MEDICARE BENEFICIARIES

For the degree of Doctor of Philosophy

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7/25/2016

Date



RISKS AND HEALTH CONSEQUENCES OF FORGOING, DELAYING, OR  
HAVING TROUBLE ACCESSING NEEDED HEALTH CARE AMONG MEDICARE  
BENEFICIARIES

A Dissertation

Submitted to the Faculty

of

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by

Angelitta M. Spells

In Partial Fulfillment of the  
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of

Doctor of Philosophy

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West Lafayette, Indiana

For my parents, sister, and husband.

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## ABSTRACT

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Medicare provides health care coverage for approximately 93% of non-institutionalized older adults. Compared to uninsured adults, Medicare beneficiaries have greater access to needed healthcare including preventative care. However, disparities in accessing needed health care still exist among Medicare beneficiaries. Prior research has described barriers to accessing needed health care among older Medicare beneficiaries, such as transportation and health system characteristics, but little is known about prevalence, risks, or health consequences of older Medicare beneficiaries delaying, forgoing, or having trouble accessing needed health care. The three studies included in this dissertation followed a nationally representative sample of older Medicare beneficiaries to describe the phenomenon of older adults delaying, forgoing, or having trouble getting needed care.

Study 1 described the prevalence and risks of Medicare beneficiaries forgoing, delaying, or having trouble getting needed health care. Estimates of the prevalence and risks for forgoing, delaying, or having trouble accessing needed care were estimated separately for five years beginning with 2006 and ending in 2010 using the Medicare Current Beneficiary Survey (MCBS). A meta-analysis was conducted to determine overall effect sizes for the five years of data. Study results revealed that about one in every nine older Medicare beneficiaries reported forgoing, delaying, or having trouble accessing needed health care. Beneficiaries most likely to report going without or having trouble getting needed care were more likely to be of minority status, younger, female, more educated, live in a non-metropolitan area, have a lower annual income, have no supplementary insurance, be in poorer health, and have multiple chronic conditions or disabilities. This study confirmed that disparities in accessing needed care exist among

Medicare beneficiaries. The study findings also revealed that those most likely to delay, forgo, or have trouble accessing needed care are among the most vulnerable Medicare beneficiaries due to their multiple chronic conditions or disabilities.

The second study examined whether reports of forgoing, delaying, or having trouble accessing needed health care was prognostic of receiving an influenza vaccination in the following year. This study followed the 2006-cohort and 2007-cohort from the 2007 Medicare Current Beneficiary Survey to determine if receipt of the influenza vaccination in 2008 was associated with forgoing, delaying, or having trouble accessing needed health care. Nearly one in every four older Medicare beneficiaries reported not receiving an influenza vaccination. Those who reported forgoing, delaying, or having trouble accessing needed health care were significantly less likely (OR = 0.749; 95% CI = 0.609, 0.922) to receive an influenza vaccination the following year. Findings suggest that forgoing, delaying, or having trouble accessing needed healthcare increases risk for vaccination non-compliance; which in turn can increase risk for experiencing adverse health outcomes associated with influenza. The results of this study suggest that more proactive measures may be needed to increase vaccination rates among older adults who forgo, delay, or have trouble accessing needed health care.

Study 3 examined whether reports of forgoing, delaying, or having trouble accessing needed care were prognostic of hospital admissions among older Medicare beneficiaries. Number and length of hospital admissions in 2010 were determined for respondents to the 2009 MCBS survey. Results revealed that forgoing, delaying, or having trouble accessing needed care was not prognostic (Hazards Ratio = 0.905; 95% CI = 0.722, 1.134) of future hospital admissions after adjusting for other risk factors associated with hospitalizations. Findings suggest that there may be potential confounding between forgoing, delaying, or having trouble accessing needed health care and hospital admissions. Further work should be considered to examine potential confounders and/or other health outcomes.

The three studies in this dissertation improve our understanding of the prevalence, risks, and consequences of older Medicare beneficiaries forgoing, delaying, or having trouble accessing needed health care. The findings will inform the importance of

developing interventions or policies aimed at improving older Medicare beneficiaries' access to needed health care.

## CHAPTER 1. INTRODUCTION

### 1.1 Introduction

Older adults represent approximately one in every seven Americans, approximately 14.1% or 44.7 million (AoA, 2014). This subpopulation is one of the fastest growing age groups and is expected to nearly double by the year 2060 (AoA, 2014). Health care advancements over the last several decades have increased the life expectancy of older adults by nearly 4.2 years (AoA, 2014), but increases in life expectancy do not necessarily mean that older adults have fewer chronic diseases. Healthcare advances have led to older adults living longer with chronic diseases. Eighty percent of older adults require ongoing care for at least one chronic condition or more such as arthritis, diabetes, dementia, cardiovascular disease, or hypertension (Thorpe et al, 2011). Further, many of these conditions are not well-managed (Egan, Zhao, & Axon, 2010; Hoffman & Schwartz, 2008; McGlynn et al, 2003; Seeman et al, 2010; Wilper et al, 2008).

Less than half of older Americans are up-to-date on core preventive services such as immunizations, screenings, and vaccinations (Benson, 2012; HHS, 2010; Shenson et al, 2007, Shenson, 2011). Shenson and colleagues (2007) reported that only 40% of men and 33% of women aged 65 years or over were up-to-date on all recommended preventive services for adults in this age group. This suggests that older adults often lack key preventive services that reduce the burden of disease.

A common misconception about older adults is that Medicare eliminates barriers to health care access; however, more recent studies have shown the opposite. Thorpe and colleagues (2011) found that older adults who reported experiencing barriers were most likely to live in a rural area, lack sufficient health insurance, have depressive symptoms, have speech limitations, and have affordability issues. Fitzpatrick and colleagues (2004) conducted a similar study of older Medicare beneficiaries and found a variety of common barriers to seeing a physician reported by beneficiaries. These barriers included

transportation, medical bills, lack of supplemental insurance, older age, and low income (Fitzpatrick et al, 2004). Barriers in accessing needed primary care has been shown in other populations to lead to poorer continuity of health care, ultimately, result in suboptimal quality of care, reduced quality of life, poorer health outcomes, and increased healthcare expenses (Alazari et al, 2007; Shin et al, 2014). As the population of older adults continues to grow rapidly so will their healthcare needs, thus increasing demands on our current health care system and posing a serious challenge to the federal health care budget. Developing effective strategies to enhance healthcare access will ultimately improve health outcomes and reduce health care costs among Medicare beneficiaries.

To date no published studies have examined the risks and potential health outcomes of older Medicare beneficiaries forgoing, delaying, or having trouble getting needed health care. The research reported in this dissertation explored the risk factors associated with forgoing, delaying, or having trouble accessing needed care among older Medicare Beneficiaries and examine potential adverse health outcomes associated with this behavior. Findings of this study will apprise health care providers which older patients are most likely to forgo, delay, or have trouble accessing needed health care. Study findings will also inform policy makers about the prevalence and consequences of forgoing, delaying, or having trouble accessing needed health care.

## 1.2 Study Aims

### 1.2.1 Study 1

The purpose of the first study was to describe the associations between individual-level predisposing, enabling, and need characteristics and forgoing, delaying, or having trouble accessing needed care among older Medicare beneficiaries.

### 1.2.2 Study 2

The primary aim of the second study was to examine the prognostic association between reports of forgoing, delaying, or having trouble getting needed medical care and receipt of the influenza vaccine among older Medicare beneficiaries.

### 1.2.3 Study 3

The aim of the third study was to determine whether forgoing, delaying, or having trouble accessing needed care predicts future hospitalization admissions among older Medicare beneficiaries.



## CHAPTER 2. LITERATURE REVIEW

### 2.1 Conceptualizing Forgoing, Delaying, or Having Trouble Accessing Needed Care in Terms of Access Among Older Medicare Beneficiaries

Access to care is one of the most common concepts considered when discussing quality of care, health care improvement, health care utilization, and health outcomes. Understanding risks and outcomes of accessing needed health care is critical for informing best public health practices and health care policy. Before the effects of accessing needed health care can be assessed, a thorough working definition is needed. There have been many studies over the last few decades that have attempted to conceptualize access to care. Despite these efforts, there is no consensus on how to define or operationalize the concept of health care access (Aday & Andersen, 1974; Berk and Schur, 1998; Daniels, 1982; Levesque, Harris, & Russell, 2013; Pechasky & Thomas, 1981; Waters, 2000; Whitehead, 1992).

Berk and Schur (1998) reviewed studies of health care access from 1982 to 1992 and concluded that there is little agreement about how to operationalize lack of access to care. Across the studies, operational definitions of access to care included: (a) insurance coverage, (b) inability to obtain care, (c) use of emergency room, services, and (d) having a health problem but not seeking medical attention (Berk & Schur, 1998). This lack of agreement has led to inconsistent prevalence estimates across studies. Berk and Schur (1998) compared results across many studies and found the prevalence of unmet needs for health services among the insured ranged from 1.7% to 11.0%. Estimates were even more varied for uninsured respondents; they ranged from 6.2% to 45% (Berk & Schur, 1998).

Health care access is commonly measured in three ways: (a) measures of specific resources that facilitate health, such as having a usual source of care or health insurance; (b) assessments of how easily patients can gain access to health care, and (c) utilization

measures (e.g., successful receipt of needed services)” (AHRQ, 2014). A 2005 AHRQ report evaluated methods from several national survey datasets and identified common access concepts and their corresponding operational definitions used to measure access to the health care system (see Table 2.1 below).

**Table 2.1. Access measurements and corresponding operational definitions across national survey datasets.**

Measure	Operational Definition	National Database
<b>Health Insurance Coverage</b>	% of persons with health insurance	NHIS
	% of persons with any private insurance coverage	NHIS
	% of persons with only public insurance coverage	NHIS
	% of persons uninsured all year	MEPS / MCBS
	% of persons with any period of public insurance during a year	MEPS / MCBS
	% of persons with any period of uninsurance during a year	MEPS / MCBS
	% of persons offered health insurance coverage through their employer or a family member's employer	MEPS / MCBS
<b>Usual Source of Care</b>	% of persons who have a specific source of ongoing care	NHIS
	% of persons in fair or poor health who have a specific source of ongoing care	NHIS
	% of persons with hospital outpatient department as usual source of care	NHIS
	% of persons with hospital emergency department as usual source of care	NHIS
	Main reason no usual source of healthcare	MEPS / MCBS
	% of persons with a usual primary care provider	MEPS / MCBS
	% of persons with community health center as usual source of care	Commonwealth
	% of persons with very little or no choice in source of care	Commonwealth
	Time with regular doctor (years)	Commonwealth
<b>Unmet Need</b>	% of families that experience difficulties or delays in obtaining health care or do not receive needed care for one or more family members	MEPS / MCBS
	Main problem that caused family member's difficulty, delay, or not receiving needed health care	MEPS / MCBS
	% of families in which a family member did not receive doctor's care or prescription medications because the family needed the money	MEPS / MCBS
	Satisfied that your family can get health care if they need it	MEPS / MCBS

Table obtained from Access to Care Measures: National Healthcare Disparities Report, 2002. May 2005. Agency for Healthcare Research and Quality, Rockville, MD.

<http://archive.ahrq.gov/research/findings/nhqrdr/nhdr02/premeasurea.html>

Notes: NHIS - National Health Interview Survey; MEPS – Medical Expenditure Survey; MCBS – Medicare Current Beneficiary Survey; Commonwealth – The Common Wealth Fund

Many of the measures described above are not relevant to Medicare Beneficiaries. For example, many studies have considered the availability of health insurance as an indicator of lack of access; but all Medicare Beneficiaries have some form of insurance coverage. Therefore, operationalizing access to care as whether or not a person has insurance is not relevant to Medicare Beneficiaries.

Many studies have operationalized access to care as having a usual source of care. Within the Medicare population, approximately 96% report having a usual source of care (Boccuti et al, 2013). In fact, older Medicare beneficiaries are more likely than privately insured young adults (aged 18 to 64 years) to have a usual source of care (Boccutti et al, 2013). This suggests that access to a usual care provider may not capture problems with access to health care among older Medicare beneficiaries. A more relevant measure may be whether they are able to access a health care provider when needed.

Over half of older Medicare beneficiaries get treated for at least five or more chronic conditions annually (Thorpe & Howard, 2006) and these individuals seek care from many different physicians each year (Bodenheimer, Chen, & Bennertt, 2009). The average Medicare beneficiary seeks care from two primary care physicians and at least five specialists in four different practices (Pham et al, 2007). Among older Medicare beneficiaries, definitions of access to care should include whether they delayed, or did not visit their health care provider when they had a problem that should have been seen by a health care provider.

In conclusion, older adults' Medicare coverage, multiple co-morbidities, disabilities, and health care utilization patterns suggest that studies of access to care in different populations are not as relevant to older adults. Instead, access to care for older adults should be defined in the context of their Medicare coverage and the health characteristics that increase their need for health care.

## 2.2 Accessing Needed Care Among Older Adults: Medicare

Since its introduction in 1965, Medicare has provided federal universal health insurance coverage to Americans aged 65 years and older and young people with End-Stage Renal Disease (ESRD), or certain long-term disabilities. Medicare is the largest

payer of healthcare services in the United States. In 2013 alone, Medicare covered approximately 93% of non-institutionalized adults 65 years and older (AoA, 2014). Individuals may become eligible for Medicare based on age, disability, or ESRD. In addition, individuals must work a certain number of Medicare-covered quarters (QCs), pay Medicare taxes while working, and file for social security benefits or railroad retirement board benefits. The number of required QCs varies depending on the reason for eligibility (i.e., age, disability, ESRD) (CMS, 2015a; Medicare, 2016). Currently, Medicare eligible beneficiaries can select coverage from five different plans: Part A (Hospital Insurance), Part B (Medical Insurance), Part C (Medicare Advantage/HMO/PPO), Part D (Prescription Drug Coverage), and Medigap (Medicare Supplement Insurance Policy).

Part A covers inpatient hospital services, skilled nursing, hospice care, and some home health care. It is also known as hospital insurance. There is typically no premium associated with Part A coverage except in special cases of disabilities and/or which an individual worked less than 40 quarters of Medicare-covered employment (HHS, 2014). In all cases, beneficiaries are responsible for annual deductibles that are associated with Part A. Part B is voluntary and offers most of the basic medical care coverage for primary care including physician visits, preventative services, and laboratory tests. While Part B provides the basic coverage needed for health care in the primary care setting, it does require co-pays and a monthly premium that is based off of a beneficiary's annual income.

In addition, beneficiaries' may also select a Medicare Advantage (MA) Plan (Part C). MA plans are offered and conducted by private insurance companies; they are Medicare-approved private health insurance companies (CMS, n.d.; Medicare, 2016). In addition to all of the basic coverage found within the Original Medicare Plans (Part A & Part B), these plans may offer additional services such as vision, hearing, and dental. Beneficiaries who select this plan may pay monthly premiums, co-pays, co-insurance, and annual deductibles associated with their selected MA plan, which vary depending on company and type of plan selected. Additionally, although MA plans must offer the basic services offered by Plan B, MAs do not always pay for Medicare Part B for beneficiaries.

Thus, beneficiaries may still be required to pay premiums and deductibles for Part B (CMS, n.d.; Medicare, 2016). Health Maintenance Organizations (HMOs) and Preferred Provider Organizations (PPOs) are just two of the many plans that fall under the MA plan umbrella.

Medicare Part D provides coverage for prescription drugs for beneficiaries. As with Part B and Part C, beneficiaries must pay a monthly premium, annual deductible, copay, and/or co-insurance for Part D. Lastly, a Medicare Supplement Insurance policy (Medigap) is another voluntary insurance plan that beneficiaries may acquire to assist in paying some of the cost associated with Original Medicare (e.g., premiums, co-pays, co-insurance, and deductibles) (CMS, n.d.; Medicare, 2016). Like Part C, Medigap is purchased from a private insurance company and does require a monthly premium. Although Medigap fills in the “gaps” not covered by Original Medicare coverage, Medigap plans rarely ever cover health services such as vision, dental, hearing, prescription drugs, private nurses, or long-term care. This supplement insurance mainly covers excess charges, deductibles, coinsurance, and copays associated with Original Medicare.

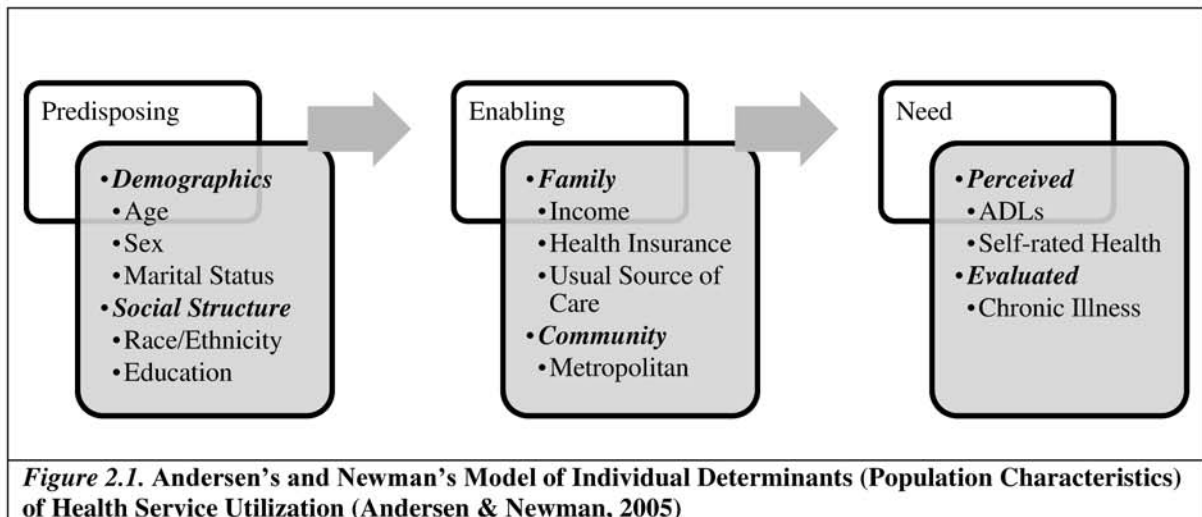
Medicare offers a variety of plans that provide a beneficiary full-coverage and access to the health care system. However, many of the services most essential to having access to the health care system are associated with plans that require additional out of pocket costs. For example, essential primary care needs are only covered for those who sign-up for supplementary insurance coverage plans, along with Part A. Therefore, beneficiaries are required to pay monthly premiums, yearly deductibles, co-pays, and/or co-insurances in order to receive adequate needed care (CMS, 2015a; Medicare, 2016). Supplementary insurance appears to have a protective effect on health outcomes. A study by Fang & Alderman (2004) found that beneficiaries with supplementary private insurance reported lower rates of in-hospital mortality associated with acute myocardial infarction. Another study by Porell and Miltiades (2001) found that supplementary insurance coverage increased survival chances and reduced disability by approximately 30% for Medicare beneficiaries.

Lack of supplementary insurance is associated with difficulties accessing care. Fitzpatrick and colleagues (2004) found that having no supplemental insurance was associated with increased barriers to access to healthcare among Medicare beneficiaries. Another study found that older female Medicare beneficiaries who did not have supplementary insurance were less likely to have seen a health provider within the prior year (Hsia et al, 2000). Collectively, the above evidence suggests that there is a variation in older adults' access to care depending on the type of Medicare coverage they have.

### 2.3 Conceptual Framework for Understanding Correlates of Accessing Needed Health Care

Andersen's Behavioral conceptual model of Individual Determinants of Health Service Utilization provides a framework for determining which individual characteristics influence healthcare utilization. It will be used to determine risks for forgoing, delaying, or having trouble accessing needed care that are adjusted for characteristics that increase need for health care (Andersen & Newman, 2005). Andersen's model is one of the most commonly used frameworks utilized to explain health care utilization (Phillips et al, 1998).

The Individual Determinants of Health Service Utilization model describes individual characteristics that may influence one's utilization of medical services.



The model, depicted in Figure 2.1, consists of three domains of individual characteristics, predisposing, enabling, and need, that increase one's propensity to utilize health care (Andersen & Newman, 2005). Andersen and Newman (2005) argue that there are certain individual characteristics that exist in an individual prior to utilization or health condition that predisposes one to use health care services. Although, these characteristics may not be directly responsible for health care use, they do increase one's chances of utilizing healthcare services. Predisposing characteristics include variables such as age, sex, race, education, and marital status. Enabling characteristics are resources that facilitate or impede one's access to health care services. Variables in this category make it possible for an individual to access care and include higher income, insurance coverage, and whether or not the patient has a regular source of care. Lastly, need for medical care refers to triggers for seeking care. For example, illness severity triggers the need for medical care. Chronic conditions such as diabetes or cancer, self-rated health, and disability status are strongly predictive of future medical care utilization (Andersen & Newman, 2005).

#### 2.4 Correlates of Health Care Utilization

The following individual risk factors have been associated with health care utilization.

*Marital Status:* Married adults are believed to benefit from a protection and selection effect (Burman & Margolin, 1992; Goldman, 1993; Waldron, Hughes, & Brooks, 1996; Waldron, Weiss, & Hughes, 1997). Specifically, healthier individuals are more likely to marry and stay married. In addition, marriage offers additional resources such as social support and finances that shield an individual from adverse health outcomes. For example, one study found that those who are married are more likely to have health insurance than those who are unmarried (Kong, 2010). Further, studies suggest that in comparison to those who are married, never married individuals have lower health care utilization rates and previously married individuals (divorced or separated) have higher health care utilization rates (Anson, 1979; Carter & Glick, 1970; Joung et al, 1995; Morgan, 1980; Verbrugge, 1979).

Socioeconomic Status (Education, Income): A study conducted in Canada found that in comparison to middle and higher income residents, low income individuals were more likely to be hospitalized (Lemstra et al, 2009). Filc and colleagues (2014) found that, among individuals in a universal health care system in Israel, lower socioeconomic groups had greater utilization of emergency rooms and more visits to a primary care physician. Additionally, lower socioeconomic status is associated with poorer health outcomes such as chronic conditions including cardiovascular disease, diabetes, hypertension, and cancer (Pamuk et al 1998; Lantz et al, 1998).

Chronic conditions: Chronic conditions increase the need for medical care. More than two-thirds of older Medicare beneficiaries report having two or more chronic conditions (e.g., Arthritis, Diabetes, CVD, hypertension) (CMS, 2012). Having one or more chronic conditions is associated with greater use of emergency rooms and higher hospitalization rates (CMS, 2012; Reuben et al, 2002; Sorondo et al, 2004). Furthermore, engagement of a multidisciplinary team in the primary care setting is the best setting for prevention and proper management of these conditions to avoid health complications that may require costly care (Bodenheimer, Chen, & Bennett, 2009; Rothman & Wagner, 2003).

Sex: Gender also plays a significant role in accessing healthcare. Older women have a higher incidence of chronic conditions (James et al, 2009). Additionally, women tend to utilize healthcare services more than men and more often report forgoing needed medical care due to cost (Rustgi, Doty, & Collins, 2010). Women are also less likely to be insured by their employer than men and are often dependents (KFF, 2013).

Race: Race plays a significant factor in one's utilization and need for health care. Minorities tend to have more chronic conditions and greater severity of disease. Link and McKinlay (2009) found that Blacks and Hispanics are more likely to have diabetes than their white counterparts. Furthermore, in comparison to Whites, Black men are 1.6 times more likely to develop prostate cancer and 2.4 times as likely to die from the disease (Zenka, 2012). In spite of their heightened risk of adverse health conditions, minorities tend to lack the available resources to afford and access appropriate care. Among working families, Blacks are significantly more likely to be poor than Whites (Duckett &



Artiga, 2013). Additionally, a study conducted by the UCLA Center for Health Policy Research found that while minorities are more likely to be financially and economically insecure than Whites, they often are ineligible to receive government assistance (Wallace, Padilla-Frausto, & Smith, 2010). This suggests that minorities may be less likely able to utilize the health care system despite their increased risk of needing care.

Usual source of care: Having a usual source of care improves access to health care. Individuals with a usual source of care are more likely to receive health care services including preventive care (Bindman et al, 1996; Blewett et al, 2008; DeVoe et al, 2003). Having a usual source of care also improves outcomes of chronic health conditions such as hypertension (He et al 2002; Moy, Bartmen, & Weir, 1995; Spatz et al, 2010). Having a usual source of care is associated with higher quality and effectiveness of medical care (Starfield, 1992).

Metropolitan Status: Compared to urban areas, health care utilization in rural areas is lower (Arcury et al. 2005; Casey et al. 2001; Horner et al. 1994). A study by Goins and colleagues (2005) identified five commonly reported barriers to utilizing care among rural older adults including transportation, too few health care providers, quality of health care, social isolation, and financial constraints. Furthermore, this study found that rural individuals employed a range of coping techniques to deal with their access barriers. These included: relying on assistance from family, using alternative medications, limiting other household expenses to ensure sufficient funds for needed care/medicines, and even reducing prescription dosages or just going without the medication (Goins et al, 2005). Thus, location could hinder health care utilization. Further rural residents have higher rates of chronic condition, disability, and mortality (Jones et al, 2009).

Health Insurance Blustein (1995) found that female Medicare beneficiaries who have supplementary health insurance were more likely to receive a mammography screening than those who lacked supplementary insurance. Another study conducted by Fang and Alderman (2004) found that among Medicare beneficiaries who were admitted to the hospital for a myocardial infarction, those with supplementary private insurance had higher rates of revascularization and lower rates of in-hospital mortality.

Self-Rated Health: Self-reported health is a strong predictor of need for and utilization of health care services. Miilunpalo and colleagues (1997) reported that individuals who reported worse health status had fewer annual doctor's visits and were at greater risk for mortality. DeSalvo and colleagues (2005) also found that poor self-rated health was associated with higher risk for hospitalization, mortality, and outpatient utilization.

ADLs: Functional status within an individual plays a key role in one's need and utilization of care because functional disability typically results from illness and injury, both of which precipitate need for medical care. Functional status is often measured by assessing one's disability in one or more activities of daily living (ADLs). ADLs include toileting, bathing, dressing, transferring, and eating. Reuben and colleagues (2002) found that ADL limitations increased hospitalization risk among older adults.

Age: Older adults have a number of co-morbidities and disabilities that require adequate health care services (Bodenheimer, Chen, & Bennett, 2009; Christ & Diwan, 2008; Pham et al, 2007; Thorpe, 2006). Compared to younger adults, adults aged 65 years and older have higher rates of hospitalization and emergency room visits (Amiinzaheh & Dalziel, 2002; Li et al, 2007; Weiss & Elixhauser, 2014). Further, older adults with chronic conditions and disabilities are at greater risk for hospitalization (Reuben et al, 2002). In addition, compared to younger patients, older adults who utilize the emergency department tend to be more acutely ill and require higher utilization of emergency department resources (Amiinzaheh & Dalziel, 2002; Baum & Rubenstein, 1987; Biber et al, 2012; Latham & Ackroyd-Stolarz, 2014).

## CHAPTER 3. METHODOLOGY

### 3.1 Overview for Study 1: Characteristics of Forgoing, Delaying, or Having Trouble Accessing Needed Care

Study 1 used information from five cross-sectional studies of older Medicare Current Beneficiary Survey (MCBS) respondents who were interviewed from 2006 to 2010. For each of the five surveys a logistic regression analysis was performed. Meta-analysis was used to develop overall estimates across the five years of results to determine the magnitude and direction of individual-level risks for forgoing, delaying, or having trouble accessing needed care among older Medicare beneficiaries.

#### 3.1.1 Specific Aims for Study 1

**Primary Aim:** Describe and analyze the magnitude and direction of associations between individual-level predisposing, enabling, and need characteristics and forgoing, delaying, or having trouble accessing needed health care among older Medicare Beneficiaries.

**Sub-aim 1:** Assess the prevalence of Medicare beneficiaries who go without, delay, or have trouble accessing needed health care.

**Sub-aim 2:** Identify risks for older Medicare beneficiaries who go without, delay, or have trouble accessing needed health care.

#### 3.1.2 Design and Methods for Study 1

##### 3.1.2.1 Data Source and Study Sample

Study 1 utilized data from the Medicare Current Beneficiary Survey (MCBS). The MCBS is a continuous, longitudinal, multipurpose survey, representative of the Medicare population. The MCBS sample is comprised of a rotation panel of Medicare beneficiaries that are followed for up to four years with in-person interviews conducted three times a

year for each respondent. Survey items differ at each interview during the year. The MCBS sample includes aged and disabled beneficiaries that were alive and eligible as of January 1 of the sampling year, therefore, each panel (cohort) is followed for a total of 12 interviews. There is a new panel added to the existing sample each year and it consists of a unique set of respondents not included in prior panels (cohorts). Additionally, each year that a new panel is added to the existing sample, the oldest panel is retired from the existing sample. The MCBS dataset consists of two modules: (i) “access to care” (AC) and (ii) “cost and use” (CU). Study 1 utilized data from the 2006 to 2010 Access to Care files that included information pertaining to healthcare access and healthcare utilization for Medicare Beneficiaries that were enrolled in Medicare for the entire year. The sample for the current study included only community-dwelling respondents aged 65 years and older across each year.

#### 3.1.2.2 Outcome Variable: Forgoing, Delaying, or Having Trouble Accessing Needed Care

Self-reports of forgoing, delaying, or having trouble accessing needed care in the prior 12 months was created by combining responses of three variables in the dataset: (i) “had a health problem that thought the doctor should see but didn’t”; (ii) “delayed seeking care due to cost”; and (iii) “has study respondent had trouble getting needed health care.” Respondents who responded “yes” to any of these variables were coded as having “Did Forgo, Delay, or Have Trouble Accessing Needed Care” and those who responded “no” were coded as having “Did Not Forgo, Delay, or Have Trouble Accessing Needed Care”. All other responses (i.e., don’t know, refused, inapplicable, missing) will be coded as missing.

#### 3.1.2.3 Predictor Variables

This study examined several demographic and socioeconomic characteristics that reflect characteristics that predispose, enable, and create need for primary care. Predisposing characteristics included age, gender, race/ethnicity, educational attainment,

and marital status. Enabling characteristics included household income, usual source of care, metropolitan area, and supplemental insurance. Need characteristics were chronic conditions, number of limitations in activities of daily living (ADL), and self-rated health status. All variables were operationalized as categorical variables with mutually exclusive categories.

Predisposing variables included age (65 years to 74 years, 75 to 84 years, and greater than or equal to 85 years), sex (male vs. female), race (non-Hispanic White vs. minority/other), marital status (married vs. not married), and education (less than High School or GED, High School Diploma/GED equivalent, vs. Some College or More).

Enabling variables were income (less than \$25,000, \$25,000 to \$50,000, vs. greater than or equal to \$50,000), metropolitan status (metro area or non-metro area), usual source of care over the last twelve months (Have usual source of care vs. No usual source of care), and insurance status (Medicare Advantage, Medicaid or Other Public Coverage, Private, vs No Supplemental). Insurance status was coded into mutually exclusive categories using hierarchy coding, in which the category orders from highest to lowest were: Medicaid or other public coverage (which include public coverage, Medicaid, or tri-care), Private (which included employer sponsored, self-purchased or both), Medicare Advantage, and No Supplementary insurance. Therefore, respondents were grouped into the category with the highest ordering regardless of other coverage.

Need measures included self-perceived general health (excellent/very good, good, or poor/very poor), number of ADL limitations reported (none, one to two ADLs, three or more ADLs), and chronic conditions (none, one, vs. two or more). ADL limitations corresponded to the sample person usually having difficulty and anticipating continued trouble with the following tasks: bathing, dressing, eating, getting in and out of chairs, walking, and toileting. Chronic conditions were based on the number of the following conditions reported by the respondent: Diabetes, Cancer, High Blood Pressure, Heart Disease, Emphysema/Asthma/COPD, Arthritis, and Stroke.

### 3.1.3 Statistical Analysis

Nationally representative estimates were obtained by applying the cross-sectional sample weights that account for the complex sampling design. The cross-sectional weights reflect the probability of being included in the sample in a particular year. The complexity of the cross-sectional weights is due to the fact that each year includes cohorts that have been in the study for varying lengths of time, and non-response rates for each of the cohorts differ for each year the cohort is included in the sample. Thus, the complexity of the sampling design makes it unfeasible to calculate new weights for the purpose of combining data across the five years of the study. Consequently, each year of the study was treated as a separate cross-sectional study using the cross-sectional sampling weights computed by MCBS statisticians.

Using the weighted responses, descriptive characteristics for the analytical sample were examined using raw weighted proportions and bivariate associations were determined using chi-square analyses. Multivariable logistic regression was used to determine the adjusted associations of the predisposing, enabling, and need variables and self-reports of forgoing, delaying, or having trouble accessing needed care separately for each of the five years included in the study. These five sets of analyses resulted in each variable having five odds ratio (OR) estimates, one for each year. A meta-analysis, using the five effect sizes from each year, was conducted to estimate the aggregated effect size for each of the predictor variables over the five years. All analyses were conducted using STATA SE 12.0.

## 3.2 Overview for Study 2: Forgoing, Delaying, or Having Trouble Accessing Needed Care and Preventive Health Care Utilization

This study utilized multivariable logistic regression to test the association between forgoing, delaying, or having trouble accessing needed care and receipt of the influenza vaccination the next year using data from the 2007 and 2009 MCBS Access to Care data files.

### 3.2.1 Specific Aims for Study 2

**Primary Aim:** Examine the prognostic association of forgoing, delaying, or having trouble accessing needed care on preventive healthcare utilization among older Medicare beneficiaries.

**Sub-aim 1:** Assess the individual-level predisposing, enabling, and need characteristics associated with receiving an influenza vaccination among older Medicare beneficiaries.

**Sub-aim 2:** Examine whether reports of forgoing, delaying, or having trouble accessing needed care are prognostics of influenza vaccination receipt among older Medicare beneficiaries.

### 3.2.2 Design and Methods for Study 2

#### 3.2.2.1 Data Source and Study Sample

Participants for this study were obtained from the MCBS Access to Care Files. This study followed two cohorts from the 2007 MCBS forward in time to determine whether a respondent in the baseline survey received an influenza vaccination during the 2008 winter. In the MCBS dataset receipt of the influenza vaccination for the current winter is reported in the following year. Specifically, reports of influenza vaccination for the winter of 2008 would be asked in the 2009 dataset. This longitudinal design allowed only two cohorts from the 2007 survey to be followed forward in time (2006 cohort and 2007 cohort) because prior cohorts were rotated out of the sample by 2009.

The sample for Study 2 consisted of the 2006-cohort & the 2007-cohort found in the 2007 MCBS Access to care survey. The baseline characteristics (predisposing, enabling, and need variables) and independent variable were obtained from the 2007 Access to Care Survey dataset for each cohort. The dependent variable, a retrospective report of getting the influenza vaccination in the prior winter, came from the 2009 Access to Care dataset. The sample for the current study included only community-dwelling respondents aged 65 years and older from the 2006-cohort and the 2007-cohort found within the 2007 Access to Care survey dataset.

### 3.2.2.2 Outcome Variable: Influenza Vaccination

The outcome of interest for this study was whether the respondent received the influenza vaccination during the prior winter. Influenza vaccination receipt was obtained from the 2009 Access to Care survey and inquired whether the respondent received the influenza vaccination in the 2008 winter. The question pertaining to the influenza vaccine was coded as a dichotomous variable. Respondents who responded “no” to this variable were classified as “Did not receive an influenza vaccination” and respondent who responded “yes” to this variable were be coded as “Received an influenza vaccination.” All other responses (i.e., don’t know, refused, inapplicable, missing) were coded as missing.

### 3.2.2.3 Independent Variable: Forgoing, Delaying, or Having Trouble Accessing Needed Care

Self-reports of a study respondent forgoing, delaying, or having trouble accessing needed care was the independent variable of interest. This variable was obtained from the 2007 Access to Care survey dataset for the 2006-cohort and the 2007-cohort included in the analytic sample. Forgoing, delaying, or having trouble accessing needed care was derived by combining the responses of three variables: (i) “had a health problem that thought the doctor should see but didn’t; (ii) “delayed seeking care due to cost”; and (iii) “has study respondent had trouble getting needed health care”. Respondents who responded “no” to any of these questions were coded as “Did Not Forgo, Delay, or Have Trouble Accessing Needed Care” and respondents who responded “yes” to either of these questions were coded as having “Did Forgo, Delay, or Have Trouble Accessing Needed Care”. Any other responses (i.e., don’t know, refused, inapplicable, missing) were coded as missing.

### 3.2.2.4 Covariate Variables

The covariates for Study 2 are the predictor variables described in Study 1.



This study utilized covariates obtained from the 2007 MCBS AC Survey dataset for the 2006-cohort and the 2007-cohort that examine demographic and socioeconomic characteristics that reflect characteristics that predispose, enable, and create need for health care utilization. Predisposing characteristics included age, gender, race/ethnicity, educational attainment, and marital status. Enabling characteristics included annual household income, usual source of care, metropolitan area, and supplemental insurance. Need characteristics were chronic conditions, ADLs, and self-rated health status.

### 3.2.3 Statistical Analysis

Longitudinal sample weights were used to account for survey non-responses and the complex sampling design of the MCBS dataset. This study examined whether reports of forgoing, delaying, or having trouble accessing needed care in year 1 was predictive of influenza vaccination in the following winter. The independent variable and baseline characteristics came from the 2007 Access to Care dataset and the dependent variable was obtained from the 2009 Access to Care dataset. For this analysis, the 3 year longitudinal weights from the 2009 Access to Care dataset were used. These weights accounted for the current year (2009) and the two years prior (2007). Descriptive statistics of the sample characteristics were conducted using raw weighted proportions and chi-square analyses. Multivariable logistic regression was used to assess the relationship between forgoing, delaying, or having trouble accessing needed care and influenza vaccination receipt among beneficiaries. All analysis for this study was conducted in STATA SE 12.0.

### 3.3 Overview for Study 3: Forgoing, Delaying, or Having Trouble Accessing Needed Care and Hospitalization Risk

This study utilized survival analysis to test the prognostic association between forgoing, delaying, or having trouble accessing needed care and risk for all-cause hospitalization among older Medicare beneficiaries using the 2009 Access to Care and the 2010 Cost and Use survey data files.

### 3.3.1 Specific Aims for Study 3

**Primary Aim:** Determine whether forgoing, delaying, or having trouble accessing needed care is prognostic of future hospital admissions among older Medicare beneficiaries.

**Sub-aim 1:** Assess individual-level predisposing, enabling, and need characteristics associated with hospitalizations among older Medicare beneficiaries

**Sub-aim 2:** Examine the predictive association between forgoing, delaying, or having trouble accessing needed care and hospital admission risk among older Medicare beneficiaries.

### 3.3.2 Design and Methods for Study 3

#### 3.3.2.1 Data Source and Study Sample

This study used a subsample from the MCBS dataset. The sample included study respondents from the 2009 MCBS Access to Care survey. Baseline characteristics (predisposing, enabling, and need variables) and the independent variable were obtained from the 2009 Access to Care dataset. The outcome variable was obtained from the 2010 MCBS Cost and Use dataset. The analytic sample included only community-dwelling respondents aged 65 years and older from the 2009 MCBS Access to Care survey respondents.

#### 3.3.2.2 Outcome Variable: Hospital Admission

The outcome of interest for Study 3 was time to hospital admission in the year since the community survey. The study followed participants for a total of 13 months (395 days), from December 2009 thru the end of December 2010. Entry time for all respondents was day 0. Exit time (study end date) for all respondents was day 395 or date of death. Death date was determined by the survey death records found in the 2010 Cost and Use dataset. In addition, each respondent had at least one observation per event or time interval. There were three scenarios for computing time to event (reported hospital

admission) for each respondent. The first scenario pertained to respondents who did not report an event. Respondents who did not report a hospital admission during the study time follow-up period had one-time interval, entry into the study (time 0) to the study follow-up end date (time 395 or date of death). The second scenario corresponds to respondents who reported only one event. These respondents had two observations. The first spanned from the respondent's entry into the study (time 0) until the first hospital admission date (time 1). In scenario two, the respondent's second observation spanned from the discharge time of event 1 to the end of the follow-up period (time 395 or death). The final scenario pertains to respondents with two or more events. For the third scenario, the first event covered study entry date (time 0) to the first hospital admission. All subsequent intervals started with the prior event's discharge date and extended to the next hospital admission date or end of the study's follow-up period (time 395 or death). Observations were right-censored at the time of death or at the end of the study's follow-up period (time 395).

### 3.3.2.3 Independent Variable: Forgoing, Delaying, or Having Trouble Accessing Needed Care

The independent variable of interest in this study was the same as the independent variable used in Study 2.

The independent variable of interest was self-reports of forgoing, delaying, or having trouble accessing needed care and was derived by combining three variables in the dataset: (i) "had a health problem that thought the doctor should see but didn't"; (ii) "delayed seeking care due to cost"; and (iii) "has study respondent had trouble getting needed health care." Forgoing, delaying, or having trouble accessing needed care was a dichotomous variable that was coded "Did Forgo, Delay, or Have Trouble Accessing Needed Care" if a respondent replied "yes" to either of the questions or was coded "Did Not Forgo, Delay, or Have Trouble Accessing Needed Care" if a respondent replied "no." Any other responses (i.e., don't know, refused, inapplicable, missing) were coded as missing.

#### 3.3.2.4 Covariate Variables

Covariates for Study 3 were the same as those used in Study 2.

Predisposing characteristics included age, race/ethnicity, gender, marital status, and educational attainment. Enabling characteristics were metropolitan areas, household income, supplemental insurance, and usual source of care. Need characteristics self-rated health status, ADLs, and chronic conditions.

#### 3.3.3 Statistical Analysis

Descriptive statistics using weighted and unweighted proportions were used to summarize sample characteristics. Nationally representative estimates were obtained by applying cross-sectional sample weights that accounted for the complex sampling design and survey non-response in the MCBS dataset. Multivariable survival analysis using the Andersen and Gill (1982) model was used to determine the association between forgoing, delaying or having trouble accessing needed health care and time to hospital admission in the following year after controlling for various predisposing, enabling, and need covariates. The Andersen and Gill (AG) model is an extension of the Cox Proportional Hazard model that accommodates recurrent event data and accounts for multiple event dependence. The AG model also accounts for discontinuous risk intervals found in time to events. Risk intervals for the current analysis represent the time interval that an individual is at risk for a hospitalization. A respondent's risk begins once they are discharged from or prior to any hospitalizations, thus hospital stay duration is not included in risk interval sets. As a result, risk intervals may be discontinuous because respondents are not at risk for being hospitalized if they are currently in the hospital. Data analyses for Study 3 were conducted using STATA SE 12.0.

## CHAPTER 4. GETTING IN THE DOOR: EXAMINING DETERMINANTS OF OLDER MEDICARE BENEFICIARIES WHO REPORT FORGOING, DELAYING, OR HAVING TROUBLE ACCESSING NEEDED HEALTH CARE

### 4.1 Abstract

**Background:** Older adults are one of the fastest growing subpopulations in the United States. More than two thirds of older adults have at least two or more chronic conditions that require ongoing medical care. Lack of primary care interaction is associated with poorer health outcomes (e.g., hospitalizations, complications, morbidity, mortality). Majority of older adults aged 65 years and older are covered by Medicare. Despite having coverage and being a subpopulation that is in greatest need for care, disparities in health care utilization still exist. **Purpose:** This study determined prevalence and risk of community-dwelling Medicare beneficiaries who report they forgo, delay, or have trouble accessing needed medical care. **Methods:** Using weighted proportions, logistic regression, and meta-analytic techniques this study assessed prevalence and risk of not accessing or having trouble getting needed care among older community-living respondents to 2006 through 2010 Medicare Beneficiary Survey (MCBS). **Results:** Approximately one in every nine beneficiaries reported forgoing, delaying, or having trouble accessing needed health care. Beneficiaries who reported they delay, go without, or have trouble accessing needed care were more likely to be female, younger, more educated, of minority status, in poorer health, lived in a non-metropolitan area, had no supplementary insurance, had a lower annual income, and reported multiple chronic or disabilities. **Conclusions:** Results suggest that there is a vulnerable population of Medicare beneficiaries who do not seek or may not be receiving adequate needed health care. Thus, primary care providers are not able to interact with or provide vital services to some of the most vulnerable beneficiaries when care is most needed. More comprehensive health initiatives should be employed to reach this vulnerable subpopulation.

## 4.2 Introduction

Older Americans represented about 14%, or 45 million persons, of the U.S. population in 2013. The number of older adults is expected to rise, almost doubling by 2060 (AoA, 2014). Approximately 80% of older adults require ongoing care for at least one chronic condition such as arthritis, diabetes, dementia, cardiovascular disease, or hypertension (Thorpe et al, 2011), and more than two-thirds have two or more chronic conditions that requires medical supervision (ODHPH, 2020). The primary care setting is the most common setting for treating these types of conditions. Insufficient access to primary care is associated with higher utilization of the emergency room for non-urgent issues, poorer self-rated health, lower health status, increased hospitalization rates for ambulatory care sensitive conditions, more severe complications of chronic conditions, poorer quality of life, higher rates of preventable premature deaths, and higher medical expenses (Katz, McCoy, & Vaughan-Sarrazin, 2015; Murray & Berwick, 2003; Shi, 2012). Most studies of insufficient access to primary care have focused on adults younger than age 65, before one becomes eligible for universal health insurance provided by Medicare.

Medicare, the largest payer for health services in the United States, has provided federal universal health insurance coverage since its' introduction in 1965 by President Johnson and covers approximately 93% of non-institutionalized adults 65 years and older (AoA, 2014). There are currently five types of Medicare coverage plans for older adults to select from: Part A (Hospital Insurance), Part B (Medical Insurance), Part C (Medicare Advantage/HMO/PPO), Part D (Prescription), and Medigap. Part B is voluntary for beneficiaries and requires an income-based monthly premium along with an annual deductible, but offers most of the basic medical care coverage needed for access to primary care that is found within health insurance (e.g., physician visits, preventative services, medical equipment, laboratory test) (Medicare, 2016).

Approximately one in seven older adults report not going to a physician for a check-up in the prior two years (Janes et al, 1999) and over half are not up to date with preventive services. Preventive services include those aimed at preventing the onset or worsening of chronic conditions (Benson & Aldrich, 2012, Shenson, Bolen, & Adams,

2007; Shenson, Adams, & Bolen, 2011). Provision of services for treatment of both acute and chronic illness is predicated on the assumption that the patient seeks care from a provider. Not all Medicare patients seek the services of a provider. Some may not go because they do not have a health need; however, others may not see a provider even though they have health needs. It is the latter group of individuals who are of most concern. Older adults who need, but do not receive, sufficient healthcare are at greater risk for emergency department and hospital admissions (Bazargan, Bazargan, & Baker, 1998).

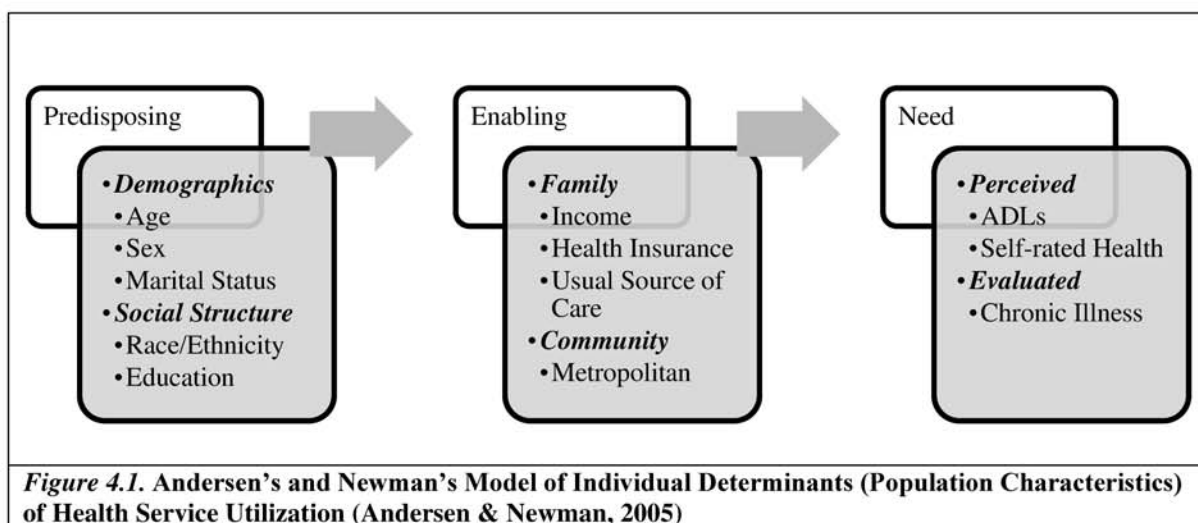
Several prior studies have considered access to outpatient care among older adults', but definitions of access vary considerably (AHRQ, 2014; Berk & Schur, 1998; Levesque, Harris, & Russell, 2015). For example, some describe access as whether or not a person has a usual source of care (Devoe et al, 2003) or health insurance coverage (Kasper, Giovanni, & Hoffman, 2000). Other studies define access as patients' perceived ease in accessing medical care including wait time for an appointment (Thorpe et al, 2011) and others examine satisfaction with care (Rosenback, 1995). These definitions are useful for determining the impact of health system characteristics on receipt of care, however, they do not focus on determining the prevalence and risks of older patients not seeking care when needed. This unique population is of great interest because in order for providers to provide needed health care, patients must first get to the provider. A provider is unable to educate or provide needed health services if the patient does not make it into their office. Studies of younger adults who do not yet qualify for Medicare Services, suggest that usual source of care and absence of health insurance are significant predictors of gaining "access" to a provider's office. These findings have limited generalizability to Medicare beneficiaries because all beneficiaries are insured with some form of coverage and approximately 96% of beneficiaries report having a usual source of care (Boccuti et al, 2013).

The primary care setting is the principle setting for receipt of preventive services and treatment for health care needs. When older Medicare beneficiaries delay, forgo, or have trouble accessing needed care, physicians do not have the opportunity to interact and provide health education and needed healthcare services to treat current conditions

and to prevent worsening of health. The current study will examine five consecutive nationally representative samples of older Medicare beneficiaries to determine the magnitude and risks for not seeking needed health care among this population.

#### 4.2.1 Conceptual Framework/Theory

The Andersen and Newman Model of Individual Determinants of Health Service Utilization provides a conceptual framework for determining which individual characteristics put Medicare beneficiaries at risk for not accessing needed health care (Andersen & Newman, 2005). The Individual Determinants of Health Service Utilization model (also known as the behavioral model of health services utilization) describes individual determinants that may influence one's utilization of medical services. The behavioral model, depicted in Figure 4.1, consists of three main constructs that influence one's use of health services. These constructs include predisposing, enabling, and need characteristics. Andersen and Newman (2005) define predisposing characteristics as individual characteristics that exist prior to utilization that may increase one's propensity of utilizing health care services. Although, these characteristics are not considered to be directly responsible for health care use, they do increase one's likelihood of utilizing health services. Potential predisposing characteristics for older adults include age, sex, race, education, and marital status (James et al, 2009; Link & McKinlay, 2009; Nunes et al, 2010; Waldron, Hughes, & Brooks, 1996; Waldron, Weiss, & Hughes, 1997).





Enabling variables describe resources that facilitate or impede one's access to health care services. Variables in this category make it possible for an individual to access care and include higher income, insurance coverage, whether or not the patient has a regular source of care, and metropolitan area (Blewett et al, 2008; Fang & Alderman, 2004; Goins et al, 2005; Olah, Gasisano, & Hwang, 2013). Lastly, illness level refers to the need for medical care. Among older adults' chronic conditions (e.g., diabetes, cancer), self-rated health, and disability status are strongly predictive of future medical care utilization (CMS, 2012; Goins et al, 2001; Porell and Miltalides, 2001). In this study, Andersen and Newman's model is utilized to risk adjust for those predisposing, enabling, and need characteristics associated with higher propensity for health care utilization.

#### 4.2.2 Purpose

To the author's knowledge, no prior study has assessed which predisposing, enabling, and need characteristics increase the probability that older Medicare beneficiaries delay, forego, or have trouble accessing needed primary care. The current study will determine the prevalence and predictors of foregoing or delaying access to needed care among Medicare Beneficiaries. The specific study aims for the current study are to:

1. Assess the prevalence of Medicare beneficiaries who go without, delay, or have trouble accessing needed health care.
2. Identify risks (characteristics) for beneficiaries who go without, delay, or have trouble accessing needed health care.

Findings of this study will inform providers which Medicare beneficiaries are most likely to delay or forgo access to needed care. Furthermore, results from this study will inform the development of interventions and policies to reduce older Medicare beneficiaries risk for delaying or foregoing needed primary care.

### 4.3 Methods

#### 4.3.1 Data Source and Study Sample

The current study utilized data from the Medicare Current Beneficiary Survey (MCBS), a continuous, longitudinal, multipurpose survey, representative of the Medicare population. MCBS is comprised of a rotating panel of Medicare beneficiaries that are followed for up to four years and includes aged and disabled beneficiaries that were alive and eligible as of January 1 of the sampling year. There is a new panel added to the existing sample each year and it consists of a unique set of respondents not included in prior panels (cohorts). Additionally, each year that a new panel is added to the existing sample, the oldest panel is also retired from the existing sample. MCBS consists of two modules: (i) “access to care” (AC) and (ii) “cost and use” (CU). This study utilized data from the 2006 to 2010 access to care MCBS data files that included information pertaining to healthcare access and healthcare utilization for Medicare Beneficiaries that were enrolled in Medicare for the entire year.

The sample for the current study included only community-dwelling respondents aged 65 years and older across each year. There were 15,770 survey respondents in the MCBS 2006 AC data file. Of the 14,732 community dwelling respondents, only 12,986 were 65 years and older and eligible for inclusion in this study for the 2006 year. Based on these respondents, 1,698 respondents were excluded from our analytic 2006 sample because of missing values on at least one or more of the variables of interest in our study. The final analytic sample contained a total of 11,288 respondents from 2006. Similarly, 11,339 respondents were available from the 2007 survey, 10,515 respondents from the 2008 survey, 10,567 respondents from the 2009 survey, and 10,569 respondents were retained from the 2010 survey for inclusion in this study. Table 4.1 shows the analytic samples across each year considered in this study.

<b>Respondents</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>Total Survey</b>	15,770	15,806	14,547	14,695	14,762
<b>Community-Dwelling</b>	14,732	14,804	13,651	13,751	13,879
<b>65 years or Older</b>	12,986	13,009	12,017	12,158	12,145
<b>No Missing Covariates</b>	11,288	11,339	10,515	10,567	10,569
<b>Final Analytic Sample, Weighted (Unweighted)</b>	29,791,079 (n = 11,288)	30,364,946 (n = 11,339)	31,106,103 (n = 10,515)	32,004,288 (n = 10,567)	32,803,448 (n = 10,569)

#### 4.3.2 Outcome Variable: Forgo, Delay, or Have Trouble Getting Needed Care

The outcome of interest was self-reports of getting needed health care in the prior 12 months. Three variables were combined into a dichotomous variable that indicated whether or not the respondent reported they did not seek, they had delayed, or they had trouble accessing needed health care. This variable was derived by combining responses of three variables in the dataset: (i) “had a health problem that thought the doctor should see but didn’t”; (ii) “delayed seeking care due to cost”; and (iii) “has study respondent had trouble getting needed health care.” Respondents who responded “yes” to any of these variables were coded as having “Did Forgo, Delay, or Have Trouble Accessing Needed Care” and those who responded “no” were coded as having “Did Not Forgo, Delay, or Have Trouble Accessing Needed Care.” All other responses (i.e., don’t know, refused, inapplicable, missing) were coded as missing.

#### 4.3.3 Predictor Variables

The current study examined demographic and socioeconomic characteristics identified in the literature that may predispose, enable, and create a need for primary health care utilization. Predisposing characteristics from the MCBS data were age (65 years to 74 years, 75 to 84 years, vs. greater than or equal to 85 years), sex (male vs. female), race (Non-Hispanic White vs. Minority/other), marital status (married vs. not married), and education (less than High School or GED, High School Diploma/GED equivalent, vs. Some College or More).

Enabling characteristics were household income (less than \$25,000, \$25,000 to \$50,000, vs. greater than or equal to \$50,000), usual source of care over the last twelve months (Yes do have a usual source or care vs. No do not have a usual source of care), metropolitan area (metro area vs. non-metro area), and supplemental insurance status (Medicare Advantage, Medicaid or Other Public Coverage, Private, vs. No Supplemental). Insurance status was coded into mutually exclusive categories using hierarchy coding, in which the category orders from highest to lowest were: Medicaid or other public coverage (which include public coverage, Medicaid, or tri-care), Private (which included employer sponsored, self-purchased or both), Medicare Advantage, and

No Supplementary insurance. Therefore, respondents were grouped into the category with the highest ordering regardless of other coverage.

Need characteristics were chronic conditions (none, one, vs two or more), functional status (none, one to two, vs three or more), and self-rated general health status (excellent/very good, good, or poor/very poor). Presence of chronic conditions were based on whether the respondent reported they currently had one of the following conditions in the last 12 months: Diabetes, Cancer, High Blood Pressure, Heart Disease, Emphysema/Asthma/COPD, Arthritis, and Stroke. Functional status was measured as the count of Activities of Daily Living (ADL) limitations (None, 1 to 2 ADLs, 3 or More ADLs). ADLs included having difficulty and anticipating continued trouble with the following tasks: bathing, dressing, eating, getting in and out of chairs, walking, and toileting.

All predictor variables were operationalized as categorical variables with mutually exclusive categories.

#### 4.3.4 Statistical Analysis

Nationally representative estimates were obtained by applying the sample weights that account for the complex sampling design and survey non-responses. Using the weighted responses, the association between each predisposing, enabling, and need characteristics were explored using chi-square analyses and raw weighted proportions. Multivariable logistic regression, that included sampling weights, was used to estimate associations between the predisposing, enabling, and need variables and forgo, delay, or trouble variable separately for each of the five years. It was necessary to compute a separate regression for each of the five years, because the sampling weights were designed to address the probability of responding in a specific year, and not designed to combine all data across the five years. These analyses resulted in the computation of five odds ratio (OR) estimates, one for each year for each variable included in the logistic regression equation and the dependent variable that described whether the respondent reported forgoing, delaying or having trouble getting needed health care.

To develop an aggregate effect size for the dependent variable and each of the predictor variables across the five sets of analyses, we conducted meta-analyses for each variable of the effect sizes from each year. The overall effect size analysis was calculated using the STATA SE 12.0 metan function utilizing the fixed option to conduct a fixed-effects method analyses. The following analyses reported were all conducted using STATA SE 12.0.

#### 4.4 Results

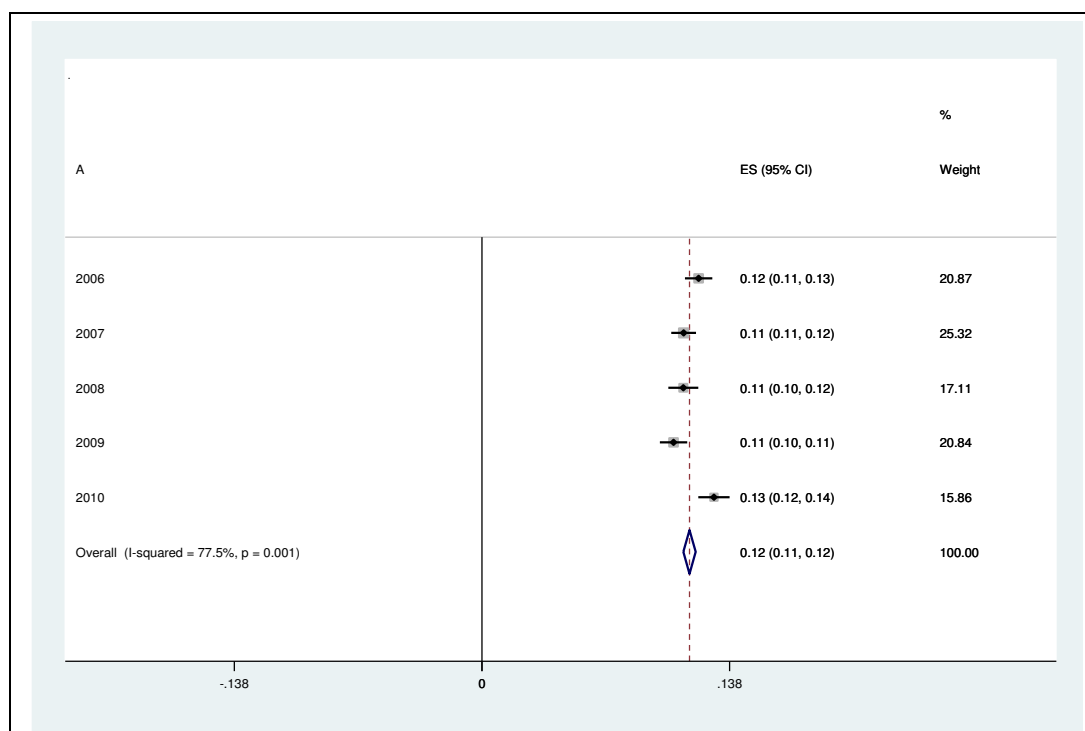
The overall pooled estimate for reports of forgoing, delaying, or having trouble accessing needed care across all five years was 11.50% (95% CI = 11.20%, 11.90%), as reported in Figure 4.2. Table 4.2 shows the proportion estimates for Medicare beneficiaries reporting forgoing, delaying, or having trouble accessing needed care for each of the years utilized in this study. Distributions of the sample characteristics as a whole and stratified by reports of forgoing, delaying, or having trouble are represented in Tables A.1 through A.5 located in the Appendices. Examination of Tables A.1 through A.5 revealed that the analytic samples were characterized by the majority of respondents being white, female, married, and having a high school diploma/GED or higher, few to no ADLs, a usual source of care. The majority lived in a metropolitan area, made less than \$50,000 per year, rated their health status as good or better, and had supplementary healthcare insurance.

Across each of the five years in Tables A.1 through A.5, in comparison to those who reported accessing care, a majority of the beneficiaries who reported forgoing, delaying, or not seeking needed care were female, married, had a lower level of education (less than or equivalent to a high school diploma/GED), lived in a metro area, and reported two or more chronic conditions. Furthermore, even though beneficiaries who reported forgoing, delaying, or having trouble accessing needed care did report they had a usual source of care, they were more likely to report a poorer health status, lower income level, being younger (65 to 74 years), having more ADLs, being minority, and were more likely to have no supplementary insurance compared to those who did not report an access problem. Significant chi-square bivariate results were found across each year for

every variable of interest, indicating a significant relationship between each variable of interest and accessing care.

Table 4.3 provides results from the multivariable logistic regressions predicting forgoing, delaying, or having trouble accessing needed care among Medicare beneficiaries across each year and the estimated pooled effect size for each variable based on results of the meta-analyses. Age was significantly related to forgoing, delaying, or having trouble accessing needed care. In comparison to the youngest group of beneficiaries (65 to 74 years), older beneficiaries were less likely to report forgoing, delaying, or having trouble accessing needed care. Additionally, beneficiaries who were less likely to report accessing care reported having a usual source of care (OR = 0.505; 95% CI = 0.434, 0.588), lived in a metro area (OR = 0.872; 95% CI = 0.799, 0.951), reported a higher income level, and reported having some type of supplementary insurance. On the other hand, beneficiaries were more likely to report forgoing, accessing, or delaying care if they were minority (10% more likely), female (20% more likely), had a chronic condition (44% to 61% more likely), had an ADL (93% more likely or more), or reported a poorer health status (28% to 65% more likely). Marital status (OR = 0.964; 95% CI = 0.902, 1.031), was not found to be a significant predictor of lack of access to care when considering all other variables of interest. Furthermore, while there were no differences between having a high school diploma/GED or equivalent and less than a HS diploma, beneficiaries who reported having more education (some college or more) reported being 15% more likely to report forgoing, delaying, or having trouble accessing needed care.

<b>Table 4.2. Number of Community-Dwelling Older Medicare Beneficiaries Who Report Forgoing, Delaying, or Having Trouble Accessing Needed Care Each Year</b>					
	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>
<b>N (Weighted)</b>	3,586,278	3,400,862	3,477,978	3,406,991	4,227,448
<b>N (unweighted)</b>	1,294	1,225	1,127	1,049	1,284
<b>Wt %</b>	12.04%	11.20%	11.18%	10.65%	12.89%
<b>Wt SE %</b>	0.3900	0.3528	0.4326	0.3879	0.4465
<b>Total</b>	29,791,079 (n = 11,288)	30,364,946 (n = 11,339)	31,106,103 (n = 10,515)	32,004,288 (n = 10,567)	32,803,448 (n = 10,569)



**Figure 4.2. Forest Plot of Percent of Community-Dwelling Older Medicare Beneficiaries Forgoing, Delaying, or Having Trouble Accessing Needed Care from 2006 to 2010**  
**Note: Net effect is shown for each year with line extending from the symbols representing 95% confidence intervals.**

<b>Table 4.3. Predictors of Community-Dwelling Older Medicare Beneficiaries Who Report Forgoing, Delaying, or Having Trouble Accessing Needed Care</b>						
<b>Variable</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>Pooled Estimate</b>
<b>Age</b>						
65-74	1.00	1.00	1.00	1.00	1.00	1.00
75-84	0.604 (0.538, 0.678)	0.581 (0.501, 0.674)	0.548 (0.470, 0.639)	0.615 (0.524, 0.722)	0.536 (0.464, 0.620)	0.578 (0.543, 0.616)
85+	0.377 (0.308, 0.463)	0.384 (0.306, 0.481)	0.363 (0.290, 0.455)	0.369 (0.300, 0.455)	0.365 (0.297, 0.448)	0.372 (0.339, 0.409)
<b>Race</b>						
Non-Hispanic White	1.00	1.00	1.00	1.00	1.00	1.00
Other	1.070 (0.928, 1.234)	1.247 (1.049, 1.484)	1.079 (0.910, 1.280)	1.189 (0.981, 1.440)	0.934 (0.776, 1.124)	1.097 (1.001, 1.204)
<b>Gender</b>						
Male	1.00	1.00	1.00	1.00	1.00	1.00
Female	1.160 (0.999, 1.346)	1.171 (1.021, 1.343)	1.262 (1.031, 1.544)	1.188 (1.016, 1.389)	1.245 (1.056, 1.468)	1.196 (1.114, 1.284)
<b>Marital Status</b>						
Not Married	1.00	1.00	1.00	1.00	1.00	1.00
Married	1.002 (0.879, 1.142)	0.952 (0.812, 1.115)	0.988 (0.848, 1.151)	0.958 (0.816, 1.123)	0.908 (0.777, 1.061)	0.964 (0.902, 1.031)
<b>Educational Attainment</b>						
Less than High School/GED	1.00	1.00	1.00	1.00	1.00	1.00
High School Grad/GED Equivalent	0.973 (0.831, 1.138)	1.026 (0.856, 1.229)	1.052 (0.870, 1.272)	0.929 (0.764, 1.130)	0.885 (0.729, 1.076)	0.979 (0.888, 1.080)
Some College or More	1.137 (0.938, 1.378)	1.209 (0.997, 1.466)	1.149 (0.950, 1.391)	1.189 (0.997, 1.416)	1.118 (0.953, 1.310)	1.157 (1.068, 1.255)
<b>Chronic Condition</b>						
None	1.00	1.00	1.00	1.00	1.00	1.00
Yes, have one	1.774 (1.281, 2.458)	1.047 (0.700, 1.566)	1.310 (0.844, 2.034)	1.494 (1.096, 2.036)	1.376 (0.953, 1.988)	1.435 (1.200, 1.717)
Yes, have two or more	1.983 (1.458, 2.698)	1.321 (0.936, 1.865)	1.893 (1.338, 2.678)	1.522 (1.089, 2.129)	1.370 (0.986, 1.903)	1.606 (1.385, 1.863)
<b>Usual Source of Care</b>						
No usual source of care	1.00	1.00	1.00	1.00	1.00	1.00
Usual source of care	0.538 (0.374, 0.776)	0.583 (0.420, 0.807)	0.452 (0.328, 0.623)	0.431 (0.290, 0.639)	0.518 (0.379, 0.709)	0.505 (0.434, 0.588)
<b>Metro</b>						
Non-Metro Area	1.00	1.00	1.00	1.00	1.00	1.00
Metro Area	0.854 (0.694, 1.051)	0.942 (0.710, 0.997)	0.851 (0.719, 1.006)	0.931 (0.736, 1.178)	0.936 (0.749, 1.168)	0.872 (0.799, 0.951)



<b>Table 4.3 (Cont.). Predictors of Community-Dwelling Older Medicare Beneficiaries Who Report Forgoing, Delaying, or Having Trouble Accessing Needed Care</b>						
<b>Activities of Daily Living (ADL) Limitations</b>						
None	1.00	1.00	1.00	1.00	1.00	1.00
1-2 ADLs	1.725 (1.451, 2.049)	1.851 (1.596, 2.146)	2.041 (1.729, 2.410)	1.877 (1.575, 2.236)	1.852 (1.568, 2.187)	1.927 (1.790, 2.075)
3+ ADLs	2.256 (1.844, 2.761)	2.154 (1.776, 2.612)	2.487 (1.982, 3.119)	2.427 (1.878, 3.135)	2.272 (1.831, 2.818)	2.296 (2.085, 2.529)
<b>Household Annual Income Level, \$</b>						
<25,000k	1.00	1.00	1.00	1.00	1.00	1.00
25,000k to < 50,000k	0.760 (0.645, 0.897)	0.787 (0.654, 0.947)	0.712 (0.601, 0.843)	0.783 (0.645, 0.951)	0.654 (0.550, 0.779)	0.735 (0.679, 0.795)
≥ 50,000k	0.667 (0.492, 0.903)	0.816 (0.634, 1.052)	0.564 (0.417, 0.763)	0.752 (0.586, 0.966)	0.585 (0.471, 0.728)	0.671 (0.598, 0.754)
<b>Self-Rated Health</b>						
Excellent/Very Good	1.00	1.00	1.00	1.00	1.00	1.00
Good	1.313 (1.106, 1.558)	1.340 (1.152, 1.558)	1.301 (1.063, 1.594)	1.214 (1.026, 1.437)	1.228 (1.027, 1.468)	1.281 (1.186, 1.383)
Fair/Poor	1.838 (1.513, 2.233)	1.795 (1.525, 2.114)	1.377 (1.113, 1.703)	1.591 (1.296, 1.953)	1.596 (1.348, 1.889)	1.650 (1.518, 1.792)
<b>Insurance</b>						
No Supplementary Insurance	1.00	1.00	1.00	1.00	1.00	1.00
Medicare Advantage	0.505 (0.405, 0.631)	0.674 (0.533, 0.852)	0.544 (0.430, 0.686)	0.608 (0.480, 0.770)	0.707 (0.546, 0.916)	0.597 (0.537, 0.663)
Private [ES/SP/Both]	0.416 (0.338, 0.513)	0.534 (0.446, 0.641)	0.502 (0.399, 0.633)	0.518 (0.410, 0.654)	0.554 (0.444, 0.690)	0.503 (0.457, 0.553)
Medicaid/Other Public	0.450 (0.344, 0.589)	0.585 (0.472, 0.725)	0.477 (0.353, 0.644)	0.526 (0.394, 0.701)	0.599 (0.437, 0.820)	0.529 (0.469, 0.597)
<b>Note: Logistic Regression Odds Ratios and Overall Pooled Estimate with 95% Confidence Intervals for Each Variable</b>						

#### 4.5 Discussion

Nearly 12% of community-living older Medicare Beneficiaries reported they delayed, did not seek, or had trouble getting needed health care. Results suggests that health care providers will be unable to interact with or provide needed health care services to approximately one in every nine older Medicare beneficiaries who need care. This is alarming when nearly 80% of older adults have one or more chronic conditions and over 30% have functional status limitations in one of the basic activities of daily living (ADLS) (AoA, 2014; CMS, 2012). Both co-morbidity and disability reflect a greater utilization and need for interaction with primary health care providers for proper management to avoid adverse health outcomes such as hospitalizations, emergency department visits, and mortality (Bodenheimer, Chen, & Bennett, 2009; Porrell & Miltiades, 2001).

Findings of the current study suggest that those most likely to report forgoing, delaying, or having trouble accessing care were minority, female, reported a poorer health status, and had multiple chronic conditions and functional status (ADL) limitations. These results are alarming because these individuals have a greater need for health care services (Bodenheimer, Chen, & Bennett, 2009; DeSalvo et al, 2005; James et al, 2009; Link & McKinlay, 2009; Porell & Miltiades, 2001; Zenka, 2012). For example, older women have a higher incidence of chronic conditions and women tend to utilize healthcare services more than men (James et al, 2009; Rustgi, Doty, & Collins, 2010). Furthermore, Desalvo and colleagues (2005) found that individuals who report poorer self-rated health had higher hospitalizations, outpatient utilizations, and mortality rates. Being older, having a usual source of care, living in a metropolitan area, having a higher income, and having some type of supplementary insurance were all associated with a reduced risk of beneficiaries forgoing, delaying, or having trouble accessing care among Medicare beneficiaries. Characteristics associated with beneficiaries who forgo, delay, or have trouble accessing care in the current study, are similar to findings from other studies that examine those at risk of having insufficient access to other forms of medical care such as personal care for disabilities (Sands et al, 2006). Each of these characteristics associated with an increased risk of forgoing, delaying, or having trouble accessing

needed care are also strongly associated with poorer health outcomes (Long, King, & Coughlin, 2005). Results suggest that despite having “access” there remains a very vulnerable subpopulation of older Medicare beneficiaries who do not get needed health care services and/or do not seek out needed services in the basic primary care setting.

Interesting findings in this study included that marital status was not a significant predictor of forgoing, delaying, or having trouble accessing care and that beneficiaries who reported higher education levels were also more likely to forgo, delay, or have trouble accessing care. Married individuals are believed to benefit from a protection and selection effect that leads to better health and greater access (Wood, Goesling, & Avellar, 2007). In contrast, higher co-morbidity and disability were associated with increased risk for not accessing needed care. It is possible that the moderating effects of marriage are more relevant to health prevention rather than the management of poor health and disability. Literature also suggests that individuals with lower levels of education are more likely to have insufficient access to care (Nunes et al, 2014). Findings in this study suggests that individuals with higher education levels are more likely to report forgoing, delaying, or having trouble accessing care. A potential reason could be that these higher educated individuals are more likely to seek out non-health care resources and solutions (e.g., internet, relative’s advice) to their health care needs on their own. Although this has not been found in other studies, further research should be conducted to examine this hypothesis. While these findings were contrary to what was expected based on prior literature, they offer further insight on vital characteristics to focus on when creating and implementing initiatives to reach those who forgo, delay, or have trouble accessing care.

To the best of the author’s knowledge, this is the first study to assess prevalence and risks of forgoing, delaying, or having trouble accessing needed care among a nationally representative sample of community-dwelling older Medicare beneficiaries. For community-dwelling older beneficiaries, the vast majority of whom require ongoing healthcare services, results of this study suggest the existence of disparities in accessing needed care. Prior studies have examined access, but have heavily focused on health system characteristics, identifying barriers, and satisfaction with care (Fitzpatrick et al, 2004; Thorpe et al, 2011). While prior studies have assessed how the health care system

is doing once an individual gets into the provider's office, they do not address those who do not get to their providers' office even though they felt they needed care.

The findings of this study must be considered in the context of its potential limitations. One limitation of this study is that it utilized self-reported data. Self-reported data may introduce some recall bias to the results of the study. For instance, some respondents may not have accurately recalled whether or not they went without, delayed, or had trouble accessing needed care. Further, we do not know how often they went without needed care. Presumably, those who went without needed care frequently would be at greater risk for poor health outcomes. In addition, this study did not assess why a respondent went without or had trouble accessing needed care, instead it focused on determining the prevalence and risks of going without or having trouble getting needed care. Future studies should examine mechanisms for delaying, forgoing, or having trouble accessing needed care. For example some Medicare beneficiaries may experience access problems because some providers do not accept Medicare patients. This study also did not determine which care needs were not addressed when the respondent reported forgoing, delaying, or having trouble accessing needed care. Furthermore, it is not possible to validate whether they did not seek care when they felt they needed it because there would be no medical records for visits that didn't occur. Despite these potential limitations, self-reports provide the opportunity to assess patients' collective appraisal of whether they are getting the care they need. Prior research has demonstrated that older Medicare beneficiaries' self-reports of unmet need for care for disabilities are prognostic of future hospitalizations, emergency department utilization, and mortality (Hass et al, 2015; He et al, 2015; Xu et al, 2012), suggesting that self-reports of not receiving care have value in identifying older adults who are vulnerable to poor health outcomes. Also, this study did not examine future health outcomes or behaviors and previous assessments of beneficiaries going without needed care because of the cross-sectional nature of the study. Further studies should determine whether forgoing, delaying, or having trouble getting needed care is associated with risk for not receiving preventive care such as getting yearly vaccinations, a health behavior known to reduce morbidity and mortality among older adults (Fiore et al, 2009). Also, future studies should determine whether

forgoing, delaying, or having trouble is a permanent or modifiable condition, and if it is modifiable, what services and supports lead to improved access to needed health care.

#### 4.6 Conclusion

Findings suggest that many Medicare beneficiaries report not accessing needed medical care. Emerging research is needed to evaluate recent health care initiatives focused on ensuring individuals get to the provider to receive needed care. For example, the patient-centered medical home model (PCMH; Sia et al, 2004) seeks to coordinate care and improve patients' access to the provider, even outside of office visits. Patients have 24/7 access to a team of providers to receive advice quickly outside of the office visit and patients are up-dated and reminded of needed care, testing, new information, and personal health records. Although the efficacy and efficiency of this model is currently being tested (Bitton, Martin, & Landon, 2010; Peikes et al, 2012), it may be a well-suited model to address the needs of older adults getting to a healthcare provider. Further, future work should consider examining other potential determinants of health care utilization such as self-efficacy or intent. In addition, more complex analytic work should be conducted to further assess the associations found within the current study. For example, assessing potential interactions (e.g., between gender and marital status) should be considered to fully understand the reported associations.

Future public health practice targeted towards enhancing access to care among the elderly should focus on creating interventions that are conscious and reflective of these subpopulations who are forgoing, delaying, or having trouble seeking needed health care. A greater emphasis should be placed on finding ways to ensure older beneficiaries are utilizing health services when care is needed (e.g., a more comprehensive Medicare program that monitors and moderates all services and needs). Findings of this study add to the sparse literature currently available on understanding access to care among older adults and highlight some of the potential deficiencies in the current Medicare program system. Results of this study may also greatly inform public health policy aimed to enhance access to care among Medicare beneficiaries by encouraging a more all-inclusive comprehensive health care service program for all older adults. In particular,

public health interventions should focus on finding effective strategies that appropriately target and provide needed services to reduce the current prevalence and potential adverse health effects of beneficiaries not seeking out or having trouble accessing needed care.

CHAPTER 5. EXAMINING THE ASSOCIATION BETWEEN ANNUAL  
INFLUENZA VACCINATION AND OLDER MEDICARE BENEFICIARIES  
WHO REPORT FORGOING, DELAYING, OR HAVING TROUBLE  
ACCESSING NEEDED CARE: MISSED OPPORTUNITIES AMONG OLDER  
MEDICARE BENEFICIARIES

5.1 Abstract

**Background:** Influenza and pneumonia are the eighth leading cause of death among adults aged 65 years or older. Older adults represent almost 90% of influenza-related deaths each year. The primary care setting is the principle setting for receiving counseling, education, and recommendations for preventive services such as the influenza vaccination. Medicare, which provides insurance coverage for majority of older adults aged 65 years or older, provides influenza vaccinations free to its' beneficiaries. Beneficiaries who do not seek or have trouble accessing needed health care are at greater risk for not interacting with their primary care provider. **Purpose:** This study examined the prognostic association between reports of forgoing, delaying, or having trouble accessing needed health care and receipt of the influenza vaccination among community-dwelling Medicare beneficiaries. **Methods:** Using data from the 2007 and 2009 Medicare Current Beneficiary Survey (MCBS), risk-adjusted logistic regression was used to assess the relationship between reports of going without, delaying, or having trouble accessing needed health care and influenza vaccination receipt in the following winter among Medicare beneficiaries. **Results:** Approximately 25% of Medicare beneficiaries reported not receiving the influenza vaccination and 11% reported forgoing, delaying, or having trouble accessing needed care. Beneficiaries who reported going without or having trouble accessing needed care were significantly less likely (Odds Ratio = 0.749; 95% CI = 0.609, 0.922) to receive the influenza vaccination in the following winter. **Conclusions:** Results suggest that beneficiaries who forgo, delay, or have trouble accessing needed care are at a heightened risk of vaccination non-compliance. Individuals who do not seek or have trouble getting needed health care may be at greater

risk for reduced interaction with primary care providers. Thus, reducing their opportunity to learn vital preventive health behaviors from their providers. Heightened awareness of this association and potential missed opportunity should encourage greater health initiatives to better address and reach this subpopulation.

## 5.2 Introduction

Each year between 15 and 61 million Americans contract influenza, resulting in about 226,000 hospitalizations on average (American Lung Association, 2010; CDC, 2010). In 2014 approximately 55,000 Americans died as a result of influenza and pneumonia-related conditions (National Center for Health Statistics, 2016). Several studies suggest that adults aged 65 years and older account for nearly 90% of all influenza-related deaths annually (Thompson et al, 2003; Thompson et al, 2009; Thompson et al, 2010). Risk of complication severity and death due to influenza increase with age due to the age-related decline in the immune system, particularly for older adults (McElhaney, 2005). Currently, influenza and pneumonia are the eighth leading cause of death among older adults aged 65 years and older (National Center for Health Statistics, 2016). Studies suggest that influenza vaccination programs can reduce hospitalizations by as much as 40% (Nichol et al, 1994; Vu et al, 2002). The US Preventive Services Task Force has been urging that older adults aged 65 years and older get vaccinated for pneumonia and influenza for years to prevent potential adverse or fatal health consequences (USPSTF, 1989).

Older adults make up one of the fastest growing segments of the United States population. In 2014, older adults represented one in every seven Americans (14.1%), the proportion of older adults in our population is expected to nearly double by 2060 (AoA, 2014). Medicare is a federally funded universal health care system for all Americans aged 65 years and older and young adults with certain long-term disabilities. Currently, Medicare covers approximately 93% of all non-institutionalized older adults aged 65 years and older (AoA, 2014). Medicare has been covering the cost of vaccinations for pneumonia as early as 1981 and influenza since 1993 for all of its beneficiaries. Despite the availability and potential risks that older adults face, only 60% of older adults, aged



65 years and older received the influenza vaccination during the 2015 winter (CDC, 2015a). Further, less than half of older adults aged 65 years and older are up-to-date on core preventive services such as immunizations, screenings, and vaccinations (Benson, 2012; HHS, 2010; Shenson et al, 2007; Shenson, 2011). Shenson and colleagues (2007) reported that approximately 40% of men and 33% of women aged 65 years or older were up-to-date on all recommended preventive services for adults in this age group.

Immunizations have been considered the most effective way to decrease influenza rates and ultimately prevent influenza-related hospitalizations, morbidity, and mortality.

Despite these recommendations there were more than 92,000 older adults (65 years and older) who were hospitalized in 2015 for influenza-associated conditions, one of the highest rates recorded by the CDC since they began tracking in 2005 (CDC, 2015b).

Primary care is the principle setting for counseling, education, and recommendations for vaccinations, preventive services, and screenings. While some individuals may refuse receipt of the influenza vaccination despite discussing the risks and benefits with their primary care provider (PCP), there are others who delay, forgo, or have trouble accessing needed primary care and consequently are less likely to receive counseling about vaccinations. The latter is of greatest concern because of the double risk for poor health outcomes by delaying needed care and not receiving important health counseling about preventive care. This study investigates the association between access to needed health care and receipt of the influenza vaccination.

Andersen and Newman's (2005) model of Individual Determinants of Health Service Utilization posits that there are predisposing risks (intrapersonal characteristics that increase one's likelihood to utilize services), enabling resources (assets that may facilitate ability to access care), and need risks (illness level) that affect one's utilization of and need for health care services. Based on this model, several characteristics have been identified that help predict which older adults are most likely to utilize health care. Predisposing characteristics include older age, minority race or ethnicity, being female, not being married, and lower education (James et al, 2009; Link & McKinlay, 2009; Nagata et al, 2013; Nunes et al, 2010; Waldron, Hughes, & Brooks, 1996; Waldron, Weiss, & Hughes, 1997). Resources that enable older adults to use health care services

include higher income, more comprehensive health insurance coverage, having a usual source of care, and living in a metropolitan area (Blewett et al, 2008; Fang & Alderman, 2004; Goins et al, 2005; Nagata et al, 2013; Olah, Gasisano, & Hwang, 2013). Lastly, characteristics that indicate need for the use of health services include functional status limitations (e.g., disabilities), poor self-rated health, and presence of chronic conditions (CMS, 2012; Goins et al, 2001; Nagata et al, 2013; Porell and Miltaides, 2001). This study utilizes Andersen and Newman's model to risk adjust for individual characteristics that increase need for health care utilization among older beneficiaries to reduce potential confounding in the reported relationship.

### 5.2.1 Purpose

To the author's knowledge no study has attempted to quantify the relationship between those who choose to forgo, delay, or have had trouble accessing needed care and receipt of preventive services among a nationally representative sample of older Medicare beneficiaries. The current study examines the association between influenza vaccination receipt and not seeking needed health care among a nationally representative sample of older Medicare beneficiaries. The specific aims for the current study are to:

- 1) Assess the individual-level predisposing, enabling, and need characteristics associated with receiving the influenza vaccination among older Medicare beneficiaries.
- 2) Examine the prognostic association between forgoing, delaying, and having trouble accessing needed health care and receipt of the influenza vaccination among older Medicare beneficiaries.

## 5.3 Methods

### 5.3.1 Data Source and Study Sample

The sample was drawn from the Medicare Current Beneficiary Survey (MCBS), a longitudinal survey based on a nationally representative sample of the Medicare population. MCBS is comprised of a rotating panel of Medicare beneficiaries that are followed for up to four years and were alive and eligible as of January 1 of the sampling

year. Each year a new panel, which consists of a unique set of respondents not included in prior panels (cohorts), is added to the existing sample. Additionally, each year that a new panel is added to the existing sample, the oldest panel is also retired from the existing sample. This study utilized data from the Access to Care data files within the MCBS. These files include information pertaining to healthcare access and healthcare utilization for Medicare Beneficiaries that were enrolled in Medicare for the entire year.

The timeline of this study is based on the premise that forgoing, delaying, or having trouble accessing care in one year will reduce the probability of receiving an influenza vaccination the following year. To maximize the number of subjects in this study, two cohorts were followed forward. Specifically, the study followed the cohorts that began either in 2006 or 2007 who responded to the Access to Care survey in 2007. These two cohorts from the 2007 MCBS Access to Care survey dataset were followed forward to determine whether they received an influenza vaccination in the 2008 winter. Because reports of receiving the influenza vaccination were retrospective reports, data regarding whether or not the person received an influenza vaccination shot in 2008 were obtained from the 2009 Access to Care survey. All baseline characteristics (predisposing, enabling, and need variables) and the independent variable were obtained from the 2007 Access to Care survey.

There were 15,806 survey respondents in the MCBS 2007 Access to Care data file. Of the 14,804 community dwelling respondents, only 13,009 were 65 years and older and eligible for inclusion in this study for the 2007 Access to Care survey. Based on these respondents, 7,518 respondents were a part of the two cohorts of interest (2006-cohort and 2007-cohort) for the current study. The other respondents to the 2007 survey rotated out of the sample prior to the 2009 survey which contained information about receipt of the influenza vaccination in 2008. Of the 7,518 respondents, we matched and followed forward, there were 5,335 respondents who responded to the 2009 Access to Care Survey. Finally, 847 respondents were excluded from the analytic sample because of missing values on at least one or more of the variables included in the analyses. The final analytic sample contained a total of 4,488 respondents from the 2007 Access to Care dataset. Table 5.1 describes the development of the analytic sample for this study.

<b>Table 5.1. 2007 MCBS Analytic Sample Source</b>	
	<b>Respondents</b>
<b>Survey Respondents</b>	15,806
<b>Community-Dwelling Respondents</b>	14,804
<b>65 years or Older Respondents</b>	13,009
<b>2006 Cohort &amp; 2007 Cohort in 2007 Analytic Sample</b>	7,518
<b>2006 Cohort &amp; 2007 Cohort found in 2009 Analytic Sample</b>	5,335
<b>Covariates Not Missing Respondents</b>	4,488
<b>Final Analytic Sample, Weighted Respondents (Unweighted)</b>	26,280,282 (n = 4,488)

### 5.3.2 Outcome Variable: Influenza Vaccination

The outcome was whether the respondent received the influenza vaccination during the 2008 winter. In the dataset, the influenza vaccination receipt variable was a dichotomous variable that indicated whether or not the respondent received the influenza vaccination during the prior winter. The influenza vaccination variable is derived from the 2009 Access to Care survey. Specifically, respondents were asked whether they “had a flu shot for last winter.” For this question, the phrase “last winter” referred to the winter of 2008. Since this study assesses whether forgoing, delaying, or having trouble accessing needed care (independent variable) in 2007 affects influenza vaccination (dependent variable) in the following year (2008), we utilize the 2009 Access to Care survey dataset to determine influenza vaccination in 2008. Respondents who responded “yes” to this variable were coded as “received the influenza vaccination” (flu = 1) and those who responded “no” were coded as “Did not receive influenza vaccination” (flu = 0). All other responses (i.e., don’t know, refused, inapplicable, missing) were coded as missing.

### 5.3.3 Independent Variable: Forgo, Delay, or Trouble Getting Needed Care

The independent variable of interest for the current study was self-reports of a study respondent choosing to forgo, delay, or having trouble getting needed care in the prior 12 months. Three variables from the 2007 Access to Care survey were combined into a dichotomous variable for the independent variable. The three variables were: (i) “had a health problem that thought the doctor should see but didn’t”; (ii) “delayed seeking care due to cost”; and (iii) “has study respondent had trouble getting needed

health care.” Respondents who responded “yes” to any of these variables were coded as having “Did Forgo, Delay, or Have Trouble Accessing Needed Care” and those who responded “no” were coded as having “Did Not Forgo, Delay, or Have Trouble Accessing Needed Care.” All other responses (i.e., don’t know, refused, inapplicable, missing) were coded as missing.

#### 5.3.4 Covariate Variables

This study utilized covariates obtained from the 2007 Access to Care survey that were reflective of characteristics that predispose, enable, and create need for primary care. All covariate variables were operationalized as categorical variables with mutually exclusive categories.

Predisposing characteristics included age (65 years to 74 years, 75 to 84 years, 85 years and older), sex (male, female), race (Non-Hispanic White, Minority/other), marital status (married, not married), and education (No High School Diploma/GED, High School Diploma/GED equivalent, Some College or More).

Enabling characteristics were household income (less than \$25,000, \$25,000 to \$50,000, \$50,000 or more), usual source of care over the last twelve months (Yes do have a usual source of care, No do not have a usual source of care), metropolitan area (metro area, non-metro area), and supplemental insurance status (Medicare Advantage, Medicaid or Other Public Coverage, Private, No Supplemental). Mutually exclusive categories using hierarchy coding were used to code insurance status. The hierarchy category orders from highest to lowest were: Medicaid or other public coverage (which include public coverage, Medicaid, or tri-care), Private (which included employer sponsored, self-purchased or both), Medicare Advantage, and No Supplementary insurance. Therefore, respondents were grouped into the category with the highest ordering regardless of other coverage.

Illness need characteristics included number of chronic conditions (none, one, two or more). In the MCBS, respondents reported whether or not they currently had one of 7 conditions (Diabetes, Cancer, High Blood Pressure, Heart Disease, Emphysema/Asthma/COPD, Arthritis, and Stroke). The number of Activities of Daily

Living (ADL) limitations were utilized to assess functional status among study respondents (none, one to two ADLs, three or more ADLs). ADLs included having difficulty and anticipating continued trouble with the following tasks: bathing, dressing, eating, getting in and out of chairs, walking, and toileting. Also, self-rated general health status reflected respondents' overall perception of their health status (excellent/very good, good, poor/very poor).

### 5.3.5 Statistical Analysis

Nationally representative estimates were obtained by applying longitudinal sample weights that account for the complex sampling design and survey non-responses. The 3-year longitudinal sample weights from the 2009 Access to Care dataset were used for all analyses. This weight accounted for the current year (2009) and the two years prior (2007). Therefore, we were able to apply this weight to the 2006-cohort and 2007-cohort found within the 2007 Access to Care Survey dataset. Using the weighted responses, descriptive characteristics for the analytical sample were explored using chi-square analyses and raw weighted proportions. Sample characteristics were examined in the full sample and compared by influenza vaccination receipt status. Multivariable logistic regression, that included longitudinal sampling weights, were used to estimate the associations between forgoing, delaying, or having trouble accessing needed care in the prior year and receipt of the influenza vaccination the following year. The analyses reported for the current study were all conducted using STATA SE 12.0.

## 5.4 Results

Distributions of the sample characteristics as a whole and stratified by influenza vaccination receipt are shown in Table 5.2. In 2007, 11.7% of study respondents reported delaying, forgoing, or having trouble accessing needed care. Study respondents were characterized by the majority of respondents being younger, white, female, married, and having had some college or more. The majority reported having two or more chronic conditions, having had a usual source of care, living in a metropolitan area, and having had few to no ADL limitations. Additionally, respondents made less than \$50,000

annually, rated themselves as having had good or better health status, and a large majority had either a Medicare advantage plan or private insurance.

About 25% of the analytic sample reported not receiving an influenza vaccination. Among respondents who reported not receiving the influenza vaccination, a greater proportion also reported forgoing, delaying, or having trouble accessing needed care (31% among respondents who delayed, did not seek, or had trouble accessing needed care vs 24% among those who did not forgo, delay, or have trouble accessing needed care). A greater proportion of older individuals (85+), Whites, and those who were married reported receiving an influenza vaccination. In addition, a greater proportion of those with a higher education level, more chronic conditions or functional limitations, and with a higher annual income received an influenza vaccination. Those with private insurance, who lived in a metropolitan area, and had a higher self-rated health were also among those most likely to receive an influenza vaccination. Bivariate analyses using chi-square analysis revealed that gender was not significantly associated with receipt of the influenza vaccination. This variable was removed from all further analyses.

Odds Ratios along with corresponding 95% confidence intervals for the multivariable logistic regression are reported in Table 5.3. Results revealed that, compared to individuals who do not report forgoing, delaying, or having trouble accessing needed care, respondents who report forgoing, delaying, or having trouble accessing needed care in the prior year were 25% less likely to report receiving an influenza vaccination the following year (Odds Ratio (OR) = 0.749; 95% Confidence Interval (CI) = 0.609, 0.922).

**Table 5.2. Sample Characteristics for 2006 and 2007 Cohort from 2007 Analytic Sample MCBS (n = 4,488/ N = 26,280,282)**

	Full Sample		Influenza Vaccination				Chi-Sq(DF) p-value
			No Vaccination		Vaccination		
	No.	Wt%	No.	Wt%	No.	Wt%	
<b>All</b>	4,488	100%	1,118	24.97%	3,370	75.03%	
<b>Delay, Forgo, or Have Trouble Accessing Needed Care</b>							
Yes	513	11.71%	157	30.60%	356	69.40%	11.65 (1)
No	3,975	88.29%	961	24.18%	3,014	75.82%	0.001
<b>Age</b>							
65-74 years	2,141	53.87%	642	29.99%	1,499	70.01%	
75-84 years	1,787	35.97%	370	20.71%	1,417	79.29%	55.16 (2)
85+ years	560	10.16%	106	18.93%	454	81.07%	<0.001
<b>Race</b>							
Non-Hispanic White	3,615	80.40%	802	22.19%	2,813	77.81%	57.04 (1)
Other	873	19.60%	316	36.20%	557	63.80%	<0.001
<b>Gender</b>							
Male	1,983	43.69%	499	25.16%	1,484	74.84%	15.94 (1)
Female	2,505	56.31%	619	24.71%	1,886	75.29%	0.7156
<b>Marital Status</b>							
Not Married	2,034	44.25%	546	26.84%	1,488	73.16%	9.63 (1)
Married	2,454	55.75%	572	23.31%	1,882	76.69%	0.0001
<b>Educational Attainment</b>							
Less than HS/GED	1,127	23.33%	353	31.32%	774	68.68%	
High School Grad/GED Equivalent	1,354	30.18%	329	24.30%	1,025	75.70%	37.13 (2)
Some College or More	2,007	46.50%	436	21.72%	1,571	78.28%	<0.001
<b>Chronic Condition</b>							
None	429	9.96%	179	41.72%	250	58.28%	
Yes, have one	883	20.40%	274	31.03%	609	68.97%	121.25 (1)
Yes, have two or more	3,176	69.64%	665	20.94%	2,511	79.06%	<0.001
<b>Usual Source of Care</b>							
No, do not have a usual source of care	161	3.76%	100	62.11%	61	37.89%	141.76 (1)
Yes, have a usual source of care	4,327	96.24%	1,018	23.53%	3,309	76.47%	<0.001
<b>Metro</b>							
Non-Metro Area	1,154	23.17%	323	27.99%	831	72.01%	9.10 (1)
Metro Area	3,334	76.83%	795	23.85%	2,539	76.15%	0.0031
<b>ADL Limitations</b>							
None	3,404	76.79%	885	26.00%	2,519	74.00%	
1-2 ADLs	828	17.85%	174	21.01%	654	78.99%	11.43 (2)
3+ ADLs	256	5.36%	59	23.05%	197	76.95%	0.007
<b>Household Annual Income Level, \$</b>							
<25,000k	2,049	43.83%	611	29.82%	1,438	70.18%	
25,000k - < 50,000k	1,777	39.98%	370	20.82%	1,407	79.18%	50.11 (2)
≥ 50,000k	662	16.19%	137	20.69%	525	79.31%	< 0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	2,243	50.83%	591	26.35%	1,652	73.65%	
Good	1,428	31.42%	335	23.46%	1,093	76.54%	6.17 (2)
Fair/Poor	817	17.75%	192	23.50%	625	76.50%	0.0424
<b>Insurance</b>							
No Supplementary	489	11.00%	165	33.74%	324	66.26%	
Medicare Advantage	939	21.06%	259	27.58%	680	72.42%	
Private [ES/SP/Both]	2,559	57.18%	551	21.53%	2,008	78.47%	39.99 (3)
Medicaid or Other Public Coverage	501	10.76%	143	28.54%	358	71.46%	<0.001

**Note: Based on the 4,488 (N = 26,280,282) 2006 and 2007 Cohort of Medicare beneficiaries 65 years or older interviewed in 2007 with non-missing data for variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses.**

**Abbreviations: No., Unweighted Frequency Count; WT%, Weighted Percent; ADL, Activities of Daily Living**



<b>Table 5.3. Logistic Regression of Community Dwelling Older Medicare Beneficiaries Who Report Receipt of the Influenza Vaccination</b>	
<b>Variable</b>	<b>Odds Ratio (95% CI)</b>
<b>Delay, Forgo or Have Trouble Accessing Needed Care</b>	
No	1.000
Yes	0.749 (0.609, 0.922)
<b>Age</b>	
65-74	1.000
75-84	1.566 (1.328, 1.848)
85+	1.778 (1.351, 2.339)
<b>Race</b>	
Non-Hispanic White	1.000
Other	0.607 (0.488, 0.756)
<b>Marital Status</b>	
Not Married	1.000
Married	1.121 (0.961, 1.307)
<b>Educational Attainment</b>	
Less than High School or GED	1.000
High School Grad/GED Equivalent	1.178 (0.966, 1.437)
Some College or More	1.346 (1.084, 1.671)
<b>Chronic Condition</b>	
None	1.000
Yes, have one	1.464 (1.130, 1.897)
Yes, have two or more	2.294 (1.805, 2.916)
<b>Usual Source of Care</b>	
No, do not have a usual source of care	1.000
Yes, do have a usual source of care	3.748 (2.452, 5.730)
<b>Metro</b>	
Non-Metro Area	1.000
Metro Area	1.296 (1.084, 1.548)
<b>Activities of Daily Living (ADL) Limitations</b>	
None	1.000
1-2 ADLs	1.186 (0.941, 1.494)
3+ ADLs	1.158 (0.812, 1.651)
<b>Household Annual Income Level, \$</b>	
<25,000k	1.000
25,000k to < 50,000k	1.418 (1.183, 1.699)
≥ 50,000k	1.498 (1.135, 1.977)
<b>Self-Rated Health</b>	
Excellent/Very Good	1.000
Good	1.127 (0.953, 1.332)
Fair/Poor	1.216 (0.974, 1.518)
<b>Insurance</b>	
No Supplementary Insurance	1.000
Medicare Advantage	1.057 (0.803, 1.391)
Private [ES/SP/Both]	1.262 (1.000, 1.592)
Medicaid or Other Public Coverage	1.278 (0.978, 1.670)
<b>Note: Logistic Regression Odds Ratios with 95% Confidence Intervals (CI) for Each Variable</b>	

## 5.5 Discussion

Approximately one in four Medicare beneficiaries reported not receiving the influenza vaccination in 2008. Individuals who did not seek, delayed, or had trouble accessing needed care in 2007 were significantly less likely to receive the influenza vaccination in the winter of 2008. Those who delay, forgo, or have trouble accessing needed care tend to have no usual source of care, have lower income, have no supplementary insurance, and were of minority status; characteristics that increase risk for poorer health outcomes (Fang & Alderman, 2004; He et al, 2002; Lantz et al, 1998; Link & McKinlay, 2009; Pamuk et al, 1998; Spatz et al, 2010). Consequently, those who delay, forgo, or have trouble accessing needed care are especially vulnerable for poor health outcomes because of their baseline risks, their reduced access to needed health care, and not getting recommended vaccinations. This suggests that targeting interventions to increase vaccination rates among older beneficiaries who delay, forgo, or have trouble accessing needed health care should be an important public health priority.

Collective evidence from studies that sought to understand factors that influence influenza vaccination rates among older adults supports the premise of this investigation. Lochner & Wynne (2011) assessed community-dwelling Medicare beneficiaries aged 65 years and older and found that unvaccinated beneficiaries were more likely to be younger, not married, of minority status, had a lower socioeconomic status, were less educated, and had no interaction with the health care system. Their study differed from the current study because it did not adjust for other risk factors when assessing associations and it did not specifically assess whether forgoing, delaying, or having trouble accessing needed care was associated with getting the influenza vaccination. Other studies offer further support for the importance of the current study. Avelino-Silva and colleagues (2011) explored numerous variables associated with compliance of receiving a seasonal influenza vaccination among older adults living in Brazil. They found that a direct recommendation from a physician was the only significant predictor of vaccination compliance for older adults. In particular, older adults who received the influenza vaccination were 2.7 times more likely to have received a recommendation from a physician compared to those who did not receive the vaccination. Zimmerman and

colleagues (2003) compared characteristics among older adults living in Pennsylvania who did and did not receive the influenza vaccination and found that receiving a direct recommendation from a physician significantly increased the likelihood of receiving the vaccination. However, patients cannot receive such recommendations unless they interact with their physician. Emerging evidence suggests that getting to the physician's office is an important first step to being educated about getting vaccinations (Dip & Cabera, 2010). It is likely that when patients forgo, delay, or have trouble accessing needed care, it reduces their opportunity to learn from their physician about the importance of preventive health behaviors such as getting the influenza vaccination.

The emergence of walk-in retail clinics in pharmacies and urgent care centers across the country have made it more convenient for individuals to seek out medical attention and receive needed care in an outpatient setting. Utilization of such clinics has been on the rise, especially during weekends and evenings (Ashwood et al, 2011; Mehrotra & Lave, 2012). Approximately, one in five older Medicare beneficiaries receives their influenza vaccination within a community setting (e.g., retail clinics; Lochner & Wynne, 2011). However, retail clinics can disrupt continuity of care for chronic conditions because they reduce the likelihood that patients visit their primary care physician for treatment of minor complaints and illnesses (Reid et al, 2013). This is of great concern for older adults with multiple conditions who benefit from an integrated plan of care (Bodenheimer, Chen, & Bennett, 2009; Pham et al, 2007; Thorpe & Howard, 2006).

## 5.6 Conclusion

Individuals who delay, forgo, or have trouble accessing needed health care are less likely to receive preventive health care counseling in the primary care setting. Therefore, interventions that occur outside of primary care providers' offices may be more effective for those at risk of not accessing needed care. For example, mailing easily understood information about the importance of the influenza vaccination, may increase vaccination rates among those who delay, forgo, or have trouble accessing needed primary care. Information from a source that is considered to have credibility such as

Medicare, could help debunk many of the myths associated with the influenza vaccination. Such myths include beliefs that the influenza vaccination causes the flu or that the influenza vaccine will cause harm. Others believe that they are unlikely to contract the influenza virus (Avelino-Silva et al, 2011; Lochner & Wynne, 2011; Zimmerman et al, 2003). In addition, incentive based interventions have been shown to be effective in promoting healthy behaviors (Lynagh, Sanson-Fisher & Bonevski, 2013; Meredith et al, 2014; Terry & Anderson, 2011; Volpp, 2009). Currently, the influenza vaccination is covered under Medicare Part B, a voluntary medical coverage plan that requires an annual deductible and monthly premium. Insurance companies, including Medicare, could reduce the annual deductible and/or monthly premiums as an incentive for older adults to receive and stay up-to-date on all key vaccinations such as the influenza vaccination.

The primary limitation of this study was utilization of self-reported retrospective data. Self-reported data may have introduced some recall bias due to beneficiaries inaccurately reporting whether or not they received an influenza vaccination during the prior winter. Also, this study did not assess the underlying reasons respondents did not receive the influenza vaccination. For instance, a very small percentage of individuals are allergic to one or more components of the influenza vaccination, also those with Guillain-Barré Syndrome should not receive the vaccine, but this involves so few people, that it is unlikely that their inclusion affected the study outcomes. Another limitation is the longitudinal nature of this study led to loss of follow-up due to deaths and attrition. However, the use of longitudinal sampling weights reduced potential bias in estimates due to dropouts and nonresponse. Despite these limitations, to the author's knowledge, this study is the first to demonstrate that forgoing, delaying, or having trouble getting needed medical care among Medicare beneficiaries is prognostic of not receiving the influenza vaccination. Heightened awareness of this association and missed opportunity might lead to enhanced preventive health campaigns that may better address and reach this vulnerable subpopulation.

CHAPTER 6. EXAMINING THE ASSOCIATION BETWEEN RISK FOR ALL-CAUSE HOSPITALIZATION AND OLDER MEDICARE BENEFICIARIES WHO REPORT FORGOING, DELAYING, OR HAVING TROUBLE ACCESSING NEEDED CARE

6.1 Abstract

**Background:** Older adults have high rates of chronic and co-morbid conditions that require ongoing specialized care. These conditions are best managed in the primary care setting. Inadequate continuity or utilization of primary care has been associated with an increased risk of hospitalizations. The majority of adults aged 65 and older are covered under Medicare, a universal health care coverage program for older adults. However, one in nine Medicare beneficiaries report going without or having trouble accessing needed care. These beneficiaries are at greatest risk for disruption of continuity of needed health care in the primary care setting, potentially leading to costly adverse health outcomes.

**Purpose:** This study examined the prognostic association between forgoing, delaying, or having trouble accessing needed medical care and hospital admissions among older community-dwelling Medicare beneficiaries. **Methods:** Using data from the 2009 and 2010 Medicare Current Beneficiary Survey (MCBS), a multivariable Andersen Gill (AG) survival model was computed to determine the association between forgoing, delaying, or having trouble accessing needed care and time to hospital admission in the following year after controlling for risks for hospital admissions. **Results:** Approximately 18% of the analytic sample reported having at least one or more hospital admission and 8% reported forgoing, delaying, or having trouble accessing needed health care. After adjusting for other potential risk factors, there was no association found between reports of delaying, going without, or having trouble accessing needed health care (Hazard Ratio = 0.905, 95% CI = 0.722, 1.134) and hospital admission among beneficiaries. **Conclusions:** Although non-significant, the initial findings suggest that further work is warranted to examine potential confounders and/or other health outcomes to fully understand the

health consequences associated with forgoing, delaying, or having trouble accessing needed health care.

## 6.2 Introduction

In 2012, there were 36.5 million hospital stays in the United States (Weiss & Elixhauser, 2014). Despite representing only 14% of the US population (AoA, 2014), adults aged 65 years and older make-up approximately 40% of hospitalized persons in the United States (MEDPAC, 2015). In 2012, adults aged 65 to 84 and 85 years or older had a hospitalization rate of 261 and 502 per 1,000 persons in the population, respectively. In contrast, younger adults age 18 to 44 and 45 to 64 had a hospitalization rate of 79 and 109 hospital stays per 1,000 persons in the population, respectively (Weiss & Elixhauser, 2014). The risk and severity of hospitalization increases with age. On average hospitalized older adults have longer and costlier stays than younger adults. The aggregated cost associated with hospitalization is about \$377.5 billion, with Medicare paying for the largest number of hospitalizations (Weiss & Elixhauser, 2014). In fact, one-third of all health care expenditures can be attributed to hospital inpatient care (Weiss & Elixhauser, 2014). This burden is expected to increase with the growing aging population. Thus, identification of patients who are most vulnerable for hospitalization is critical so that interventions may be efficiently targeted toward and tailored to these patients

Older adults experience higher rates of chronic and co-morbid conditions that require specialized and integrated health care. About 80% of adults have at least one or more chronic conditions that require an ongoing, integrated plan of care (Bodenheimer, Chen, & Bennett, 2009; Pham et al, 2007; Thorpe et al, 2011; Thorpe & Howard, 2006). Ambulatory Care Sensitive Conditions (ACSCs) are defined as health conditions that are best managed in the primary care setting and include many of the chronic conditions experienced by older adults (e.g., diabetes, hypertension, congestive heart failure, pneumonia, angina; CMS, 2015b). Older adults experience an increased vulnerability to hospitalization due to multiple chronic conditions (Rueben, 2002; Steiner et al, 2006; Steiner & Friedman, 2013; Wolff & Starfield, 2002).

Adequate utilization of primary care services has been associated with a reduction of risk hospitalization for ambulatory care sensitive conditions (Bodenheimer, Wagner, & Grumbach, 2002; Cabana et al, 2004; Rizza et al, 2007; Rosano et al, 2012). However, many chronic conditions are not well-managed (Egan, Zhao, & Axon, 2010; Hoffman & Schwartz, 2008; McGlynn et al, 2003; Seeman et al, 2010; Wilper et al, 2008). Inadequate utilization of primary care services reduces continuity of care for chronic conditions and is associated with increased risk for hospitalization. For example, Rizza and colleagues (2007) found that preventable hospitalizations increased in Italian adults who had fewer visits to their primary care provider. Disruption in primary care also increases risk for multiple hospitalizations. Nitu and colleagues (2012) found that diabetics who did not show up for scheduled appointments were at increased risk for readmissions. Adults who forgo, delay, or have trouble getting needed care are at risk for not receiving primary care services that may be vital to proper management of chronic conditions and therefore may be at increased risk for hospitalization.

The current study utilized Andersen and Newman's (2005) Individual Determinants of Health Service Utilization model to identify characteristics that influence one's utilization of the hospital. Authors posit three constructs that are associated with utilization of health services: predisposing, enabling, and need characteristics/risks. Predisposing characteristics reflect pre-existing intrapersonal factors that influence one's tendency to use care. Predisposing risk for hospitalizations among older adults include: age, race/ethnicity, sex, marital status, and education level (Davis, Liu, and Gibbons, 2003; Inouye et al, 2008; Reuben et al, 2002). Enabling characteristics pertain to assets that hinder or facilitate use of services. Resources that enable older adults to utilize hospital care include: income level, insurance coverage, usual source of care, and metropolitan area (Goins et al, 2005; Inouye et al, 2008; Katz et al, 2015; Reuben et al, 2002). Lastly, need reflects illness level that may require health care. Need characteristics among older adults include: self-rated health, chronic condition, and disabilities (Inouye et al, 2008; Miilunpalo et al, 1997; Reuben et al, 2002; Xu et al, 2012). Andersen and Newman's model is used to statistically adjust for predisposing, enabling, and need risks for hospital admission among older Medicare beneficiaries. The risk adjustment reduces the potential that there is confounding in the association between going without or having

trouble getting needed health care and risk of hospitalization among older Medicare beneficiaries.

### 6.2.1 Purpose

The purpose of this study is to evaluate whether self-reports of going without, delaying, or having trouble accessing needed care is associated with an increased risk of hospital admission after statistically controlling for commonly used and validated indicators for hospital admission among a nationally representative sample of Medicare beneficiaries.

The specific aims for the current study were to:

1. Assess the individual-level predisposing, enabling, and need characteristics associated with hospitalization among older Medicare Beneficiaries.
2. Examine the prognostic association between forgoing, delaying, or having trouble accessing needed care and hospitalization among older Medicare Beneficiaries.

Results of this study will inform public health practitioners and policy makers of potential adverse and costly health consequences associated with forgoing, delaying, or having trouble accessing needed care.

## 6.3 Methods

### 6.3.1 Data Source and Study Sample

Data for this study are from the Medicare Current Beneficiary Survey (MCBS), a multi stage longitudinal panel survey of a nationally representative sample of Medicare beneficiaries. MCBS is sponsored by the Centers for Medicare and Medicaid Services (CMS) and consists of a rotating panel of Medicare Beneficiaries that are followed up to four years. Each year a unique set of respondents (panel) that have not been previously included is added to the existing sample. Beneficiaries sampled in MCBS include both aged and disabled beneficiaries that were alive and eligible for Medicare as of January 1 of the sampling year. Additionally, each year the oldest panel of the survey is retired from the existing sample. MCBS consists of two modules: (i) "Access to Care" and (ii) "Cost and Use." The current study utilized data from the 2009 MCBS Access to Care Survey and the 2010 MCBS Cost and Use Survey. The study sample consisted of



community-dwelling study respondents aged 65 years and older from the 2009 MCBS Access to Care Survey. All baseline characteristics (predisposing, enabling, and need variables) and the independent variable were obtained from the 2009 MCBS Access to Care Survey dataset. Study respondents of the 2009 MCBS Access to Care Survey were followed into the 2010 MCBS Cost and Use dataset to obtain hospitalization utilization information the following year for each respondent.

The sample for the current study included only community-dwelling respondents aged 65 years and older. There were 14,695 survey respondents in the MCBS 2009 Access to Care data file. Of the 13,751 community dwelling respondents, 12,158 were 65 years and older and eligible for inclusion in this study for the 2009 year. Among these respondents, 1,591 respondents were excluded from the analytic 2009 sample because of missing values in the independent variable or one or more of the covariates in the study leaving 10,567 respondents. There were four cohort panels in the 2009 Access to Care dataset (2006, 2007, 2008, and 2009). The 2010 Cost and Use data files contains only three of the cohort panels from the 2009 analytic sample (2007, 2008, and 2009). Therefore, the 2006 cohort ( $n = 2,472$ ) was removed from the 2009 Access to Care dataset prior to merging the sample with the Cost and Use dataset. Of the 8,095 remaining respondents, 7,131 respondents from the 2009 Access to Care sample were matched and followed into the 2010 Cost and use dataset. An additional 68 respondents were excluded from the study because of missing hospitalization information values. The final analytic sample contained a total of 7,063 respondents from the 2009 analytic sample.

### 6.3.2 Outcome Variable: Time to Inpatient Hospital Admission

The outcome of interest was time to inpatient hospital admission in the year since the community survey. Hospital admission and discharge dates were obtained from the 2010 MCBS Cost and Use survey dataset. Time to event was calculated in days. Participants were followed for a total of 13 months (395 days), from December 2009 to December 2010. Entry time for each respondent was day 0. Therefore, exit time (study end date) for all respondents was day 395 or date of death. Death date was determined by the survey death records found in the 2010 CU dataset.

There are three scenarios for computing the time to event, a reported hospitalization. Each respondent had at least one observation per event or time interval. Scenario one pertains to patients who do not have an event. If a patient does not have an inpatient hospitalization during the study time follow-up period, they had only one-time interval, entry into the study (at time 0) to study follow-up end date (at time 395 or time of death). Scenario two pertained to respondents with only one event that was reported within the study follow-up period (395 days). Respondents with only one event had two observations. The first observation covered the time span from entry into the study (time 0) until the first hospital admit date (time 1). The second observation in scenario two, spanned from the discharge time of event 1 to the end of the follow-up period (death or 395 days) for the respondent. The last scenario corresponds to respondents with multiple (two or more) events. For scenario three, respondents have two or more events. As described in scenario two, the first event spanned from entry date (time 0) to the first hospital admission. All subsequent time intervals began with the prior event's discharge date and extended to the next hospital admission date or the end of the follow-up period (death or 395 days). Observations were right-censored at the end of the study (395 days) or at the time of death. Each time interval represented a risk interval, which is a time period wherein respondents are at risk for an event (a hospitalization). For hospital events, these risk intervals are discontinuous because respondents are not at risk for an event when they are hospitalized. A respondent's risk began once they were discharged from the prior hospitalization, therefore, the duration of their hospital stay is excluded from the risk interval sets.

### 6.3.3 Independent Variable: Forgo, Delay, or Trouble Getting Needed Care

The independent variable was based on self-reports of study respondents reporting forgoing, delaying, or having trouble accessing needed health care in the prior 12 months. One dichotomous variable was used to indicate whether a respondent went without, delayed, or had trouble getting care. This dichotomous variable was derived by combining three variables from the 2009 MCBS Access to Care Survey dataset: (i) "had a health problem that (he/she) thought the doctor should see but didn't"; (ii) "delayed seeking care due to cost"; and (iii) "had trouble getting needed health care." Respondents

were coded as “Did Forgo, Delay, or Have Trouble Accessing Needed Care” if they responded “yes” to any of these three variables. Respondents were coded as “Did Not Forgo, Delay, or Have Trouble Accessing Needed Care” if they responded “no” to any of these three variables. All other responses were coded as missing (i.e., missing, don’t know, inapplicable, or refused).

#### 6.3.4 Covariate Variables

Information about predisposing, enabling, and need characteristics were obtained from the 2009 MCBS Access to Care Survey dataset for each respondent included in the study. Predisposing risk for hospital admission included age, sex, race, marital status, and education. Age was divided into three categories: 65 years to 74 years, 75 to 84 years, or greater than or equal to 85 years. Sex was divided into two categories: male or female. Race was split into two categories; Non-Hispanic White or Minority/Other. Marital status had two groups: married or not married. Lastly education was divided into three categories: less than high school or GED, high school diploma/GED equivalent, vs. some college or more.

Enabling characteristics included household income, usual source of care, metropolitan area, and supplemental insurance status. Income included three categories: less than \$25,000, \$25,000 to \$50,000, or greater than or equal to \$50,000. Usual source of care over the last twelve months had two groups: “yes” do have a usual source of care or “no” do not have a usual source of care. Metropolitan status included: metro area or non-metro area. Lastly, supplemental insurance status was divided into: Medicare Advantage, Medicaid or Other Public Coverage, Private, or No Supplemental insurance. Insurance status was coded into mutually exclusive categories using hierarchy coding, in which the category orders from highest to lowest were: Medicaid or other public coverage (which include public coverage, Medicaid, or Tri-Care), Private (which included employer sponsored, self-purchased or both), Medicare Advantage, and No Supplementary insurance. Respondents were placed into the category with the highest ordering regardless of other coverage.

Need characteristics included chronic conditions, functional status, and self-rated general health status. The number of chronic conditions was categorized into three

categories: none, one, two or more. Chronic conditions considered were: arthritis, diabetes, cancer, emphysema/asthma/copd/, heart disease, high blood pressure, or stroke. Self-rated general health status was based on a self-assessment of health provided by study respondents. Three categories were used for this variable and included: excellent/very good, good, or poor/very poor. Lastly, functional status was assessed by counting the number of Activities of Daily Living (ADL) limitations a respondent reported. ADLs included the following daily tasks: bathing, dressing, eating, getting in and out of chairs, walking, and toileting. ADL limitations categories included: none, 1 to 2 ADLs, or 3 or More ADLs.

### 6.3.5 Statistical Analysis

Nationally representative estimates were obtained by applying the sample weights that account for the complex sampling design and survey non-responses to the MCBS. Descriptive statistics of sample characteristics were computed using weighted and unweighted proportions. An extension of the Cox Proportional Hazard model proposed by Andersen and Gill (AG model) (Andersen & Gill, 1982) was used to examine the association between forgoing, delaying, or having trouble accessing needed care and risk of hospital admissions among beneficiaries after controlling for various predisposing, enabling, and need covariates. The AG model is used for recurrent event data. This model is utilized because there may be correlation within multiple hospital admissions clustered within a study respondent (e.g., more than one hospital admission within the study follow-up period). The AG model accommodates for potential multiple event dependence by adjusting the standard error estimates using robust sandwich variance estimators. In addition, the AG model also accounts for the discontinuous risk intervals found in time to events for hospitalizations. Bivariate AG models were computed to assess the association between predisposing, enabling, and need characteristics and time until hospitalization. Respondents were right censored at the end of the study if they died before the end of the study follow-up period. Standard errors were computed using the Taylor series linearization approach to adjust for the complex sampling design. All analyses were conducted using STATA SE 12.0.

## 6.4 Results

Table 6.1 reveals that about 18% of respondents reported having at least one or more hospital admissions during the follow-up period. In the 1,399 respondents who reported a hospital admission there were a total of 3,752 reported hospital admission incidences. Table 6.1 provides the unweighted and weighted sample characteristics. About eight percent of respondents reported forgoing, delaying, or having trouble accessing needed care. The majority of the analytic sample was 65 to 74 years of age (54%), female (56%), White (80%), and married (56%). Nearly 49% of the sample had some college and most lived in a metropolitan area (76%). Eighty percent made less than \$50,000 annually and ninety percent had supplementary insurance. About half reported having good or poor health, and the majority did not report having any functional limitations. Ninety percent reported having one or more chronic conditions.

Table 6.2 shows the bivariate associations between each of the risk factors and hospital admissions during the study's follow-up period. Those at higher risk for hospital admissions were older, less educated, unmarried, lived in a non-metro area, had public coverage, and had a lower annual income. In addition, individuals with functional limitations, chronic conditions, and poorer self-rated health status were at higher risk of a hospitalization. Bivariate analyses revealed that metropolitan area, gender, and usual source of care were not associated with hospital admission among the study respondents. These three variables were removed from further analyses. Although reports of forgoing, delaying, or having trouble accessing needed care were nonsignificant in the bivariate analyses, based on the study's aims this variable was retained in the multivariable AG survival model.

Table 6.3 shows the multivariable logistic regression for self-reports of forgoing, delaying, or having trouble accessing needed care and hospital admissions. Self-reports of forgoing, delaying, or having trouble accessing needed care were not prognostic of subsequent hospital admissions after statistically controlling for known risks of hospital admissions. When adjusting for other risk factors, individuals who report forgoing, delaying or having trouble accessing needed care were 10% less likely (Hazard Ratio = 0.905, 95% CI = 0.722, 1.134) to be hospitalized than those who do not.

<b>Table 6.1. Sample Characteristics for the 2009 MCBS Access to Care Study Respondents</b>			
<b>Variable</b>	<b>N</b>	<b>Unweighted (%)</b>	<b>Weighted (%)</b>
<b>Hospital Admission</b>			
No	5,664	80.19	81.73
Yes	1,399	19.81	18.27
<b>Delay, Forgo or Have Trouble Accessing Needed Care</b>			
No	6,525	92.38	91.79
Yes	538	7.62	8.21
<b>Age</b>			
65-74	3,064	43.38	54.28
75-84	2,846	40.29	33.68
85+	1,153	16.32	12.04
<b>Gender</b>			
Male	3,061	43.34	43.84
Female	4,002	56.66	56.16
<b>Race</b>			
Non-Hispanic White	5,631	79.73	79.99
Other	1,432	20.27	20.01
<b>Marital Status</b>			
Not Married	3,312	46.89	43.96
Married	3,751	53.11	56.04
<b>Educational Attainment</b>			
Less than High School or GED	1,736	24.58	22.40
High School Grad/GED Equivalent	2,057	29.12	28.38
Some College or More	3,270	46.30	49.22
<b>Chronic Condition</b>			
None	561	7.94	9.48
Yes, have one	1,290	18.26	19.47
Yes, have two or more	5,212	73.79	71.05
<b>Usual Source of Care</b>			
No, do not have a usual source of care	246	3.48	4.05
Yes, do have a usual source of care	6,817	96.52	95.95
<b>Metro</b>			
Non-Metro Area	1,820	25.77	23.52
Metro Area	5,243	74.23	76.48
<b>Activities of Daily Living (ADL) Limitations</b>			
None	4,985	70.58	73.60
1-2 ADLs	1,443	20.43	18.49
3+ ADLs	635	8.99	7.91
<b>Household Annual Income Level, \$</b>			
<25,000k	3,239	45.86	41.99
25,000k to < 50,000k	2,584	36.59	37.95
≥ 50,000k	1,240	17.56	20.07
<b>Self-Rated Health</b>			
Excellent/Very Good	3,453	48.89	50.83
Good	2,288	32.39	31.67
Fair/Poor	1,322	18.72	17.50
<b>Insurance</b>			
No Supplementary Insurance	664	9.40	10.01
Medicare Advantage	2,010	28.46	27.25
Private [ES/SP/Both]	3,642	51.56	52.73
Medicaid or Other Public Coverage	747	10.58	10.01

<b>Table 6.2. Bivariate associations for the 2009 Access to Care study respondents between risk factors and hospital admissions during the 13 months after the baseline survey (Unadjusted Risks for Hospital Admissions)</b>	
<b>Variable</b>	<b>Hazard Ratio (95% Confidence Interval)</b>
<b>Delay, Forgo or Have Trouble Accessing Needed Care</b>	
No	1.000
Yes	1.097 (0.868, 1.386)
<b>Age</b>	
65-74	1.000
75-84	1.780 (1.546, 2.050)
85+	2.257 (1.891, 2.694)
<b>Gender</b>	
Male	1.000
Female	0.940 (0.827, 1.070)
<b>Race</b>	
Non-Hispanic White	1.000
Other	0.842 (0.712, 0.996)
<b>Marital Status</b>	
Not Married	1.000
Married	.692 (0.601, 0.796)
<b>Educational Attainment</b>	
Less than High School or GED	1.000
High School Grad/GED Equivalent	0.903 (0.748, 1.090)
Some College or More	0.647 (0.546, 0.767)
<b>Chronic Condition</b>	
None	1.000
Yes, have one	1.611 (1.128, 2.301)
Yes, have two or more	3.202 (2.389, 4.292)
<b>Usual Source of Care</b>	
No, do not have a usual source of care	1.000
Yes, do have a usual source of care	1.277 (0.884, 1.845)
<b>Metro</b>	
Non-Metro Area	1.000
Metro Area	0.858 (0.723, 1.018)
<b>Activities of Daily Living (ADL) Limitations</b>	
None	1.000
1-2 ADLs	2.118 (1.813, 2.474)
3+ ADLs	3.251 (2.762, 3.826)
<b>Household Annual Income Level, \$</b>	
<25,000k	1.000
25,000k to < 50,000k	0.819 (0.724, 0.926)
≥ 50,000k	0.489 (0.410, 0.583)
<b>Self-Rated Health</b>	
Excellent/Very Good	1.000
Good	1.877 (1.630, 2.162)
Fair/Poor	3.494 (3.044, 4.011)
<b>Insurance</b>	
No Supplementary Insurance	1.000
Medicare Advantage	0.555 (0.433, 0.711)
Private [ES/SP/Both]	1.035 (0.849, 1.262)
Medicaid or Other Public Coverage	1.368 (1.025, 1.826)

<b>Table 6.3. Multivariable analysis results for the 2009 Access to Care study respondents between risk factors and hospital admissions during the 13 months after the baseline survey (Adjusted Risks for Hospital Admission)</b>	
<b>Variable</b>	<b>Hazard Ratio (95% Confidence Interval)</b>
<b>Delay, Forgo or Have Trouble Accessing Needed Care</b>	
No	---
Yes	0.905 (0.722, 1.134)
<b>Age</b>	
65-74	---
75-84	1.465 (1.274, 1.684)
85+	1.588 (1.337, 1.887)
<b>Race</b>	
Non-Hispanic White	---
Other	0.739 (0.627, 0.871)
<b>Marital Status</b>	
Not Married	---
Married	0.854 (0.733, 0.995)
<b>Educational Attainment</b>	
Less than High School or GED	---
High School Grad/GED Equivalent	1.016 (0.840, 1.228)
Some College or More	0.873 (0.725, 1.053)
<b>Chronic Condition</b>	
None	---
Yes, have one	1.395 (0.973, 1.999)
Yes, have two or more	1.960 (1.449, 2.650)
<b>Activities of Daily Living (ADL) Limitations</b>	
None	---
1-2 ADLs	1.368 (1.162, 1.610)
3+ ADLs	1.774 (1.482, 2.123)
<b>Household Annual Income Level, \$</b>	
<25,000k	---
25,000k to < 50,000k	1.068 (0.927, 1.231)
≥ 50,000k	0.781 (0.633, 0.964)
<b>Self-Rated Health</b>	
Excellent/Very Good	---
Good	1.558 (1.337, 1.816)
Fair/Poor	2.403 (2.031, 2.842)
<b>Insurance</b>	
No Supplementary Insurance	---
Medicare Advantage	0.533 (0.419, 0.679)
Private [ES/SP/Both]	1.030 (.845, 1.255)
Medicaid or Other Public Coverage	1.036 (0.809, 1.326)



## 6.5 Discussion

Forgoing, delaying, or having trouble accessing needed care was not associated with increased risk of hospital admission after controlling for other commonly reported risks for hospitalizations such as self-rated health and functional status (ADL limitations). The findings reveal that other risk factors associated with hospitalization explain a greater amount of the variation in hospital admission than forgoing, delaying, or having trouble getting needed care. The strong associations found among ADL disabilities, chronic conditions, and self-rated health on hospital admissions are consistent with prior literature that has identified these need variables as strong indicators of hospitalizations (Issac et al, 2015; Kennedy, Kasi, & Vaccarino, 2001; Reuben et al, 2002; Wolff & Starfield, 2002).

Surprisingly the findings of the current study were non-significant. The analytic sample in this study was comprised of a fairly young Medicare population (54% were 65yrs to 74yrs of age), majority had employee and/or self-purchased insurance (53%), and most reported good or better health (81%). In addition, only 18% of the analytic sample reported having one or more hospitalizations. While the weights did assist in adjusting results to make them nationally representative, the sample was still a relatively young, healthy group, who had employee and/or self-purchased insurance. The non-significant results between forgoing, delaying, or having trouble accessing needed care may be reflective of the analytic sample's characteristics. Ultimately, this suggests more work is needed to untangle the association between forgoing, delaying, and having trouble accessing needed care and future hospitalizations.

Although non-significant, in the multivariable analysis the direction of association between forgoing, delaying, or having trouble accessing needed care reversed. Initially, in the bivariate analyses the results suggested that individuals who forgo, delay, or have trouble accessing needed care were more likely to report a hospitalization. In the multivariable analyses this direction changed once self-rated health or functional status (ADL limitations) were added to the model. Once either of these variables were added, the association suggested those who forgo, delay, or have trouble accessing needed care were less likely to be hospitalized. In the current analyses it is unclear why the direction changed once either of these two variables entered the model. The change in direction of the estimate could suggest some complex unexplored confounding in the association

between forgoing, delaying, or having trouble accessing needed care and hospital admission among older beneficiaries. The potential for uncontrolled confounding is further supported by the positive association between having a usual source of care and increased risk of hospitalizations among study respondents in the bivariate analysis. Prior research suggests that sicker individuals are more likely to have a usual provider and are more likely to be hospitalized (Katz et al, 2015). Together, these unexpected findings suggest that further work is needed to explore potential confounders not examined in the current study.

Future analyses are warranted to determine other potential adverse health outcomes associated with going without or having trouble accessing needed care among beneficiaries. It may be that individuals who forgo, delay, or have trouble accessing needed care may be less likely to have any interaction with the health care system. As a result, there may be other possible health outcomes that should be explored such as mortality. Mortality may be a competing risk with hospitalization among this subpopulation. The current study utilized death record information provided in the MCBS Cost and Use record files. The month and year of death were provided for each deceased beneficiary included in the analytic sample. More detailed information on death and cause of death would be needed to accurately assess this association.

In addition, access to Medicare claims data would also allow assessments of other potential adverse health outcomes such as ambulatory care sensitive conditions. Claims data provides very specific detailed information regarding hospital admissions. Claims data include admission date, discharge date, primary diagnosis, up to nine additional diagnoses, and any procedures performed. The current study did not have access to the accompanying Medicare Claims data for study respondents. This study specifically examined the risks of all-cause hospitalization and did not assess reason for hospitalization admissions. Specifically, examining the association of forgoing, delaying, or having trouble accessing needed care and risk of ambulatory care sensitive conditions (preventable hospitalizations) among beneficiaries may be more reflective of how forgoing, delaying, or having trouble accessing needed care may increase risk hospitalization in this subpopulation. Without detailed claims data, we could not fully explore this potential relationship

The current study had several limitations. First, all data, including hospitalizations, were from self-reported retrospective interviews. This study did not have access to the respondents' Medicare claims data to validate hospital admission or reason for admission. Therefore, there is a potential for some recall bias that may have diminished the true relationship between going without or having trouble getting needed care and hospital admissions. Second, this study examined all-cause hospitalization and did not examine specific types of hospitalizations such as preventable ambulatory care sensitive conditions. Lastly, this study followed a cohort forward in time, this may have introduced bias toward a healthier sample due to loss of follow-up (e.g., deaths and attritions) among the analytic sample.

## 6.6 Conclusion

The current study only included key prevalent risk factors found in the literature that have been associated with hospitalizations among older adults. For example, the model did not include other potential variables such as respondents' living arrangements (alone vs. not alone), working status, health behaviors (e.g., smoking or alcohol consumption), psychosocial risks (e.g., depression, life satisfaction, stress), patient-physician relationship/satisfaction, or number of prior hospitalizations. While these additional variables were not explored under the specific aims of the current analysis, they might be potential modifiers or mediators in the relationship between forgoing, delaying, or having trouble accessing needed care and hospitalization risk among beneficiaries. Further, the implementation of the 2010 Affordable Care Act has required a Health Risk Assessment (HRA) be conducted for all Medicare Beneficiaries (Staley, Stange, & Richards, n.d.). HRAs are self-reported assessments that include health behaviors and risk factors that could provide insight into beneficiaries' health risk. Currently, there is no set standard for questions included in HRAs, however, understanding and identifying risks that increase older adults' risk for poor health outcomes, including hospital admission, should be a priority.

This study utilized a nationally representative sample of Medicare beneficiaries and is the first study to examine the association between delaying, forgoing, or having trouble accessing needed care and potential hospital admissions among older Medicare

beneficiaries. Future analyses should consider examining other adverse outcomes such as mortality or hospital admission for ambulatory care sensitive chronic conditions.

Ultimately, the current study did not find a significant association between risk of all-cause hospital admission and respondents who forgo, delay, or have trouble accessing needed care. Thus, findings of the current study warrant additional analytic work that further considers the complexities involved in this relationship.

## CHAPTER 7. DISCUSSION

### 7.1 Summary

The research described in this dissertation focused on understanding the prevalence, risks, and consequences of older Medicare beneficiaries delaying, forgoing, or having trouble getting needed health care. Unintended consequences of not accessing needed health care include interrupting care for chronic conditions and reducing the opportunity of preventive health education from providers. The findings from this research inform providers which patients are at risk for delaying, forgoing, or having trouble accessing needed health care. The findings will also inform policy makers about downstream health outcomes of not seeking needed medical care.

Study 1 revealed that one in every nine beneficiaries go without, delay, or have trouble getting needed medical care. Those individuals at greatest risk for not getting care when needed were of minority status, had lower incomes, were younger, did not have supplementary insurance, had poorer health, and reported multiple disabilities and chronic conditions. These same characteristics place individuals at a heightened risk of poorer health outcomes including mortality, morbidity, and hospital admission (Fang & Alderman, 2004; He et al, 2002; Lantz et al, 1998; Link & McKinlay, 2009; Pamuk et al, 1998; Reuben et al, 2002; Spatz et al, 2010). Findings suggest that despite having Medicare coverage, some of the most vulnerable older adults go without needed health care.

Study 2 found that delaying, going without, or having trouble accessing needed care predicts whether older adults receive the influenza vaccination. The Centers for Disease Control and Prevention recommend that all persons receive a seasonal influenza vaccination annually (CDC, 2016a). Older adults and individuals with chronic condition are especially encouraged to receive the influenza vaccination (CDC, 2016a; Gnanasekaran et al, 2016). It is well noted that prevention through vaccination is the best and most effective method to prevent influenza-related adverse health outcomes (CDC, 2016b; Gnanasekaran et al, 2016). Findings of study 2 revealed that older beneficiaries who go without or have trouble

accessing needed care were at a higher risk for not receiving the influenza vaccination. Older adults who do not comply with the recommended vaccination place themselves at a higher risk for contracting influenza and experiencing greater severity of the condition once it is acquired (Gnanasekaran et al, 2016).

The third study reported in this dissertation examined whether going without or having trouble accessing needed health care predicted future hospital admission among older Medicare beneficiaries. Results revealed that reports of delaying, forgoing, or having trouble accessing needed care were not prognostic of future admissions. The lack of association was surprising given that older adults who are most likely to go without or having trouble getting needed health care have multiple ambulatory care sensitive conditions that increase risk for hospitalization when needed care is interrupted. Analyses suggested potential confounding that requires further work to fully untangle the true underlying association.

Delaying, going without, or having trouble accessing needed care reduces the opportunity for health care providers to treat or educate patients in need of care. As described in Study 1, individuals who choose to go without or have trouble getting needed care are already at risk for poorer health outcomes due to their multiple chronic conditions and disabilities. Not seeking care when it is needed is likely to increase their risk for poor health outcomes. Further, study 2 suggests that missed interactions may reduce preventive health behaviors, which could result in poorer health outcomes. Collectively, these studies confirm that despite having Medicare health coverage, a vulnerable subpopulation of Medicare beneficiaries at risk for adverse health outcomes is not getting needed health care.

## 7.2 Strengths and Limitations

There were several strengths to the research reported in this dissertation. To the author's knowledge, this study is the first to estimate the prevalence, risks, and outcomes of forgoing, delaying, or having trouble accessing needed health care among older community-dwelling Medicare beneficiaries. The findings inform which patient characteristics increase risk for patients not getting needed medical care. Findings were determined using a large nationally representative sample of current Medicare beneficiaries. Also, findings were adjusted for the complex sampling design used in the Medicare Current Beneficiary Survey Study. Thus the study's results are generalizable to

the general population of Medicare beneficiaries. Third, this study is the first to examine how choosing to go without or having trouble getting needed care among Medicare beneficiaries may influence preventive service utilization and costly health outcomes among older adults. Fourth, two of the three proposed studies utilized longitudinal data to improve understanding of how lack of access to health care can impact future health outcomes. In summary, findings provide insight about variations in patterns of accessing needed health care and the potential deleterious effects of older Medicare beneficiaries not seeking needed medical care.

There were some limitations to this dissertation. The data were from self-reports. Self-reported data may introduce bias in the study results. For instance, if a respondent fails to report or underreports an outcome (e.g., receiving the influenza vaccination, going without or having trouble accessing needed care) estimates of the prevalence of the outcome and associations with the outcome will be attenuated. Second, the cross-sectional design of Study 1 prevented determination of whether precipitating events (e.g., changes in health, financial, social status) had a causative association with forgoing, delaying or having trouble accessing needed health care. Third, attrition in Studies 2 and 3 may have resulted in potential bias. Both of these studies required participants to recall events (i.e., hospital admission, influenza vaccination) within the last year. This may have introduced unexplained variance in the outcome and attenuated the magnitude of the association between reports of going without or having trouble accessing needed care and the health outcomes of interest (i.e., hospital admission, influenza vaccination). Second, both of these studies followed a cohort forward in time. This may have introduced some selection bias due to loss of follow-up, caused by attrition or death. More specifically, the longitudinal sample may have been healthier than the population of Medicare beneficiaries which could have weakened the effect of going without or having trouble accessing needed care on the health outcomes of interest.

### 7.3 Implications

The findings of this dissertation have implications for public health practitioners, policy makers, and future research examining health care utilization among Medicare beneficiaries.

Public health practitioners and providers should consider greater efforts to recognize which older adults are at greatest risk for forgoing, delaying, or having trouble getting needed care. Asking patients whether they have gone without needed care would be a simple method for recognizing patients who may not be consistently receiving needed care. Since the enactment of the 2010 Affordable Care Act, a Health Risk Assessment (HRA) is currently required for all Medicare beneficiaries (Staley, Stange, & Richards, n.d.). These assessments provide insight into beneficiaries' health risks. However, there is no standard for which questions are included in the HRA. Inclusion of the question "did you forgo, delay, or have trouble accessing needed care" on HRAs may allow providers to quickly identify who is at greatest risk for not consistently receiving needed medical care. Further, being able to identify who is at risk for not getting needed care may prompt providers to develop more proactive methods that ensure patients get the care they need and adequate education about getting needed care. For example, providers might initiate monthly phone calls or emails to the beneficiary reminding them of key appointments and needed services. Providers may also refer these individuals to social or insurance services that may help reduce barriers to accessing needed care.

Policy makers might consider the cost and benefits of a more all-inclusive health care service program. Findings from this study reveal that one in nine Medicare beneficiaries are not getting needed care and those not getting needed care tend to be sicker, more disabled, and poorer. Reducing potentially preventable costly outcomes through improved access to needed outpatient care may be cost neutral. Policy makers should continue to encourage the development of coordinated models of care for all beneficiaries. For example, Medicare Advantage (MA) plans provide coordinated care plans to beneficiaries who opt in. MAs work with a network of health care providers, physicians, and hospitals to improve integration of patients' care across primary and specialty health care providers. Dependent on the plan selected, a patient's primary care physician may coordinate the beneficiaries care plan. Popular MAs include Health Maintenance Organization (HMO) plans, Point of Service (POS) plans, and Preferred Provider Organization (PPO) plans. Results from the current study revealed that beneficiaries within an MA plan were significantly less likely to forgo, delay, or have trouble accessing needed care. In addition, MA respondents from the current study were



also less likely to be hospitalized. Further, research has shown that Medicare seniors enrolled in MA plans have shorter hospital stays and lower hospital-related cost (Baicker, Chernew, & Robbins, 2013). Utilization of MAs have also narrowed some racial health outcome disparities (e.g., cardiovascular care, mammogram screenings, and diabetes care) found among Medicare beneficiaries (Trivedi et al, 2005). MA plans offer additional services (e.g., vision, prescription drug coverage, hearing, dental) outside of Original Medicare (Part A and B), but are currently voluntary plans where beneficiaries are required to pay additional premiums. Beneficiaries must choose to opt in to a MA plan and even then, dependent on the plan selected, some health services may still not be covered and provider restrictions may apply.

Another potential care model may be a care program similar to the Program of All Inclusive Care for the Elderly (PACE) that provides long-term and primary care to nursing home eligible community-dwelling older adults aged 55 and older (Eng et al, 1997). PACE provides comprehensive multidisciplinary medical and social services in the home, the community, and in PACE centers. These services include all services covered by Medicare and Medicaid services that are authorized by a patient's health care provider (e.g., primary care, hospital care, medical specialty services, emergency services, nutritional counseling, labs-x-rays, transportation, etc.). A study of community-dwelling ADL-disabled older adults reported an improvement in functioning level (reduction of the number of ADLs completed independently) among 13% of respondents after just one quarter (3 months) in the PACE program (Sands, 2008). A similar study reported a significant reduction in hospitalization rates after only 6 weeks of receiving PACE services among ADL patients who had unmet need prior to joining PACE (Sands et al, 2006). While the current PACE program is only open to nursing home eligible community-dwelling older adults, an expansion of this program to all older Medicare beneficiaries could significantly reduce the risk of a beneficiary not getting needed care because care is brought to them, monitored, and administered by trained interdisciplinary health care providers.

In addition, in the Patient-Centered Medical Home model (PCMH; Sia et al, 2004) provides patients with continuous (24/7) access to medical and health advice or services. Further, the PCMH model provides reminders of upcoming needed services and

care. PCMH model provides comprehensive coverage in which a patient's primary care provider would coordinate all health care needs for the patient by creating an interdisciplinary team of health providers. Health providers may include physicians, nurses, care coordinators, educators, nutritionists, physician assistants, social workers, or pharmacists. This model also encourages the patient and their family to actively manage, engage in, and organize their care plans (Sia et al, 2004; AHRQ, n.d.). Utilization of the PCMH model is promising. Medicare beneficiaries who received care from practices partaking in PCMH had significantly lower medical expenses (Perry et al, 2016). Further, patients of primary care providers who use the PCMH model have fewer specialty visits than those who utilize providers that do not use the PCMH model (Kaushal et al, 2015; Randall, Mohr, & Maynard, 2014). Utilization of the PCMH model has also been associated with reduced hospitalization and emergency room visits among adults (Fandre et al 2014; Randall, Mohr, & Maynard, 2014). Relevant to the findings reported in this dissertation, PCMH implementation has been associated with an increase in primary care utilization (Randall, Mohr, & Maynard, 2014). Providing comprehensive health care services to beneficiaries by organizing care and bringing the healthcare system to their doorstep could greatly increase the continuity of care and services provided to all older adults, ultimately improving health outcomes among this vulnerable subpopulation and all Medicare beneficiaries. Ultimately, policy makers should consider increasing Medicare beneficiaries access to more all-inclusive models of care,

Health services researchers should consider examining other adverse health outcomes that may be associated with beneficiaries not accessing needed care. Findings from study 2 suggest that beneficiaries who forgo, delay, or having trouble accessing needed care are less likely to receive an influenza vaccination. Other key preventive services of interest for beneficiaries may include vaccinations for pneumonia (pneumococcal vaccine) or shingles (zoster vaccine), which are prevalent among older adults. Although, study 3 did not find a significant association between not getting needed care and hospital admission, prior research suggests that reduced utilization of primary care services and poor chronic care management leads to increased hospitalizations. Thus, other costly health outcomes should be explored such as preventable hospitalization for ambulatory care sensitive conditions. Further, mortality

should also be considered given individuals who have more chronic conditions or disabilities also have a poorer self-related health and thus a heightened risk for mortality or morbidity. Expanding on the current studies will provide insight into other risks and consequences of older beneficiaries not accessing needed care.

Collectively, the three studies reported in this dissertation highlight the need to re-evaluate who is unable to access needed health care. Further there is a need to determine why a vulnerable subpopulation of older Medicare beneficiaries is not getting needed care. The research described herein inform the importance of future research to develop effective interventions aimed at improving health care access among older Medicare beneficiaries.

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## REFERENCES

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## APPENDIX

## APPENDIX

Table A.1. Sample Characteristics for 2006 MCBS (n = 11,288/ N = 29,791,079)

	Full Sample		Access to Needed Care				Chi-Sq(DF) p-value
			Did Not Forgo, Delay, or Have Trouble		Did Forgo, Delay, or Have Trouble		
	No.	Wt%	No.	Wt%	No.	Wt%	
<b>All</b>	11,288	100%	9,994	87.96%	1,294	12.04%	
<b>Age</b>							
65-74 years	4,904	50.70%	4,216	49.39%	688	60.27%	
75-84 years	4,564	37.28%	4,101	38.04%	463	31.77%	61.73 (2)
85+ years	1,820	12.02%	1,677	12.58%	143	7.96%	<0.001
<b>Race</b>							
Non-Hispanic White	9,096	80.59%	8,126	81.36%	970	74.99%	30.98 (1)
Other	2,192	19.41%	1,868	18.64%	324	25.01%	<0.001
<b>Gender</b>							
Male	4,941	43.87%	4,427	44.36%	514	40.35%	7.80 (1)
Female	6,347	56.13%	5,567	55.64%	780	59.65%	0.0174
<b>Marital Status</b>							
Not Married	5,207	43.96%	4,563	45.63%	644	48.03%	10.38 (1)
Married	6,081	56.04%	5,431	54.31%	650	51.97%	<0.001
<b>Educational Attainment</b>							
Less than HS/GED	3,126	25.98%	2,697	25.19%	429	31.75%	
High School Grad/GED Equivalent	3,360	30.09%	2,997	30.38%	363	28.03%	26.85 (2)
Some College or More	4,802	43.93%	4,300	44.44%	502	40.22%	<0.001
<b>Chronic Condition</b>							
None	920	9.22%	852	9.77%	68	5.18%	
Yes, have one	1,877	17.73%	1,704	18.01%	173	15.68%	38.97 (1)
Yes, have two or more	8,491	73.05%	7,438	72.21%	1,053	79.15%	<0.001
<b>Usual Source of Care</b>							
No, do not have a usual source of care	444	4.34%	366	4.00%	78	6.81%	22.77 (1)
Yes, have a usual source of care	10,844	95.66%	9,994	96.00%	1,216	93.19%	<0.001
<b>Metro</b>							
Non-Metro Area	2,861	22.92%	2,493	22.49%	368	26.01%	8.38 (1)
Metro Area	8,427	77.08%	7,501	77.51%	926	73.99%	0.0476
<b>ADL Limitations</b>							
None	8,013	72.93%	7,301	74.96%	712	58.09%	
1-2 ADLs	2,256	18.86%	1,894	17.84%	362	26.32%	194.61 (2)
3+ ADLs	1,019	8.21%	799	7.20%	220	15.58%	<0.001
<b>Household Annual Income Level, \$</b>							
<25,000k	5,665	47.67%	4,858	46.09%	797	59.26%	
25,000k - < 50,000k	4,037	37.21%	3,663	38.14%	374	30.47%	86.26 (2)
≥ 50,000k	1,596	15.11%	1,473	15.77%	123	10.28%	< 0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	5,203	47.02%	4,793	49.01%	410	32.47%	
Good	3,703	32.49%	3,275	32.37%	428	33.33%	211.54 (2)
Fair/Poor	2,382	20.49%	1,926	18.61%	456	34.20%	<0.001
<b>Insurance</b>							
No Supplementary	1,105	10.07%	866	8.83%	239	19.18%	
Medicare Advantage	2,199	20.36%	1,941	20.34%	258	20.51%	
Private [ES/SP/Both]	6,620	58.02%	6,019	59.66%	601	46.04%	175.45 (3)
Medicaid or Other Public Coverage	1,364	11.54%	1,168	11.17%	196	14.27%	<0.001

Note: Based on the 11, 288 community-dwelling Medicare beneficiaries 65 years or older interviewed in 2006 with non-missing data for variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses.

Abbreviations: No., Unweighted Frequency Count; WT%, Weighted Percent; ADL, Activities of Daily Living



Table A.2. Sample Characteristics for 2007 MCBS (n = 11,339/ N = 30,364,946)

	Full Sample		Access to Needed Care				Chi-Sq(DF) p-value
			Did Not Forgo, Delay, or Have Trouble		Did Forgo, Delay, or Have Trouble		
	No.	Wt%	No.	Wt%	No.	Wt%	
<b>All</b>	11,339	100%	10,114	88.80%	1,225	11.20%	
<b>Age</b>							
65-74 years	4,917	50.98%	4,264	49.71%	653	61.05%	
75-84 years	4,553	36.65%	4,125	37.42%	428	30.58%	61.30 (2)
85+ years	1,869	12.37%	1,725	12.88%	144	8.38%	<0.001
<b>Race</b>							
Non-Hispanic White	9,134	80.41%	8,229	81.34%	905	73.05%	49.16 (1)
Other	2,205	19.59%	1,885	18.66%	320	26.95%	<0.001
<b>Gender</b>							
Male	4,983	43.94%	4,494	44.47%	489	39.76%	10.16 (1)
Female	6,356	56.06%	5,620	55.53%	736	60.24%	0.0024
<b>Marital Status</b>							
Not Married	5,313	44.75%	4,687	44.12%	626	49.77%	14.57 (1)
Married	6,026	55.25%	5,427	55.88%	599	50.23%	<0.001
<b>Educational Attainment</b>							
Less than HS/GED	3,046	25.19%	2,668	24.66%	378	29.38%	
High School Grad/GED Equivalent	3,399	30.07%	3,055	30.31%	344	28.14%	13.41 (2)
Some College or More	4,894	44.74%	4,391	45.03%	503	42.47%	0.0039
<b>Chronic Condition</b>							
None	890	8.89%	822	9.18%	68	6.59%	
Yes, have one	1,891	17.89%	1,746	18.41%	145	13.77%	30.08 (1)
Yes, have two or more	8,558	73.22%	7,546	72.41%	1,012	79.64%	<0.001
<b>Usual Source of Care</b>							
No, do not have a usual source of care	424	4.11%	352	3.84%	72	6.30%	17.34 (1)
Yes, have a usual source of care	10,915	95.89%	9,762	96.16%	1,153	93.70%	<0.001
<b>Metro</b>							
Non-Metro Area	2,882	23.25%	2,544	22.91%	338	25.98%	5.96 (1)
Metro Area	8,457	76.75%	7,570	77.09%	887	74.02%	0.0426
<b>ADL Limitations</b>							
None	8,168	74.18%	7,479	76.10%	689	58.97%	
1-2 ADLs	2,247	18.65%	1,887	17.45%	360	28.14%	178.76 (2)
3+ ADLs	924	7.17%	748	6.45%	176	12.89%	<0.001
<b>Household Annual Income Level, \$</b>							
<25,000k	5,495	45.88%	4,777	44.55%	718	56.50%	
25,000k - < 50,000k	4,020	36.69%	3,660	37.54%	360	29.92%	65.10 (2)
≥ 50,000k	1,824	17.43%	1,677	17.91%	147	13.58%	<0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	5,236	47.53%	4,851	49.35%	385	33.03%	
Good	3,613	31.45%	3,222	31.35%	391	32.24%	191.44 (2)
Fair/Poor	2,490	21.02%	2,041	19.29%	449	34.73%	<0.001
<b>Insurance</b>							
No Supplementary	1,241	11.11%	1,017	10.22%	224	18.13%	
Medicare Advantage	2,305	21.03%	2,041	20.87%	264	22.33%	
Private [ES/SP/Both]	6,450	56.70%	5,893	58.11%	557	45.50%	106.90 (3)
Medicaid or Other Public Coverage	1,343	11.17%	1,163	10.81%	180	14.03%	<0.001

**Note:** Based on the 11, 339 community-dwelling Medicare beneficiaries 65 years or older interviewed in 2007 with non-missing data for the variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses. Abbreviations: No., Unweighted Frequency Count; WT%, Weighted Percent; ADL, Activities of Daily Living

Table A.3. Sample Characteristics for 2008 MCBS (n = 10,515/ N = 31,106,103)

	Full Sample		Access to Needed Care				Chi-Sq(DF) p-value
			Did Not Forgo, Delay, or Have Trouble		Did Forgo, Delay, or Have Trouble		
	No.	Wt%	No.	Wt%	No.	Wt%	
<b>All</b>	10,515	100%	9,388	88.82%	1,127	11.18%	
<b>Age</b>							
65-74 years	4,492	51.51%	3,900	50.24%	592	61.57%	
75-84 years	4,237	35.48%	3,842	36.24%	395	29.31%	55.63 (2)
85+ years	1,786	13.01%	1,646	13.50%	140	9.12%	<0.001
<b>Race</b>							
Non-Hispanic White	8,498	80.17%	7,647	80.85%	851	74.82%	23.90 (1)
Other	2,017	19.83%	1,741	19.15%	276	25.18%	<0.001
<b>Gender</b>							
Male	4,614	44.03%	4,192	44.80%	422	37.91%	20.08 (1)
Female	5,901	55.97%	5,196	55.20%	705	62.09%	0.0022
<b>Marital Status</b>							
Not Married	4,911	44.32%	4,322	43.54%	589	50.52%	20.64 (1)
Married	5,604	55.68%	5,066	56.46%	538	49.48%	<0.001
<b>Educational Attainment</b>							
Less than HS/GED	2,702	23.74%	2,351	23.18%	351	28.19%	
High School Grad/GED Equivalent	3,202	30.33%	2,865	30.35%	337	30.21%	16.42 (2)
Some College or More	4,611	45.93%	4,172	46.47%	439	41.61%	0.0025
<b>Chronic Condition</b>							
None	804	8.60%	753	9.02%	51	5.28%	
Yes, have one	1,711	17.46%	1,583	18.04%	128	12.82%	44.64 (1)
Yes, have two or more	8,000	73.94%	7,052	72.93%	948	81.90%	<0.001
<b>Usual Source of Care</b>							
No, do not have a usual source of care	396	4.12%	321	3.76%	75	6.98%	27.45 (1)
Yes, have a usual source of care	10,119	95.88%	9,067	96.24%	1,052	93.02%	<0.001
<b>Metro</b>							
Non-Metro Area	2,701	23.30%	2,362	22.84%	339	26.97%	9.95 (1)
Metro Area	7,814	76.70%	7,026	77.16%	788	73.03%	0.009
<b>ADL Limitations</b>							
None	7,426	72.75%	6,820	74.89%	606	55.76%	
1-2 ADLs	2,235	20.01%	1,874	18.64%	361	30.87%	199.18 (2)
3+ ADLs	854	7.24%	694	6.47%	160	13.37%	<0.001
<b>Household Annual Income Level, \$</b>							
<25,000k	4,908	44.02%	4,239	42.35%	669	57.27%	
25,000k - < 50,000k	3,734	36.79%	3,405	37.58%	329	30.50%	100.47 (2)
≥ 50,000k	1,873	19.20%	1,744	20.07%	129	12.23%	<0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	4,902	47.80%	4,521	49.56%	381	33.86%	
Good	3,391	32.03%	3,000	31.62%	391	35.29%	133.04 (2)
Fair/Poor	2,222	20.17%	1,867	18.82%	355	30.85%	<0.001
<b>Insurance</b>							
No Supplementary	1,123	11.14%	916	10.04%	207	19.91%	
Medicare Advantage	2,381	23.06%	2,123	23.17%	258	22.17%	
Private [ES/SP/Both]	5,783	54.75%	5,272	55.96%	511	45.12%	117.91 (3)
Medicaid or Other Public Coverage	1,228	11.05%	1,077	10.83%	151	12.80%	<0.001

**Note:** Based on the 10,515 community-dwelling Medicare beneficiaries 65 years or older interviewed in 2008 with non-missing data for the variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses. Abbreviations: No., Unweighted Frequency; WT%, Weighted Percent; ADL, Activities of Daily Living

Table A.4. Sample Characteristics for 2009 MCBS (n = 10,567/ N = 32,004,288)

	Access to Needed Care						Chi-Sq(DF) p-value
	Full Sample		Did Not Forgo, Delay, or Have Trouble		Did Forgo, Delay, or Have Trouble		
	No.	Wt%	No.	Wt%	No.	Wt%	
<b>All</b>	10,567	100%	9,518	89.35%	1,049	10.65%	
<b>Age</b>							
65-74 years	4,489	52.30%	3,953	51.19%	536	61.67%	
75-84 years	4,225	34.32%	3,838	34.86%	387	29.73%	50.36 (2)
85+ years	1,853	13.38%	1,727	13.95%	126	8.60%	<0.001
<b>Race</b>							
Non-Hispanic White	8,458	80.10%	7,692	80.96%	766	72.86%	41.08 (1)
Other	2,109	19.90%	1,826	19.04%	283	27.11%	<0.001
<b>Gender</b>							
Male	4,642	44.06%	4,221	44.55%	421	39.91%	8.79 (1)
Female	5,925	55.94%	5,297	55.45%	628	60.09%	0.0123
<b>Marital Status</b>							
Not Married	4,951	44.35%	4,410	43.79%	541	49.05%	11.27 (1)
Married	5,616	55.65%	5,108	56.21%	508	50.95%	0.0017
<b>Educational Attainment</b>							
Less than HS/GED	2,627	22.68%	2,304	22.10%	323	27.58%	
High School Grad/GED Equivalent	3,134	29.29%	2,858	29.63%	276	26.41%	17.91 (2)
Some College or More	4,806	48.03%	4,356	48.27%	450	46.02%	0.0011
<b>Chronic Condition</b>							
None	815	8.94%	759	9.24%	56	6.47%	
Yes, have one	1,818	18.47%	1,656	18.65%	162	16.97%	12.89 (1)
Yes, have two or more	7,934	72.59%	7,103	72.12%	831	76.56%	0.0117
<b>Usual Source of Care</b>							
No, do not have a usual source of care	374	4.03%	306	3.62%	68	7.55%	40.19 (1)
Yes, have a usual source of care	10,193	95.97%	9,212	96.38%	981	92.45%	<0.001
<b>Metro</b>							
Non-Metro Area	2,678	22.89%	2,395	22.72%	283	24.35%	1.52 (1)
Metro Area	7,889	77.11%	7,123	77.28%	766	75.65%	0.4055
<b>ADL Limitations</b>							
None	7,458	73.28%	6,884	75.04%	574	58.52%	
1-2 ADLs	2,150	18.63%	1,851	17.71%	299	26.33%	154.95 (2)
3+ ADLs	959	8.09%	783	7.25%	176	15.15%	<0.001
<b>Household Annual Income Level, \$</b>							
<25,000k	4,805	42.17%	4,211	40.97%	594	52.22%	
25,000k - < 50,000k	3,833	37.38%	3,525	38.04%	308	31.89%	53.16 (2)
≥ 50,000k	1,929	20.45%	1,782	20.99%	147	15.89%	<0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	5,054	49.59%	4,684	51.03%	370	37.50%	
Good	3,418	31.78%	3,074	31.67%	344	32.72%	121.42 (2)
Fair/Poor	2,095	18.63%	1,760	17.30%	335	29.78%	<0.001
<b>Insurance</b>							
No Supplementary	971	9.61%	815	8.81%	156	16.39%	
Medicare Advantage	3,017	27.80%	2,691	27.68%	326	28.84%	
Private [ES/SP/Both]	5,436	52.26%	5,007	53.42%	429	42.47%	88.51 (3)
Medicaid or Other Public Coverage	1,143	10.32%	1,005	10.09%	138	12.29%	<0.001

Note: Based on the 10,567 community-dwelling Medicare beneficiaries 65 years or older interviewed in 2009 with non-missing data for the variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses.

Abbreviations: No., Unweighted Frequency; WT%, Weighted Percent; ADL, Activities of Daily Living

Table A.5. Sample Characteristics for 2010 MCBS (n = 10,569/ N = 32,803,448)

	Full Sample		Access to Needed Care				Chi-Sq(DF) p-value
			Did Not Forgo, Delay, or Have Trouble		Did Forgo, Delay, or Have Trouble		
			No.	Wt%	No.	Wt%	
<b>All</b>	10,569	100%	9,285	87.11%	1,284	12.89%	
<b>Age</b>							
65-74 years	4,474	52.99%	3,804	51.48%	670	63.23%	
75-84 years	4,292	34.00%	3,841	34.93%	451	27.70%	67.79 (2)
85+ years	1,803	13.01%	1,640	13.59%	163	9.08%	<0.001
<b>Race</b>							
Non-Hispanic White	8,367	79.54%	7,406	80.13%	961	75.52%	15.51 (1)
Other	2,202	20.46%	1,879	19.87%	323	24.48%	<0.001
<b>Gender</b>							
Male	4,660	44.21%	4,164	45.06%	496	38.49%	20.77 (1)
Female	5,909	55.79%	5,121	54.94%	788	61.51%	<0.001
<b>Marital Status</b>							
Not Married	5,023	44.86%	4,327	43.80%	696	51.97%	32.00 (1)
Married	5,546	55.14%	4,958	56.20%	588	48.03%	<0.001
<b>Educational Attainment</b>							
Less than HS/GED	2,575	22.32%	2,190	21.51%	385	27.79%	
High School Grad/GED Equivalent	3,003	27.86%	2,666	28.20%	337	25.58%	27.08 (2)
Some College or More	4,991	49.82%	4,429	50.29%	562	46.63%	<0.001
<b>Chronic Condition</b>							
None	783	8.86%	711	9.20%	72	6.53%	
Yes, have one	1,810	18.28%	1,624	18.50%	186	16.85%	14.34 (2)
Yes, have two or more	7,976	72.86%	6,950	72.30%	1,026	76.61%	0.0120
<b>Usual Source of Care</b>							
No, do not have a usual source of care	375	3.92%	305	3.55%	70	6.41%	25.85 (1)
Yes, have a usual source of care	10,194	96.08%	8,980	96.45%	1,214	93.59%	<0.001
<b>Metro</b>							
Non-Metro Area	2,663	22.95%	2,324	22.73%	339	24.48%	2.07 (1)
Metro Area	7,906	77.05%	6,961	77.27%	945	75.52%	0.9698
<b>ADL Limitations</b>							
None	7,331	72.43%	6,638	74.57%	693	57.94%	
1-2 ADLs	2,261	19.44%	1,877	18.21%	384	27.80%	173.84 (2)
3+ ADLs	977	8.13%	770	7.22%	207	14.27%	<0.001
<b>Household Annual Income Level, \$</b>							
<25,000k	4,712	41.39%	3,952	39.33%	760	55.35%	
25,000k - < 50,000k	3,853	37.27%	3,492	38.38%	361	29.78%	127.66 (2)
≥ 50,000k	2,004	21.33%	1,841	22.29%	163	14.87%	<0.001
<b>Self-Rated Health</b>							
Excellent/Very Good	5,165	50.90%	4,706	52.74%	459	38.48%	
Good	3,276	30.12%	2,864	29.96%	412	31.20%	154.00 (2)
Fair/Poor	2,128	18.98%	1,715	17.30%	413	30.32%	<0.001
<b>Insurance</b>							
No Supplementary	1,037	10.51%	845	9.66%	192	16.29%	
Medicare Advantage	3,058	28.17%	2,647	27.78%	411	30.79%	
Private [ES/SP/Both]	5,286	50.73%	4,782	52.35%	504	39.82%	99.48 (3)
Medicaid or Other Public Coverage	1,188	10.59%	1,011	10.22%	177	13.10%	<0.001

**Note:** Based on the 10,569 community-dwelling Medicare beneficiaries 65 years or older interviewed in 2010 with non-missing data for the variables of interest; P-value & Chi-Square based on Rao-Scott Chi-Square analyses. Abbreviations: No., Unweighted Frequency; WT%, Weighted Percent; ADL, Activities of Daily Living

VITA

## VITA

**Angelitta M. Spells**

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**Education**

*Ph.D. in Health Promotion and Disease Prevention*, August 2016

Purdue University, West Lafayette, Indiana, USA

Co-Advisors: Gerald Hyner and Laura Sands

Dissertation: *Risks and Health Consequences of Forgoing, Delaying, or Having Trouble Accessing Needed Health Care Among Medicare Beneficiaries*

*Master of Public Health*, August 2013

Purdue University, West Lafayette, Indiana, USA

Advisor: Haslyn Hunte

Thesis: *Examining the Association of Everyday Discrimination and Depressive Symptoms In Black Men: The Social Support Factor*

*Master of Science in Applied Statistics*, May 2011

Purdue University, West Lafayette, Indiana, USA

*Bachelor of Science in Applied Mathematics*, Summa Cum Laude, May 2008

Norfolk State University, Norfolk, Virginia, USA

**Research Interests**

Population health, social determinants of health, health services research, health disparities, chronic diseases, ambulatory care sensitive conditions, mental health, emergency room utilization, and health care quality, access, and policy.

**Scholarships/Fellowships**

George Washington Carver Fellowship, Purdue University, August 2008 – July 2012,  
August 2013 – July 2014

Dozoretz National Institute for Mathematics and Applied Sciences (DNIMAS),  
Norfolk State University, Full Academic Scholarship, August 2004 - May 2008

## Professional Experience

Course Instructor/Teaching Assistant: Principles of Epidemiology, Department of Health and Kinesiology, Purdue University, Lafayette, Indiana

Dates: January 2016 – Present

Responsibilities: Assist in the design, planning, implementation, and teaching of the distribution and determinants of health status/outcomes (e.g., history, basic quantitative methods, quantitative measures, design and implementation of epidemiological studies, examination of infectious and chronic conditions, and various forms of epidemiology) in real-world public health problems among undergraduate students.

Course Instructor/Teaching Assistant: Stress and Human Health, Department of Health and Kinesiology, Purdue University, Lafayette, Indiana

Dates: August 2015 – Present

Responsibilities: Assist in the design, planning, implementation, and teaching of the relationship between stress and health in the human body (e.g., attitudes/beliefs, theories, health behavior, research concepts, evaluations, methods/techniques, and applications) in real-world public health problems among undergraduate students.

Teaching Assistant: Yumary Ruiz, Health Behavior and Health Promotion, Department of Health and Kinesiology, Purdue University, Lafayette, Indiana

Dates: August 2014 – December 2014; August 2015 – December 2015

Responsibilities: Assist in the design, planning, implementation, and teaching of health behavior theories, research concepts, evaluations, methods, and applications in real-world public health problems among undergraduate students.

Teaching Assistant: Yumary Ruiz, Health Behavior and Health Promotion, Department of Health and Kinesiology, Purdue University, Lafayette, Indiana

Dates: August 2014 – December 2014; August 2015 – December 2015

Responsibilities: Assist in the design, planning, implementation, and teaching of health behavior theories, research concepts, evaluations, methods, and applications in real-world public health problems among undergraduate students.

Teaching Assistant: Frank Snyder, Introduction to Quantitative Methods of Public Health, Department of Health and Kinesiology, Purdue University, Lafayette, Indiana

Dates: August 2014 – December 2014

Responsibilities: Assist in the design, planning, implementation, and teaching of biostatistics and quantitative research concepts, methods, and applications in real world public health problems among first-year graduate students.

## **Professional Experience (cont.)**

Health Educator/Outreach Worker: Veronica Jalomo, Hanna Community Health Initiative, Hanna Community Center, Lafayette, Indiana

*Dates:* June 2013 – December 2014

*Responsibilities:* Assist in the design, planning, and implementation of health awareness and education programs aimed towards the minority and youth population residing in the Tippecanoe County community.

Youth Counselor: Kimberly Sublett, After-School Program, Hanna Community Center, Lafayette, Indiana

*Dates:* August 2012 – February 2014

*Responsibilities:* Plan, organize, and implement after-school program activities for youth.

Graduate Assistant: Graduate Professional Development, Graduate School, Purdue University

*Dates:* August 2011 – April 2013

*Responsibilities:* Plan and manage a series of seminars and consultations to assist graduate students in career preparation.

Summer Intern: Hanna Community Health Initiative, Hanna Community Center, Lafayette, Indiana

*Preceptor:* Veronica Jalomo

*Dates:* May 2012 – August 2012

*Responsibilities:* Assist in the design, planning, and implementation of health awareness and education programs aimed towards the minority and youth population residing in the Tippecanoe County community.

Summer Intern: Epidemiology Department, Marion County Public Health Department (MCPHD), Indianapolis, Indiana

*Preceptor:* Joseph Gibson

*Dates:* May 2012 – July 2012

*Responsibilities:* Data management, preparation, and analysis of the Center for Disease Control and Prevention's (CDC) Behavioral Risk Factor Surveillance System (BRFSS) dataset for future use in the Marion County Community Health Needs Assessment. Creation of user written statistical program templates for use in further analyses of the CDC's BRFSS dataset.

Team Leader Consultant: Statistics in the Community (StatCom), Department of Statistics, Purdue University

*Dates:* September 2011 - January 2011

*Responsibilities:* Led project that statistically analyzed superintendents' compensation benefits for the Indiana Association of Public School Superintendents.



## Professional Experience (cont.)

Consultant: Statistical Consulting Service (SCS), Department of Statistics, Purdue University

*Dates:* Summer 2010 - December 2011

*Responsibilities:* Assisted members of Purdue's academic community with statistical design, data analysis, and software issues for their research.

P-12 Outreach: Statistics in the Community (StatCom), Department of Statistics, Purdue University

*Dates:* April 2010

*Responsibilities:* Assisting in STAT Fest outreach teaching children about collecting data, scatterplots, and normal distributions using flight time and distance.

## Research Experience

Research Assistant/Consultant: Professor Haslyn Hunte, Department of Health and Kinesiology, Purdue University

*Safetynet*

*Dates:* August 2012 - present

*Responsibilities:* Examining, analyzing, and characterizing ambulatory care sensitive conditions in emergency room settings.

Research Assistant/Consultant: Professor Haslyn Hunte, Department of Health and Kinesiology, Purdue University

*Indiana Minority Health Coalition (IMHC): Black Men's Health Study*

*Dates:* September 2011 - present

*Responsibilities:* Provide advice on data analysis and assistance in coding.

Research Assistant: Professor Rebecca Doerge, Department of Statistics, Purdue University

*Summer Research Program: Summer Research Opportunities Program (SROP)*

*Dates:* May 2008 - July 2008

*Topic:* A Statistical Analysis of Student Performance Given Additional Classroom Resources

*Responsibilities:* Investigating and quantifying the difference in performance of students

who took classroom instruction with and without a laboratory component.

## Research Experience (cont.)

Research Assistant: Professor Kimberly Weems, Department of Statistics, North Carolina State University

*Summer Research Program: Alliances for Graduate Education and the Professoriate (AGEP)*

*Dates: May 2007 - August 2007*

*Topic: A Statistical Analysis of Acute Coronary Syndrome: The Smoking Effect*

*Responsibilities: Examining the association between smoking status and various outcomes in Acute Coronary Syndrome Patients.*

Research Assistant: Professor Kimberly Weems, North Carolina State University, Department of Statistics

*Summer Research Program: Summer Institute for Training in Biostatistics (SIBS)*

*Dates: June 2007 - July 2007*

*Responsibilities: Investigating various methods of regression analysis, hypothesis testing, and sampling.*

Research Assistant: Professor Derrick Rollins, Department of Statistics, Iowa State University

*Summer Research Program: George Washington Carver Undergraduate Program*

*Dates: June 2006 - July 2006*

*Topic: Framing Dynamic Modeling for Type 2 Diabetics*

*Responsibilities: Predicting glucose levels in Type 2 Diabetics using noninvasive variables.*

Research Assistant: Professor Jiashi Hou, Department of Mathematics, Norfolk State University

*Summer Research Program: Science and Technology Academicians on the Road to Success (STARS)*

*Dates: June 2005 - July 2005*

*Topic: Mathematical Modeling in Business*

*Responsibilities: Quantifying the competitive edge in efficient decision-making and implementation in business.*

## Service Experience

Vice President: Black Graduate Student Association (BGSA), Purdue University, Lafayette, IN

*Dates: August 2012 – May 2013*

*Responsibilities: Formulating, communicating, and implementing the strategic plan guiding the vision, mission, and overall direction of the BGSA. Leading, guiding, directing, and evaluating the work of other executive officers and overseeing the complete operation and implementation of the organization.*

## **Service Experience (cont.)**

Academic Professional and Development Chair: Black Graduate Student Association (BGSA), Purdue University, Lafayette, IN

*Dates:* August 2011 – May 2012

*Responsibilities:* Plan and manage a series of seminars and consultations to assist graduate students in academic, career, lifestyle, and professional preparation post graduate school.

Graduate Mentor: Science, Technology, Engineering, and Mathematics Summer Academic Bootcamp, Purdue University

*Dates:* Summer 2010

*Responsibilities:* Mentoring and assisting in growth and development of incoming first year minority undergraduate students with Zenephia Evans.

Graduate Mentor: Department of Statistics, Purdue University

*Dates:* August 2009 - present

*Responsibilities:* Mentoring new incoming graduate students in the Department of Statistics to help them transition into graduate school.

Graduate Mentor: Summer Research, Department of Statistics, Purdue University

*Dates:* Summer 2009

*Responsibilities:* Mentoring an incoming statistic graduate student on a research project with Rebecca Doerge involving a statistical analysis to examine Chlorophyll content in Arabadopsis.

Graduate Mentor: Historically Black Institution (HBI) Visitation Program, Purdue University

*Dates:* November 2008 - Current

*Responsibilities:* Assisting in the recruitment of students from Historically Black Colleges and Universities into advanced degree graduate programs.

Undergraduate Mentor: Student Support Services, Norfolk State University

*Dates:* September 2005 - May 2008

*Responsibilities:* Assisting in mentoring and tutoring low-income students in the subject of mathematics.

Undergraduate Mentor: Science and Technology Academicians on the Road to Success (STARS) Summer Bridge Program, Norfolk State University

*Dates:* Summer 2005

*Responsibilities:* Mentoring and assisting in growth and development of incoming first year undergraduate students.

## ***Publications***

### **Peer-Reviewed in-press/accepted**

Britt-Spells, A., Slebodnik, M. B., Rollock, D., & Sands, L. P. *Effects of Perceived Discrimination on Depressive Symptoms Among Black Men Residing in the United States: A Meta-Analysis*. Accepted: American Journal of Men's Health, 11/30/2015