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# Using the Andersen Behavioral Model of Health Services Use to Examine Adult Uninsured Patient Health Services Use at a Community Health Center

Jewel Shonette Goodman  
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**USING THE ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES  
USE TO EXAMINE ADULT UNINSURED PATIENT HEALTH SERVICES USE  
AT A COMMUNITY HEALTH CENTER**

by

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Old Dominion University in Partial Fulfillment of the  
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

HEALTH SERVICES RESEARCH

OLD DOMINION UNIVERSITY  
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Approved by:

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Qi Harry Zhang (Chair)

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Elizabeth F. Giles (Member)

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George Maihafer (Member)

## **ABSTRACT**

### **USING THE ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES USE TO EXAMINE ADULT UNINSURED PATIENT HEALTH SERVICES USE AT A COMMUNITY HEALTH CENTER**

Jewel Shonette Goodman  
Old Dominion University, 2010  
Chair: Dr. Qi Harry Zhang

Prescription medications are essential to the treatment and management of chronic conditions (Smith et al., 2005). Lack of access can result in pain, worsening of the condition and increased risk of additional health problems. Health care expenditures in the United States were reportedly \$1.7 trillion in 2003 (Smith et al., 2005) and exceeded \$2.3 trillion in 2008 (Centers for Medicare and Medicaid Services, 2010). Prescription medication costs constitute a significant burden for patients who are uninsured and managing chronic conditions and links to the likelihood of medication non-compliance (Piette, et al., 2006; Reed, 2005; Solomon, 2005).

To enhance its chronic disease management model for uninsured patients diagnosed with chronic conditions requiring prescription regimens, a local community health center added a pharmaceutical access component to its health care delivery model.

The purpose of this research was to test the ability of the Andersen Behavioral Model of Health Services Use to model health services use among adult uninsured patients managing physician-diagnosed chronic conditions. Andersen's original Behavioral Model of Health Services Use, developed in the 1960s, suggests individual health behavior patterns are based on predisposition to care, factors that impede or enable the use of care and overall need for care (Andersen, 1968).

This research documents particularly the independent contribution of increased access to prescription medication as an enabling resource. This study employed a longitudinal, quasi-experimental design covering a period of 90 days. There existed no random assignment or random selection. This project yielded 100% follow-up (N=427). Of the 427 participants, 61.6% (n=263) participants qualified for the stop-gap medication program offered by the host community health center. Participants who were not eligible for stop-gap medications were more likely to have a telephone encounter, physician / nurse triage visit and an emergency department visit during the follow-up period than participants who were eligible for stop-gap medications. For all four clinical outcomes, the mean follow-up readings were lower than the mean baseline readings for participants who had access to stop-gap medications. The largest predictor of a positive change in outcomes was access to stop-gap prescription medications when controlling for population characteristics and health behaviors.

Committee Members:

Dr. Elizabeth F. Giles  
Dr. George Maihafer

To my Maternal GrandMother, Mrs. Geneva Edith Scott McCutchen;  
my Mother, Mrs. Rose Emma McCutchen Goodman; and my Sisters,  
Koren Sher'Keyer Goodman and Breionna Neva'Rose McCutchen Goodman.

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Most importantly, I dedicate this endeavor to the memory of my Mother, Mrs. Rose Emma McCutchen Goodman, for giving me the desire and drive toward this type of academic success and I thank God for His grace and mercy upon my life.

## TABLE OF CONTENTS

	Page
CHAPTER I.....	1
INTRODUCTION .....	1
PROBLEM STATEMENT .....	3
PURPOSE OF THE STUDY .....	15
SIGNIFICANCE OF THE STUDY.....	15
LIMITATIONS OF PREVIOUS RESEARCH .....	19
ASSUMPTIONS.....	21
DEFINITION OF TERMS .....	22
RESEARCH QUESTIONS .....	29
CHAPTER II .....	31
REVIEW OF LITERATURE .....	31
THEORETICAL FRAMEWORK.....	31
POPULATION CHARACTERISTICS .....	33
HEALTH BEHAVIOR.....	44
OUTCOMES.....	46
MODIFICATION OF THE THEORETICAL FRAMEWORK.....	48
RESEARCH HYPOTHESES .....	49
CHAPTER III .....	51
METHOD .....	51
RESEARCH DESIGN .....	51
RESEARCH METHOD.....	52
PILOT STUDY .....	64
SURVEY INSTRUMENT .....	65
VARIABLE DEFINITIONS .....	68
POPULATION AND SAMPLING FRAME.....	78
PROTECTION OF HUMAN SUBJECTS .....	79
STATISTICAL ANALYSIS PLAN.....	80
LIMITATIONS OF THE STUDY.....	81
CHAPTER IV .....	84
RESULTS .....	84
CHAPTER V .....	142
SUMMARY AND CONCLUSIONS .....	142
SUMMARY .....	142
DISCUSSION.....	146

POLICY RECOMMENDATIONS .....	151
FUTURE RESEARCH .....	151
CONCLUSIONS.....	156
BIBLIOGRAPHY.....	160
APPENDICES .....	171
ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES USE .....	171
MODIFICATION OF THE ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES USE .....	172
DETAILED CONSTRUCT HYPOTHESES. ....	173
FLIER .....	178
POTENTIAL PARTICIPANT LETTER.....	179
INFORMED CONSENT DOCUMENT.....	181
AUTHORIZATION TO DISCLOSE HEALTH INFORMATION .....	184
INITIAL PATIENT HEALTH ASSESSMENT .....	185
FOLLOW-UP HEALTH ASSESSMENT .....	199
BASELINE MEDICAL RECORDS DATA COLLECTION TOOL.....	204
FOLLOW-UP MEDICAL RECORDS DATA COLLECTION TOOL .....	206
RESEARCH PROPOSAL REVIEW NOTIFICATION FORM.....	208
DETAILED SUMMARY OF THE QUESTIONNAIRES.....	209
STATISTICAL ANALYSIS .....	230
AMERICAN SOCIOLOGICAL ASSOCIATION PERMISSION LETTER .....	233
VITA.....	234



## LIST OF TABLES

Table	Page
1. Self-Reported Demographics of Full Study Participants at Baseline.....	92
2. Original Stop-Gap Prescription Medication Program Formulary .....	95
3. Current Stop-Gap Prescription Medication Program Formulary .....	96
4. Prescription History Among Stop-Gap Eligible Participants.....	100
5. Attitudes about Health and Health Care Sum Score Frequency Table .....	106
6. P-Values for Pearson’s Chi-square Test of Independence for Population Characteristics .....	110
7. P-Values for Pearson’s Chi-square Test of Independence for Health Behavior .....	111
8. P-Values for Pearson’s Chi-Square for Clinical Outcomes and Population Characteristics .....	113
9. P-Values for Pearson’s Chi-Square for Clinical Outcomes and Health Behavior ..	114
10. Logistic Regression Model for Triage Telephone Encounters for Population Characteristics .....	117
11. Logistic Regression Model for Triage Telephone Encounters for Health Behavior .....	118
12. Logistic Regression Model for Triage Telephone Encounters for Outcomes.....	119
13. Logistic Regression Full Model for One or More ED Visits .....	121
14. Logistic Regression Reduced Model for One or More ED Visits.....	122

Table	Page
15. Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Population Characteristics .....	124
16. Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Health Behavior .....	125
17. Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Outcomes .....	126
18. Logistic Regression Reduced Model for One or More Physician or Nurse Triage Visits .....	129
19. Clinical Outcome Means (SD).....	132
20. Comparing the Central Tendency of the Change in Clinical Outcomes of Stop-Gap Eligible and Non-Eligible Groups Using the Student's T-test .....	133
21. ANCOVA for Follow-Up Systolic Reading .....	135
22. ANCOVA for Follow-Up Diastolic Reading .....	137
23. ANCOVA for Follow-Up Blood Glucose Serum .....	139
24. ANCOVA for Follow-Up Total Cholesterol.....	141

## **CHAPTER I**

### **INTRODUCTION**

Prescription medications are essential to the treatment and management of chronic conditions (Smith, Cowan, Sensenig, Catlin & Health Accounts Team, 2005). Lack of access to appropriate prescription medication can result in pain, worsening of the condition and an increased risk of additional health related problems. In the past decade alone, prescription drug utilization has increased dramatically. Health care expenditures in the United States were reportedly \$1.7 trillion in 2003 (Smith et al., 2005) and exceeded \$2.3 trillion in 2008 (Centers for Medicare and Medicaid Services [CMMS], 2010). This seems minimal when compared to the overall spending on health care on the global level. An increase in prescription medication spending has sharply increased at a much higher rate than for services provided by physicians at inpatient and outpatient facilities (Smith et al., 2005). Prescription medication spending accounted for 10% of total health care spending for the U.S. in 2008 (CMMS, 2010). The rising costs associated with prescription medication spending impacts all sectors of health care expenditures among private insurers, public programs and individual patients (CMMS, 2010). Once considered the fastest growing component of health care spending, increasing at double digit rates (Kaiser Family Foundation, 2001), prescription medication costs are projected to exceed expenditures for hospital care and other professional medical services by 2019 (CMMS, 2010; Truffer et al., 2010).

Another major driver of health care expenditures is chronic disease (United States Department of Health and Human Services [DHHS], 2004). Health care costs for chronic disease treatment account for more than 75% of health expenditures in the U.S. (CMMS,

2010). The greater prevalence of chronic illnesses has placed tremendous demands on the health care system, particularly an increased need for ongoing treatment and long-term care including prescription medication regimens management (Zhang & Soumerai, 2007).

The U.S. Department of Health and Human Services [DHHS] has asserted that at least half of all Americans take a minimum of one prescription drug regularly, with 1 in 6 taking three or more medications on a daily basis (DHHS, 2004). Adequate access to prescription drugs to eliminate any possible gaps in coverage is important to this population group and because prescription medicines can lessen the need for hospitalizations and medical procedures (Zhang & Soumerai, 2007). Patients diagnosed with chronic illnesses, such as high blood pressure, diabetes and high cholesterol who lack effective health insurance and appropriate prescription medication coverage experience a likelihood of decreased medication regimen adherence. In addition, these individuals are more likely to have an increase in the number of visits to emergency departments [ED] which often result in non-emergency related hospital admissions (Solomon, 2005). This has caused an increase in overall health care costs and these patients are further at risk for a decrease in overall health status and quality of life because of the lack of affordable health care administered on a consistent basis (Solomon, 2005).

This research examined the effects of enabling resources and the corresponding impact of the stop-gap medication program that offers immediate access to prescription drugs on health care utilization. This research provides an analysis of the extent and magnitude of the complications experienced by adult patients who are uninsured and are

managing chronic conditions while trying to obtain prescription medications. This chapter also addresses the initiatives that are currently being implemented by state and national health care organizations to improve prescription access. Finally, a description of the study's purpose and the questions that it effectively answers follows thereafter.

## **Problem Statement**

### **Chronic Disease in the United States**

Annual cost of chronic illness approximates 70% of the \$1 trillion allocated for health care by the U.S. (CDC, 2004). In addition to requiring on-going medical management, these diseases are neither preventable by vaccination nor curable by medication (CDC, 2004).

*Elevated blood pressure.* The American Heart Association [AHA] (2006) and the National Institutes of Health [NIH] (2005) agree that approximately 28% of American adults have prehypertension. Prehypertension is defined as a systolic blood pressure of 120–139 mmHg or a diastolic blood pressure of 80–89 mmHg (AHA, 2006; NIH, 2005; CDC, 2004). Persons with prehypertension are at increased risk to progress to hypertension (AHA, 2006; NIH, 2005; CDC, 2004). High blood pressure for adults is defined as a systolic blood pressure level of 140 mmHg or higher, and / or a diastolic blood pressure of 90 mmHg or higher (AHA, 2006; NIH, 2005; CDC, 2004). A normal blood pressure level is considered a systolic blood pressure level of less than 120 mmHg and a diastolic blood pressure level of less than 80 mmHg (AHA, 2006; NIH, 2005; CDC, 2004).

Studies have provided evidence that blood pressure lowering drug therapies can reduce the risk of cardiovascular disease and the possible mortality that results. The

National Health and Nutrition Examination Survey [NHANES] is a longitudinal series of studies conducted by the National Center for Health Statistics [NCHS] of the Centers for Disease Control and Prevention (Mensah, 2003). NHANES researchers have been collecting information about the health of people in the U.S. since the 1970s. NHANES I accounted for the period 1971-1975, with a population sample of 28,000 aged 1-74 years; NHANES II, 1976-1980, with a sample of 28,000 aged 6 months to 74 years; and NHANES III, 1988-1994, with a sample of 40,000 aged  $\geq 2$  months (Mensah, 2003).

NHANES III identified 5,128 persons aged 18 years and older as hypertensives (Gu, Dillon, Burt & Gillum, 2010). Those who reported current medication regimens were enrolled in the treated group meaning their blood pressures were considered controlled, while those with uncontrolled blood pressures were enrolled in the untreated group. The established blood pressure for hypertensive state was all readings that were greater than 140/90 mm Hg. At pre-test, more than half (52%) reported taking prescription medication. More than one-third (38%) of those in the treated hypertensives group had achieved their therapeutic goals with the medication and 77% of the untreated hypertensives group were undiagnosed. When compared to controlled hypertensives, the uncontrolled hypertensives had an increased risk (CI 1.28–1.91 and 1.36–2.22) of cardiovascular mortality. Among the untreated hypertensives, there was an increased risk (CI of 1.12–1.62 and 1.04–1.81) of cardiovascular mortality, respectively. The association remained after controlling for persons with pre-existing hypertension comorbidities. This study indicates an association of increased risk cardiovascular mortality among hypertensives with uncontrolled and untreated hypertension (Gu et al., 2010).

Using data collected from the Framingham Heart Study participants between 1990 and 1995, authors examined the rate of control from systolic blood pressure (a goal of less than 140 mm Hg), diastolic blood pressure [a goal of less than 90 mm Hg), and both (a goal of systolic <140 and diastolic <90 mm Hg] (Lloyd-Jones, Evans, Larson, O'Donnell, Roccella, & Levy, 2000). Of the 1959 subjects identified as hypertensive, there was a mean age of 66 years and more than half were women (54%). Among the readings of this group, 32.7% had a controlled systolic blood pressure reading, 82.9% had a controlled diastolic blood pressure reading and 29% had both readings controlled. Of the 1189, 60.7% of all identified hypertensives, who were applying an antihypertensive therapy of prescription medication, 49.0% had a controlled systolic reading, 89.7% had a controlled diastolic reading, and 47.8% had both controlled. The covariates associated with poor systolic control goals among the treated participants were primarily age [OR for age 61 to 75 years, 95% CI of 1.79 to 3.29]; and obesity [OR for body mass index of 30 and higher, 95% CI of 1.08 to 2.06]. This study found that poor control of systolic blood pressure levels contributed to poor control of overall blood pressure, including diastolic levels individually and combined reading levels even among those who were taking prescription medications (Lloyd-Jones et al., 2000).

People older than 50 years with a systolic blood pressure level greater than 140 mm Hg have an increased risk of developing cardiovascular disease (Chobanian et al., 2003). With an initial reading of 115/75 mm Hg, the risk for cardiovascular disease doubles for each 20/10 mm Hg increment increase. Persons identified as normotensive at age 55 years have a 90% lifetime risk of developing hypertension and those individuals identified as prehypertensive, or with a systolic blood pressure reading of 120–139 mm

Hg and / or a diastolic blood pressure reading of 80–89 mm Hg, will require lifestyle modifications. These lifestyle modifications should emphasize health promotion with a goal of preventing the progressive increased risk for developing hypertension and cardiovascular diseases. Drug treatment regimens for hypertension that are not complexed with comorbidities, include thiazide diuretics. These drugs, either prescribed alone or combined with medications from other classes, have been shown to control blood pressure. For those more complicated hypertension diagnoses, treatment will require angiotensin-converting enzyme inhibitors and / or such blockers, as beta and calcium channel. Consider patients with a dual diagnosis of hypertension and diabetes; two or more antihypertensive medications are required to achieve a blood pressure reading of less than 140/90 mm Hg. The study reports that hypertension is most likely controlled when the patient is actively completing the prescribed medication regimen in the treatment plan (Chobanian et al., 2003).

Americans with chronic conditions such as diabetes, asthma and depression are more likely to go without prescription medications due to cost related factors that prevent them from obtaining the drugs (Center for Studying Health System Change, 2005). Significant disparities have been recorded in regards to prescription access among African Americans and Caucasians. African Americans were reported to be twice as likely to incur prescription access problems due to costs. The overall proportion of adults in the United States that reported prescription affordability problems increased from 12.0% to 12.8% from 2001 to 2003 (Center for Studying Health System Change, 2005). The Center for Studying Health System Change reports that in 2003, over 14 million adults that were managing chronic illnesses could not afford to purchase all of their



prescription medications on a consistent basis; 50% of these people had low incomes (Center for Studying Health System Change, 2005). Low income individuals experience difficulty in accessing medication and this may compound their health problems (Center for Studying Health System Change, 2002).

***Elevated total blood cholesterol.*** An overall national health goal is to eliminate racial/ethnic and other disparities in all health outcomes, including high blood cholesterol (*Healthy People 2010*, 2000). Borderline elevated total blood cholesterol is defined as 200 – 239 mg/dL and elevated total blood cholesterol is defined as 240 and above (State Heart Disease and Stroke Prevention Programs, 2007; National Heart, Lung, and Blood Institute [NHLBI], 2001). Lowering high blood cholesterol can reduce the risk for developing or dying from heart disease, including heart attacks (State Heart Disease and Stroke Prevention Programs, 2007; NHLBI, 2001). Elevated total blood cholesterol is a major modifiable risk factor for heart disease and stroke (NCHS, 2006). Additionally, this chronic condition is the first and third leading causes of death in the United States according to the U.S. Department of Health and Human Services (2003). A 10% decrease in total blood cholesterol levels can reduce the incidence of heart disease by as much as 30% (Cohen, 1997). Estimated costs of more than \$151.6 billion annually are attributed to coronary heart disease, with workplaces greatly affected with such indirect costs as lost productivity. Thus, reducing LDL (bad) cholesterol can be cost effective in three ways: direct economic savings from decreased hospital and ambulatory services, preventing coronary heart disease mortality, and limiting the disability, distress and pain associated with coronary heart disease (National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2002).

*Elevated blood glucose.* NIH defines a diagnosis of diabetes mellitus as a chronic metabolic disease characterized by elevated blood glucose levels due to insufficient insulin secretion (National Diabetes Statistics, 2007; National Health Interview Survey, 2007). High blood glucose serum level is defined as a blood glucose level of 200 mg/dL or higher. The three main types of diabetes are type 1, type 2 and gestational. Type 1 diabetes occurs when insulin production is completely defective to the essential needs of the body and requires injection of insulin. Type 2 diabetes occurs when the body produces less insulin than the body requires. Those with type 2 diabetes are prescribed either oral medication or injected insulin. Type 2 diabetes is the most common form of diabetes. Gestational diabetes may occur when a woman is pregnant. This condition increases her risk of developing another type of diabetes, mostly type 2, for the remainder of her life (National Diabetes Statistics, 2007; National Health Interview Survey, 2007).

### **Chronic Disease in the Commonwealth of Virginia**

Chronic disease has been the leading cause of morbidity and mortality in the Commonwealth of Virginia for most of the 20th century (Virginia Department of Health [VDH], 2005). Virginia policymakers, in an attempt to relieve some of the physical and financial burdens of chronic disease, have prioritized the examination of the current and past lifestyle behaviors of Virginians to implement relief efforts that improve health and reduce health care spending. For these reasons, the VDH, in collaborative efforts with federal and state health agencies, has developed environmental and policy modifications for the implementation of plans that will reduce the overall burden of chronic disease on individuals and health systems. The primary goal is to meet the immediate needs of communities that are experiencing these conditions at disproportionate rates, including

access to affordable care and affordable prescription medications (VDH, 2005).

In 2001, the Virginia Health Care Foundation [VHCF] commissioned the Southeastern Institute of Research to survey Commonwealth of Virginia residents (Oswalt, 2001). This study revealed that 1,051,235 Virginians did not have health insurance in any form. In addition, it was determined that the individuals whose household incomes were at or below 200% of the poverty level were approximately twice as likely to be uninsured than those individuals with higher incomes. Unemployed adults that were between the ages of 18-64, in addition to minorities, were at a greater risk for being uninsured. The distribution between male and female were similar, with 51% of the males reporting no insurance. Among the respondents, 15.9% reported foregoing needed medical care and 27.6% reported they were unable to get prescriptions, both due to cost (Oswalt, 2001).

The Virginia General Assembly and the Joint Commission on Health Care developed the VHCF in 1992 (VHCF, 2005). VHCF is a public-private partnership established to improve access to primary health care for Virginia's uninsured and medically underserved. Since its inception, VHCF has funded 190 community-based projects that have provided primary care to more than 400,000 Virginians (VHCF, 2005). The majority of patients enter the health care system at the primary care setting, although some use emergency services for routine health care. Fortunately, the primary care setting is also where many patients receive the bulk of their medical care (Corrigan, Greiner & Erikson, 2003), as opposed to the ED. Disease prevention and health promotion are the most effective health services; but when the primary care intervention is delayed, accessible and affordable specialty care is necessary (O'Fallon & Dearry, 2002). Patients

who do not have access to a primary health care facility are more likely subject to inadequate health care. Due to the VHCF initiative, many who are uninsured and underinsured have gained access to adequate health care (VHCF, 2005).

The VHCF was tasked with developing a mechanism that would provide pharmaceutical assistance to the chronically ill (VHCF, 2005). The Pharmacy Connection [TPC], an electronic software package, was implemented to link underinsured and uninsured patients with prescription assistance programs (PAP). This process is lengthy and may delay patients in getting their medications for up to 90 days; however, there are programs that provide assistance during this waiting period.

Community Health Centers [CHCs] are non-profit, federally qualified, community-directed providers of care (Corrigan, Greiner & Erikson, 2003). They serve communities who would otherwise be faced with financial, geographic, language, and cultural barriers to care. CHCs provide comprehensive primary care and case management to all community residents regardless of insurance status (Corrigan et al., 2003). At the host community health center, staff are available to assist patients with this application process on site. In addition to application assistance, patients further qualify for receiving their prescriptions from a stop-gap medication program- the Pharmacy Care of Hampton Roads (PCHR). The execution of this process enhances the community health center's service delivery model and patients have increased accessibility to necessary prescription medicines that had been previously difficult to obtain due to the increasing number of prescriptions per person, variations in the types of drugs used and increases in patient related costs.

## **The Impact of Prescription Costs among the Uninsured**

Many residents of the United States do not have immediate access to health care including prescription drug/medication coverage (Kirby, Taliaferro & Zuvekas, 2006; Frideres, 2005; Heisler, Kerr, Krein & Piette, 2005; Shi & Stevens, 2005; Solomon, 2005). Nearly 23% of Americans under age 65 had no prescription drug coverage in the previous decade (Kaiser Family Foundation, 2000). The U.S. Census reports indicate that the number of uninsured was 41.2 million in 2001 and 43.6 million in 2002 (Mills & Bhandari, 2003).

In a study of 29 million uninsured adults aged 18 – 64 years that reported their current health status as fair or poor, 66% did not get prescriptions filled or did not get any health care due to costs. This study further showed that 2 of every 5 uninsured adults had gone without care in the past 12 months due to cost factors (Kaiser, 2005). A nationwide study of 77 million adults between the ages of 18 – 65 found that almost two-thirds (45 million) were without prescription medication coverage and the remaining 32 million reported their medication coverage as being inadequate (Merck-Medco, 2005). Americans without adequate prescription coverage are unable to adhere to prescription medication instructions and recommended dosages due largely to costs (Piette, Heisler, Horne & Alexander, 2006; Center for Studying Health System Change, 2005; Solomon, 2005). As a result, many people have conditions that are worsening due to a lack of medication and therefore are unable to manage their costly chronic conditions.

Studies have also shown that prescription medication costs significantly influence the lives of adult patients who are attempting to manage chronic illnesses. This burden affects the patient's likelihood of either taking the self-administered medications as

prescribed or declining to do so (Piette et al., 2006). For example, patients have reported taking less medication than prescribed, sharing medication and /or alternating the days in which they are taken due to the economic constraints associated with out-of-pocket costs for medications (Piette et al., 2006). This is not an intended outcome because the patients have expressed a desire to follow their medication regimens. The associated costs of prescription medication however, often require decision making which results in choosing between purchasing the medicine or other essential items. Therefore, patient prescription medication compliance rates are significantly influenced by costs; particularly when the clients/patients are considered to be low-income or impoverished (Piette, Heisler, Krein & Kerr, 2005; Piette, Wagner, Potter & Schillinger, 2004; Mojtabai & Olson, 2003; Schoen, DiDomenico, Connor, Dischler & Bauman, 2001; Tamblyn et al., 2001). These findings suggest that the inherent cost barriers to prescription medication adherence, particularly medication under-use are variables that should be addressed and explored (Piette et al., 2005; Piette et al., 2004; Mojtabai & Olson, 2003; Schoen et al., 2001; Tamblyn et al., 2001).

In 1999, a report provided by the Commonwealth Fund suggested that of the 167 million working aged-adults who admitted to going without needed health care, 4% did not fill prescriptions due to cost (Commonwealth Fund National Survey of Workers Health Insurance, 1999). A study conducted on the outpatient costs of medications for patients with chronic heart failure revealed that the lack of available financial resources affected medication utilization, which often resulted in noncompliance of the prescribed medication regime (Hussey, Hardin & Blanchette, 2002). Research on drug treatment

regimens shows that non-adherence on the patient's part may negatively influence a patient's health status (Safran et al., 2005; Solomon, 2005).

African Americans are more likely to suffer complications that require much more costly care (Shulman, 1991). Funding allocated for the diagnosis and treatment of underlying chronic illnesses among African Americans is an on-going issue (Shulman, 1991). In 2002, \$162 billion dollars were spent on prescription drugs, a 15% increase from a year earlier (Piette et al., 2006; Schur et al., 2004). This amount is expected to more than triple by the year 2012 (Piette et al., 2006; Heffler, Smith, Keehan & Clemens, 2003). Individually, the proportion of expenses that are used for personal health care expenditures for prescription medication has increased more than 10% each year since 1997 (Piette et al., 2006; Levit et al., 2003).

#### **Forgoing Medications Due to Costs**

A national study that was representative of 37,000 adults between the ages of 18-64, determined that working-aged African Americans and Latinos are less likely than Caucasians to have prescriptions filled due to cost concerns (Center for Studying Health System Change, 2003). Overall, about 20% of African Americans, 16 % of Latinos and 11 % of non-Hispanic Caucasian did not fill at least one prescription in 2001 because of cost factors (Center for Studying Health System Change, 2003). A qualitative study found that patients: reported that they relied on family assistance, limited other expenses, reduced dosages, as well as utilized and supplemented alternative medicines as additional options when prescription medication access was limited (Goins, Williams, Carter, Spencer & Solovieva, 2005). Thus, all ethnicities use alternative creative methodologies to obtain prescriptions when costs would otherwise prevent them from doing so. The

relative disparity in cost-related prescription drug access problems for African Americans and Latinos compared with Caucasians is similar regardless of the number of chronic conditions (Center for Studying Health System Change, 2003). Relative to drug purchase by Caucasians, African-Americans are about 75% and Latinos approximately 50 % more likely not to have purchased at least one prescription drug in 2001 because of cost issues. The gap is much greater for those with chronic conditions. Therefore, the size of the gap that exists between minorities and Caucasians in cost-related prescription drug access problems increases when chronic conditions are present (Center for Studying Health System Change, 2003).

Americans with chronic conditions such as diabetes, asthma and depression are more likely to go without prescription medication due to cost (Center for Studying Health System Change, 2005). In 2003, over 14 million adults in the United States who were managing chronic illnesses could not afford to purchase all of their prescription medications and half were considered low-income (Center for Studying Health System Change, 2005). Significant disparities were also reported in prescription access among African-Americans and Caucasians. African-Americans were twice as likely to incur prescription access problems due to costs (Center for Studying Health System Change, 2005).

Respondents in a study of perceived barriers to prescription access reported the following as the top four coping strategies: reducing or foregoing dosage, limiting other expenses, relying on family assistance and supplementing the prescription regimen with alternative medicines (Goins & Turner, 2005).



## **Purpose**

The purpose of this research was to test the ability of the Andersen Behavioral Model of Health Services Use to model health services use among adult uninsured patients at the community health center level managing physician-diagnosed chronic conditions. Andersen's original Behavioral Model of Health Services Use [Appendix A] was developed in the 1960s and suggests that an individual's health behavior utilization patterns are based on his or her predisposition to that care, any factors that either impede or enable the use of that care and the overall need for that care (Andersen, 1968). This research documents the independent contribution of each component as it relates to health care utilization, with special emphasis placed on the enabling resource of stop-gap prescription access because of the significance.

## **Significance of Study**

The primary goal of health services research is to conduct scientific investigations that determine the correlating relationship between: social factors, financing systems, organizational structures and processes, health technologies and personal behaviors that have an impact on accessibility to health care (AcademyHealth, 2005). Examining how patients acquire access to health care, the out of pocket and overall costs for the services and the expected outcomes of care provided (AcademyHealth, 2005). This study is significant because this type of health service research effort shows that each of these entities have profound influences on individual and collective health and well-being.

**Improving the Nation's Health.** Launched in 1980, a major priority of the Health People 2010 Initiative is improving the nation's overall health status and eliminating health disparities among minority segments of the population. It provides the

much needed tools and resources for health systems to implement measures that would reduce or eliminate disparities (DHHS, 2000). The disparity in health status and access to care that exists among the races in the U.S. has been a recognized problem since the early 1960s. Research has consistently documented that on almost any measure, minorities have poorer health than do Caucasians (Center for Studying Health System Change, 2005; Goins & Turner, 2005; Smith et al., 2005)

One leading indicator of the *Healthy People 2010 Initiative* is accessibility to health care, as minorities are more likely to be underinsured and uninsured (DHHS, 2000). As a result, these population subgroups are less likely to seek preventive care and services. They are also less likely to receive quality care management of their chronic conditions because of numerous barriers to care such as cost, accessibility, socioeconomic status, income, housing and the lack of culturally competent health care providers. For these reasons, increased efforts have been made to ensure that the uninsured populations have improved access to prescription medications to manage their chronic illnesses.

The Centers for Disease Control and Prevention [CDC] have affirmed that heart disease, cancer and diabetes are three chronic diseases that are the leading cause of disability and death nationwide among adults 18 - 64 years (CDC, 2004). This has a major impact on overall health care as these diseases have the potential to claim the lives of more than 1.7 million people in the United States (CDC, 2004). Seven out of every 10 deaths are directly attributable to these illnesses (Democratic Leadership Council, 2007). These chronic diseases create medical limitations that affect the lives of 1 of every 10 Americans or approximately 25 million people. Chronic disease is a leading cause of

disability in the United States with one-half of Americans with a physician-diagnosed chronic condition; a fourth with multiple chronic diseases (Democratic Leadership Council, 2007).

Statistics show that minority populations experience disproportionate burdens of mortality and morbidity (Stewart & Napoles-Springer, 2003; Recent Trends, 2002). These disparities have also been recorded in regards to prescription access with African Americans being reported as twice as likely to incur problems due to cost (Spencer & Solovieva, 2005; Goldberg et al., 2004; *Healthy People 2010*, 2001). Millions of African Americans lack the required financial resources to obtain prescription drugs for the treatment of such chronic conditions such as hypertension (Shulman, 1991). There has been a significant increase in the number of joint initiatives by the federal government and the pharmaceutical industry that fund programs that make medications easily accessible for the medically indigent population (Shulman, 1991).

An initiative to expand access to prescription drugs for the underinsured and uninsured was announced in 2001 by former Department of Health and Human Services Secretary, Tommy G. Thompson, affording safety-net providers the ability to participate in the 340B Drug Pricing Program (DHHS, 2004). The 340B Drug Pricing Program is a result of an enactment of Public Law 102-585, the Veterans Health Care Act of 1992, which is codified as Section 340B of the Public Health Service Act. Section 340B limits the cost of covered outpatient drugs to certain federal grantees, federally-qualified health center look-alikes and qualified disproportionate share hospitals. The participating entities experience significant savings on pharmaceuticals. The community health

centers have also individually developed in-house policies to combat the devastating toll of the chronic disease rates in Virginia.

**The Role of Community Health Centers.** The Health Resources and Services Administration [HRSA] is an agency of the U.S. Department of Health and Human Services and its primary focus is to improve access to health care services for people who are uninsured or medically underserved by funding Community Health Centers [CHC] (HHS, 2010). In the U.S. there are approximately 1,100 CHCs with 7,900 facilities serving an estimated 19 million patients yearly (HHS, 2010). CHCs save the U.S. health care system \$24 billion a year by reducing the need for hospitalizations and incidence of uncompensated and complex care such as non-urgent ED use (Braccia, Ten, Napel, Samuels, Xirasagar, & Wilhide, 2005; Collaboration, 2005). CHCs serve as safety-net providers for the underserved and vulnerable populations of low-income and uninsured patients who are in need of care. The patient population base for CHCs include people who are low income, insured, underinsured, uninsured, homeless and migrant workers (Corrigan, Greiner & Erikson, 2003). With such a diverse patient population, CHCs are geared at eradicating the nation's current racial and socioeconomic gaps in health care by continually improving its health care delivery systems (Corrigan et al., 2003).

Community health centers seek to achieve seamless health care delivery to the surrounding community by minimizing the costs for quality health care (Morris, 2005). CHCs are responsible for a number of successful, cost-effective and resource-sharing projects that meet the needs of their patient population. Programs have been specifically designed for the treatment of chronic disease management. Several pharmaceutical companies have developed programs for those that are in need of medical services but

mass awareness campaigns have not been publicly implemented, leaving patients unaware of their availability. CHCs have been able to increase prescription medication access for uninsured patients by linking them to such available resources. (Morris, 2005).

This health services research study examines the utilization patterns that are associated with use among adult uninsured patients who are managing physician-diagnosed chronic disease with prescription medication; with improved access to prescription medication as an enabling resource. Because drug therapy is considered the current standard of care for patients with chronic illnesses, medication access interruptions or the lack thereof can significantly influence health status (Piette et al., 2005; Solomon, 2005).

#### **Limitations of Previous Research**

The study of health care service access and utilization has shifted from individually focused to a combination of the individual, the health care system, the external environment and the relational effects of each of these (Goldsmith, 2002). More specifically, the modified versions of the behavior model are not as widely used as the original because the newer models are incomplete (Goldsmith, 2002). The intention of the original model was to be individually-focused and the initial empirical studies were designed to test the explanatory power of the Behavior Model of Utilization for health care service use. As a result, this model was used to determine the impacting results of prescription medication access among adult uninsured patients that were managing chronic disease in urban community health centers. Thus, this research illustrates how enabling resources increase prescription access and the corresponding affects of health care service utilization and clinical outcome values through the comparison of specific

groups of people that may qualify for service enhancement and those that do not. Individual characteristics are more predictive of health behavior and the enabling factor is the key independent variable. Additionally, predisposing factors have also had an important influence on health care utilization behaviors. Increasing access as an enabling resource is critical to research as it may influence the formulation of health policy and programs that are aimed at enhancing current service delivery models for uninsured patients that are managing chronic conditions. Therefore, these variables are adequately addressed in this study.

The Andersen Behavioral Model of Health Services Use has been successful in explaining the observed disparities in access among patient health care service utilization with race and ethnicity conveying a large influence on utilization (Gaskin, Briesacher, Limcangco & Briganti, 2006). A study employing a nationally representative sample of 8,101 Caucasians, 816 African Americans and 642 Hispanics showed that much of the disparity in spending between Caucasians and African Americans was attributed to race and ethnicity, with total spending for Caucasians being 8.9% more than for African Americans and 5.4% more than for Hispanics. However, not all of the disparity between Caucasians and Hispanics were attributed to race and ethnicity. The total out-of-pocket spending for Caucasians was 28.8% more than for African Americans and 10.7% more than for Hispanics. Race and ethnicity also influenced prescription drug use; Caucasians were prescribed 2.3 more prescriptions than African Americans and 1.6 more than Hispanics (Gaskin et al., 2006).

The portion of the disparities due to race and ethnicity may also reflect additional patient characteristics such as skepticism, adherence level, communication and

prescription history, not all of which are available in the model's constructs (Gaskin et al., 2006). Furthermore, a study employing the regression analysis that examined ED use, hospital admissions and primary care physician visits among 998 low-income African Americans found greater ED use among those with less access to a primary care physician, lack of chronic disease management and more hospital visits (Bazargan, Bazargan & Bajer, 1998). ED use is the result of non-discretionary behaviors that have resulted from environmental and social factors that influence health utilization behaviors which may be beyond the patient's control (Bazargan et al., 1998). This study asserts that the most significant predictor of utilization will be access to the enabling factor of stop-gap prescription medication.

### **Assumptions**

This research has the following assumptions. First, it is assumed that the responses from the participants would be accurate and truthful. Secondly, the responses referring to behaviors performed in a given situation of prescription access and symptoms experienced with the five chronic disease states were indicative of the actual behaviors performed. Thirdly, that the eligibility specialists who completed the application process for stop-gap prescription medication would be appropriately trained and make an effort to process all patients who apply so that those patients who are eligible for stop-gap prescription medications would be recorded as eligible and the reverse. It further assumed that the pharmacist-in-charge at the host CHC's pharmacy program accurately processes the incoming prescriptions so that patients may receive correct medications in a timely fashion. Lastly, it is assumed that immediate access to stop-gap prescription medications will improve clinical outcomes.

### **Definition of Terms**

**Adult.** The legal majority age for most states in the U.S. is 18 years (Goodman, Mendez, Throop & Ogata, 2002). The Centers for Medicare and Medicaid Services [CMMS] categorizes age into three groups: children, aged 0-18 years; working age adults, aged 19-64 years; and elderly, aged 65 years and older (CMMS, 2009). For the purpose of this study, adults were defined as aged 19 – 64 years.

**Attitudes about health and health care.** The Medical Expenditure Panel Survey [MEPS], administered by the Agency for Health Care Research, is a nationally representative survey of noninstitutionalized populations (Kirby et al., 2006; MEPS, 2006). MEPS is used across the U.S. by the DHHS to survey individuals, families, medical providers and employers (MEPS, 2006). This study adapted four statements to measure attitudes about health and health care just as Kirby and colleagues had in a study that examined racial and ethnic disparities in health care (Kirby et al., 2006). The higher the summary score in this section to measure attitude, the more likely the patient is to have more unnecessary health care visits during the follow-up period and a more negative attitude.

**City of residence.** City of residence is the self-reported demographic area where the patient resides.

**Elderly.** An elder adult, referred to as elderly, is defined as an individual aged 65 years and older (CMMS, 2009; Adult Protective Services Program, 2000). Elderly was defined as aged 65 years and older.

**Gender.** A dichotomous variable with the responses male and female available for selection.



**Health insurance status.** Health Insurance type of coverage may be grouped into seven types of coverage: employer/union; privately purchased (not related to the individual's employment); Medicare; Medicaid; Military health care (military, CHAMPUS, CHAMPVA, VA, Indian Health Services); someone outside the household providing coverage; and other (U.S. Census Bureau, 2008). A person may have more than a single type of coverage at any time during the designated year of which they are providing a response. For the purpose of this study, Health Insurance Status was operationalized as currently insured, to include the seven categories identified by the U.S. Census Bureau and currently uninsured.

**Education.** Education is the highest grade or year in school the participant completed. For the purpose of this study, education was measured ranging from less than a high school diploma, high school diploma / general equivalency diploma [GED] and beyond.

**Employment status.** Employment status was defined as currently working for wages or not currently working for wages.

**Enabling resources.** Enabling resources are personal and community resources or circumstances that allow a person to act on his or her inclination (Aday & Andersen, 1974). The measures include current status of health insurance (Berk & Schur, 1998; Manning et al., 1987; Aday & Andersen, 1974; Andersen & Newman, 1973) and although insurance is not a measure of the amount of care utilized, it is highly correlated with health service use (Berk & Schur, 1998). Regular source of care measure is an enabling factor (Andersen & Aday, 1978). Income and such access measures as travel time; waiting time; health personnel and facility availability; and the accessibility of

those resources are also enabling resource measures (Bradley, McGraw, Curry, Buckser, King, Kasl, and Andersen, 2002; Andersen, 1995). For the purpose of this study, enabling resources included health insurance status, income, household size, education, stop-gap eligibility, support and regular source of care (Andersen, 1995).

**Household size.** Household size is the total number of people in the household including the participant (U.S. Census Bureau, 2008). This data in combination with annual income is used to establish poverty level. According to the DHHS, the levels are largely used for the simplification of poverty thresholds for determining federal entitlement program eligibility (DHHS: Federal Register, 2004). The size of the household includes all persons, either related or non-related who occupy the housing unit (U.S. Census Bureau, 2008). For the purpose of this study household size is total number of people in the household including the study participant.

**Household yearly income.** Household yearly income is defined by an income-to-poverty ratio that relates the total to a poverty threshold (U.S. Census Bureau, 2008). Calculated ratios below 1.00 indicate that the income for the respective household is below the official definition of poverty, while a ratio of 1.00 or greater indicates a household income above the poverty level. A ratio of 1.25, for example, indicates that income was 125 percent above the appropriate poverty threshold. For the purpose of this study, household yearly income was operationalized as the total income amount as reported in ratio value.

**Marital status.** Marital status is classified into four categories: never married, married, widowed, and divorced (U.S. Bureau, 2008). The category "married" may be further operationalized as "married, spouse present," "separated," and "other married,

spouse absent." The category single may also be used as a marital status category to identify the person as never-married, widowed, or divorced (U.S. Census Bureau, 2008). Marital status was operationalized as currently married or currently not married, with the latter being the sum of widowed, divorced, and single.

**Need.** Need consists of the individual's perceived and the provider diagnosed functional capacity, symptoms and overall health status (Bradley et al., 2002). It further includes the overall level of illness, which is the immediate cause of health service use (Andersen & Aday, 1978; Aday & Andersen, 1974). Thus, the individual, diagnosed by the provider or evaluated by the health delivery system, may or may not perceive the need for care. These measures may be referred to as health status and physical capability levels (Andersen & Aday, 1978; Aday & Andersen, 1974). Need includes self-reported health status and provider diagnosed disease state.

**New patient.** A new patient is someone who has not been seen by a provider of the host community health center in the past 12 months.

**Non-elderly adults.** The CMMS categorizes age into three groups: children, aged 0-18 years; working age adults, aged 19-64 years; and elderly, aged 65 years and older (CMMS, 2009). Non-elderly adults were defined as aged 19 – 64 years.

**Population characteristics.** Population characteristics are the individual factors that determine health service use (Bradley et al., 2002). Population characteristics included predisposing characteristics, enabling resources and need.

**Predisposing characteristics.** The term predisposing factors shape the patient's attitudes toward service use. Predisposing characteristics include demographics, social structures and health beliefs that represent the imperatives that suggest the likelihood of

individuals needing health services (Andersen, 1995; Hulka & Wheat, 1985). Biological components of predisposing characteristics include age and gender; the traditional measures of social structures include education, employment and ethnicity; and health beliefs are the individual's attitudes, values and knowledge as they relate to health and health service use and perception of need (Andersen & Davidson, 2007; Andersen, 1995). Predisposing characteristics were measured by gender, age, ethnicity, marital status, past 12 month health services use, employment status and attitudes towards health and health care.

**Prescription access history.** Prescription access was operationalized as the availability of medication to manage a condition. Prescription access included the accessibility of the medications as it relates to cost and convenience.

**Provider diagnosed disease state.** The variables for this component were captured from the medical records review. It was operationalized as the provider reported disease state of asthma, diabetes, heart conditions, hypertension or hyperlipidemia.

**Race.** In this study, the variable, race, consisted of 6 categories. These categories were White; Black / African American; Asian; Native Hawaiian or Other Pacific Islander; American Indian or Alaska Native; Hispanic or Latino of any race; and Other races (U.S. Census Bureau, 2001). In preparing for the census data collection for the year 2010, the U.S. Census Bureau published information detailing its goal to improve the collection of data pertaining to race, Hispanic origin and ancestry (U.S. Census Bureau, 2001). This information is categorized by the Census Bureau as panels. The panels show variations of how the terms are used and how the Census Bureau representatives select

which panels are most appropriate for collecting data. The panel from which these six categories were selected based on the host CHC's federal data reporting guidelines. Each year, CHCs complete the Uniform Data System report which is required by its primary funder, HRSA (HRSA, 2007). For the purpose of this study, the panel selected mirrored the categories that are used for the UDS report.

**Stop-gap eligibility.** Stop-gap eligibility was operationalized as eligible for stop-gap program prescription medication access which offers reduced cost prescriptions for the chronic disease states of asthma, diabetes, heart conditions, hypertension and hyperlipidemia for up to 90 days.

**Underinsured.** An uninsured patient may have current access to health insurance, but the coverage is not all inclusive. For instance, there may be primary health coverage, but no coverage for prescription service.

**Uninsured.** For the purpose of this study, an uninsured patient did not have current access to health insurance, and is therefore responsible for paying for services at the CHC.

**Self pay.** Self-pay is a category that defines a patient that does not have current access to health insurance coverage, and is therefore responsible for paying for services at the CHC.

**Past 12 months of health services use.** Past 12 months health care utilization was operationalized as whether or not individuals had one or more primary care visits, hospital admissions, emergency department visits, or specialty care visits in the previous year (Viera, Thorpe & Garrett, 2006; CDC, 2005). The operationalization for the measure of health care utilization mirrors that used in the secondary analysis of data from the

Medical Expenditure Panel Survey for 2000 and a study of health care services utilization among children of migrant workers migrant workers (Viera et al., 2006; Weathers, Minkovitz, O'Campo, & Diener-West, 2003). For this study, use of health services over the last three months is an outcome variable.

**Regular source of care.** Regular source of care was any health care provider agency or individual as reported other than the emergency department for primary health care and maintenance.

**Self-reported health status.** Self-reported health status was operationalized as patient's perception of overall health status and quality of life. For the purpose of this study, it was measured by whether or not the patient reports that over the course of the past 30 days, their physical or mental health has impacted their daily routines and the number of days overall they believe their physical or mental health good was not good (CDC, 2005).

**Social networks of support.** Social networks of support are the familial support or psychological enhancement to help an individual reduce their stress (Salovey, Detweiler, Steward, & Rothman, 2000; Uchino et al., 1996). Research has shown that the level of social support has been found to be related to lowering rate of disease and early death (Uchino et al., 1996) and a significant relationship between emotions and health (Salovey et al, 2000). A strong social network of support is necessary to achieving traits associated with overall physical well-being (Salovey et al., 2000). For the purpose of this study, a positive social network of support will include persons or agencies that provide both social and emotional support in a variety of means to the participant.

## **Research Questions**

**Main Research Question.** This study was directed by the model's effectiveness in identifying the factors that impact health services use and outcomes among uninsured adult patients managing physician-diagnosed chronic conditions. Andersen's Behavior Model of Health Services Use, an Emerging Model - Phase 4 (Andersen's Behavior Model of Health Services Use), consists of four domains that are used to explain health services use: environment, population characteristics, health behaviors and outcomes. This study used multivariate statistical analyses of longitudinal data collected from an identified population group to address the following main research question: To what extent is the Andersen Model of Health Services Use able to identify the greatest predictor of outcomes among (1) predisposing characteristics, (2) enabling resources, (3) need, (4) personal health practices, (5) use of health services, (6) perceived health status and (7) evaluated health status among adult uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

**Individual construct research questions derived from the model.** Three individual research questions were derived from the model's constructs:

1. Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and outcomes (perceived health status and evaluated health status) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

2. Does there exist a statistically significant relationship between health behaviors (personal health practices and use of health services) and outcomes (perceived health status and evaluated health status) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?
3. Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and health behaviors (personal health practices and use of health services) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

Bivariate hypotheses and multivariate hypotheses are outlined in Appendix C.

Chapter II of this dissertation presents the literature review that defines and conceptualizes the Andersen Behavior Model of Health Services Use and its implications for utilization in this research on health behavior use and outcomes.



## CHAPTER II

### REVIEW OF LITERATURE

#### **Research on Theoretical Framework**

Andersen's original Behavioral Model of Health Services Use [Appendix A] was developed in the 1960s (Andersen, 1968). The author has expanded the model to five phases (Andersen, 2008; Andersen, 1995; Andersen & Aday, 1978; Andersen & Aday 1974). The initial model suggests that an individual's health behavior utilization patterns are based on his or her predisposition to that care, any factors that either impede or enable the use of that care and the overall need for that care (Andersen 1968). Phase 2 was developed in the 1970s and it included measures of the health care system (Andersen, 1995). The health care system was recognized as a determinant of health services use in terms of the type of service, the site where services were received, the purpose for the visit, and the coordinated services specific to an illness. Phase 3 was developed in the 1980s and included health status outcomes which allowed researchers to extend measures of access. Measures of access are important to health policy and health reform research where utilization studies can answer questions about effective and efficient access in relation to the amount and satisfaction of health services used. Phase 4 was developed in the 1990s and includes the multiple influences on health services' use and health status. There are feedback loops that show how outcome can affect predisposing factors and health behavior. Phase 5 was developed in the past decade and includes contextual and individual determinants that show the interaction of providers and patients in the process of the health care delivery (Andersen, 2008; Andersen, 1995).

This research uses the Behavioral Model of Health Services Use Phase 4 to explore the relative contributions of predisposing, enabling and need factors on health behavior and outcomes among adult uninsured patients that are seeking primary care at a community health center (Andersen, 1995) [Appendix A]. The recursive nature of this phase of the model shows that it may be able to predict or explain health services use because each component makes its own contribution. The demographic and social structure variables of the predisposing characteristics may be unexplained by the model; the enabling resources are required but not sufficient enough to explain health services use; and need must be adequately operationalized to measure actual use. The variables assigned to measure enabling resources explain more of the variation in health services use (Andersen, 1995).

Andersen's model has been greatly modified and updated since it was originally introduced (Gelberg, Andersen & Leake, 2000; Phillips et al., 1998; Aday & Awe, 1997; Andersen, 1995). Different variables have been added to account for the varying levels of disparities. The impact of health delivery systems components (Aday & Newman 1997); health behavior components, such as personal health practices (Andersen, 1995); and patient satisfaction components (Institute of Medicine [IOM], 1993) were all introduced to predict health services use. Gelberg and colleagues (2000) modified the model to include variables that were imperative to studying experiences of vulnerable populations. Variations of the behavioral model have been used to examine health service use among the elderly (Bass, Looman & Ehrlich, 1992; Wolinsky, Johnson, & Fitzgerald 1992), the homeless and individuals with HIV/AIDS (Gelberg et al., 2000), and children and adolescents with disabilities (Weller, Minkovitz & Anderson, 2003). The model has also

been used to examine dynamics associated with dental services use (Andersen & Davidson, 1997), mental health services use (Portes, Kyle & Eaton, 1992), and physical health services use (Thind & Andersen 2003; Weller et al., 2003; Coughlin, Long & Kendall, 2002; Gelberg, et al., 2000; Coulton & Frost 1982; Wolinsky, 1978).

Specific characteristics refer to the awareness of the behaviors that are associated with utilization (Andersen, 1995; Andersen & Aday, 1978; Andersen & Aday 1974; Andersen, 1968). These characteristics are uniqueness of individuals and populations at risk, the availability and quality of services, health insurance status, location and availability of transportation and motivation to seek care based on perception of need or satisfaction (Andersen, 1995; Andersen & Aday, 1978; Andersen & Aday 1974; Andersen, 1968). For nearly 50 years, this model has been used to explain health services use and has been beneficial in the development of policies that establish equitable access to health care service. This model suggests that health policies have the ability to affect the characteristics of health care systems, which may indirectly affect the utilization patterns of patients (Smith-Campbell, 2000). This model is useful in studying non-urgent ED visits for care and applicable and relevant to research studies that are modeling health behavior utilization (Richardson & Hwang, 2001).

### **Research on Population Characteristics**

Andersen and Laake (1987) modified Andersen's behavior model of utilization for determining the use of health services. According to Andersen's model, the three components that determine physician contacts are predisposing characteristics, enabling resources and need. Predisposing characteristics include gender, age and social status. Enabling resources are the conditions that facilitate or inhibit the use of physician

services, the distance to the health center, the type of municipality, time spent at place of employment and family size. Need factors include chronic diseases, number of disability days, number of new illness and medical conditions and psychological well-being (Andersen & Laake, 1987; Kronenfeld, 1980).

Research has routinely utilized demographic and social characteristics to explain the impact of predisposing characteristics on health services use (Long et al., 2002; Albizu-Garcia et al., 2001; Hargraves, Cunningham & Hughes 2001; Green & Pope, 1999; Aday, 1993; Andersen & Newman, 1973; Andersen, 1968). Research has shown that the examination of predisposing variables may not have a statistically significant impact on health services use; however, when separated, the variables show an individual impact (Greene, 2005).

**Research on predisposing characteristics.** Access to care is measured primarily by the characteristics of the population and health delivery system or by the rates of utilization and satisfaction (Aday & Andersen, 1974). Ability to pay affects the rate of access to hospital and physician services, but much less is known about costs and determinants of prescription medication adherence, particularly among the uninsured (Phillips, Morrison, Andersen & Aday, 1998; Stuart & Grana, 1998). Individual characteristics are more predictive of utilization behaviors and the available literature is limited (Bazargan, Bazargan & Bajer, 1998). Data from a study of 988 low-income African Americans with decreased access to primary care, decreased chronic disease management and increased number of hospital visits were examined. Regression analysis showed that ED use was considered a non-discretionary behavior when examining ED use, hospital admissions and primary care physician visits (Bazargan et al., 1998).

The results of a multivariate, two-year prospective cohort study among 1987 non-institutionalized Mexican Americans in five southwestern states indicate that predisposing and enabling factors accounted for less than 5% of the variance in physician and hospital use; and need factors accounted for 21% of the variance in physician use and 7% of the variance in hospital use (Al Snih, Markides, Ray, Freeman, Ostir & Goodwin, 2006). Strong relationships between race/ethnicity, low sociodemographic status, lack of insurance, lack of a regular source of care and poor receipt of care have been reported (Shi & Stevenson, 2005). An analysis of 32,374 adults found that patients miss or delay obtaining needed medical care and corresponding prescriptions due to cost factors (NCHS, 2006). These factors are determiners as to how and when patients access medical care (NCHS, 2006). Literature on predisposing characteristics has shown decreased access to medical care for patients with lower educational attainment and unemployment among ethnic minority groups, specifically non-Hispanic blacks and Hispanic persons when compared to non-Hispanic whites (Forrest & Whelan, 2000; Hulka & Wheat, 1985).

**Gender.** Research shows women have a considerably higher rate of utilization than their male counterparts (Hulka & Wheat, 1985). Analysis of data from the 1998 – 2000 Health and Retirement Study investigating gender differences in use of hospital services, outpatient surgery, home health, and physician services showed that women were significantly less likely to use hospital services and outpatient surgery, when controlling for sociodemographics (Song, Chang, Manheim & Dunlop, 2006). Differences in health needs and economic resources partially mediate the gender differences in physician and home health care utilization but do not explain significantly gender differences in hospital service and outpatient surgery utilization. African

American, Hispanic, and Caucasian women compared with men show significantly less use of hospital services. Differences in gender in medical services use vary according to the type of services used and are largely consistent across racial/ethnic groups (Song et al., 2006).

**Age.** Age is a predisposing characteristic and affects behaviors through general and health specific cognitive resources (Murray et al., 2004; Park & Jones, 1997). A secondary analysis of cross-sectional data among 1,783 patients included medical history, social support, awareness and utilization of health care, number of ED visits, referrals, activities of daily living and socio-demographics (Afilalo, Marinovich, Afilalo, Colacone, Leger, Unger & Giguere, 2004). The resulting data indicates that patients who relied on EDs for non-urgent care experience greater health challenges when compared to patients requiring urgent care that were younger, had lower incidence of admittance, were less likely to arrive by ambulance and were less likely to follow-up with a primary care physician [PCP] (Afilalo et al., 2004). Although age and gender were strongly correlated to health care utilization behaviors as were poverty and geographic location, the strongest modifiable predictors among African Americans were insurance status and regular source of care (Rust, Fryer, Phillips, Daniels, Strothers & Satcher, 2004; Fiscella, Franks, Doescher & Saver, 2002; Hargraves, Cunningham & Hughes, 2001; Mayberry, Mili & Ofili, 2000; Weinick, Zuvekas & Cohen, 2000; Shi, 1999).

**Race.** In cataloging and operationalizing race and ethnicity status for the purpose of examining health behaviors and health services use, specific social and cultural factors must also be considered (Andersen & Davidson, 1997). A study employing Andersen's Behavioral Model of Health Services Use using gender, age, and race to model

medication adherence found that sociodemographic differences exist in medication access and medication usage (Smith & Kirking, 1999). In this study of 1,586 patients with AIDS, women who were between the ages of 15-24 and those that had experienced hospitalization had lower incidences of medication usage. In addition, the study implied that the African Americans that had insurance and a usual source of care were more likely to use prescribed medications (Smith & Kirking, 1999). In addition, the lack of health insurance is another predictor health care utilization (Rust et al., 2004).

*Marital status.* Multiple regression models were used to analyze data from the Longitudinal Study on Socio-Economic Differences in the Utilization of Health Services (Joung, Van der Meer, & Mackenbach, 1995). The study revealed that among the 2662 people with chronic conditions, educational level was found to be a cofounder of the relationship between health services use and marital status. There was an increase in health services use among widowed and divorced people and a decrease of health services use among the never married. After controlling for the confounder of education level, the analysis showed an increase in hospitalizations among the divorced than the married (Joung et al., 1995).

*Past 12 months health services use.* Previous health services utilization is a strong predictor of current utilization behaviors (Phillips, Morrison, Andersen & Aday, 1998). It is uncertain if increased previous health services use is due to a greater need for care based on an elevated progression of the condition or perhaps factors related to the provider or other issues. It is clear that past health services use is able to explain more variance in the model (Phillips et al., 1998).

***Attitude.*** Attitudes are described as values, beliefs and knowledge of the health care service system and the ultimate impact it may have on the individual's predisposition to utilize that care. Health beliefs may further impact the person's perceptual need for care (Andersen & Davidson, 2007).

**Research on enabling resources.** Enabling resources that are associated with under-utilization of medical care include lower household income, lack of continual sources of medical care and health insurance coverage (Manning et al., 1987; Andersen & Newman, 1973). Economically and socially disadvantaged people are more likely to experience medical symptoms that may not be treated in a timely and effective manner because of limited access (Aday et al., 1985; Aday, Andersen & Fleming, 1980; Andersen, Kravits & Anderson, 1975; Aday & Andersen, 1974).

***Insurance status.*** A descriptive, cross-sectional research design was used to explore the utilization patterns according to insurance status and ED visits (Smith-Campbell, 2000). ED visits decreased by 40% within three years after the funding from the state of Kansas was implemented to increase accessibility. This shows that changes in state policy have the potential to increase accessibility when an adequate amount of funding is allocated to this cause (Smith-Campbell, 2000).

In a study examining insurance coverage and its impact on outpatient service utilization, in-patient service utilization and access to prescription medication among women aged 55–64 years over a 24 month period, results of multiple regression analyses showed that those in receipt of more comprehensive coverage had an increased likelihood of medication compliance (Xu, Patel, Vahratian & Ransom, 2006). It further showed that women who had more extensive coverage for hospitalization service use, had a higher



frequency of hospital admissions. The study found that insurance coverage significantly impacted health care services use (Xu et al., 2006).

A study of 4,001 adults aged 18-64 years showed that 73% were not getting needed care and were not filling prescriptions due to cost (Kaiser Family Foundation, 1998). A corresponding study of 2,766 women determined that 34% did not fill prescriptions due to cost and more than one in four skipped or reduced doses to make medications last longer (Kaiser Family Foundation, 2005). Multivariable regression analyses were performed to quantify the impact of insurance coverage on use of outpatient services, inpatient services and prescription medication access over a two year period among women aged 55-64 years (Xu et al., 2006). The study's findings suggest that patients with extensive health care coverage with a prescription benefit significantly increased the likelihood of medication adherence (Xu et al., 2006).

Research has also determined that insurance coverage significantly predicted the use of health care services and the frequency of hospitalization for women that were able to cover the costs associated with the health services provided. Pertinent data was collected through a series of six interviews and logistic regression analyses were conducted to determine the effects of the model's constructs on the odds of medication adherence among 1,586 patients with HIV (Smith & Kirking, 1999). A usual source of care and insurance increased the odds of medication use and women patients who experienced hospital admissions used medication less frequently (Smith & Kirking, 1999). These results show that a large portion of the available literature has been on women's health.

Research using the Andersen and Neuman modified Behavioral Model of Health Services Use compared the uninsured and the insured in regards to health status and physician utilization using data from the Oklahoma Behavioral Risk Factor Surveillance Survey and the Area Resource File (Broyles et al., 1999). The study found that the uninsured were more likely to be disabled and experienced poorer health statuses than the insured. The uninsured were also less likely to have seen a physician within the past year. Those persons who had seen a doctor but did not have supplemental insurance saw them less frequently than those that had adequate health insurance. The study also found disparities in the distribution of physician care among the uninsured and insured due to health insurance coverage (Broyles et al., 1999).

Both insurance status and the level of insurance benefits affect access to and use of prescription medications (Lohr, 1986; Stuart & Grana, 1998). Research has shown that persons with higher incomes and better health insurance coverage are more likely to medicate common health problems than those with lower incomes and less comprehensive coverage (Stuart & Grana, 1998). Patients who lack adequate health insurance are less likely to purchase prescription medications due to cost and patients are extremely price conscious when considering the costs that are associated with prescriptions and durable medical supplies (Stuart & Grana, 1998). Insured individuals have a higher probability of obtaining needed medications than those who lack insurance (Lohr, 1986). This is indicative of a direct relationship between expenses and access: the higher the out-of-pocket expense, the greater the chance that patients will more likely reduce medication use at their own discretion (Solomon, 2005; Goldman, 2004; and Lohr, 1986). Researchers assert that some of the most prevalent and chronically ill patient

populations suffer from illnesses such as hypertension, diabetes and high cholesterol. These patients are also more likely to be sensitive to the associated costs for their conditions, but less likely to reveal the true creative methods used to reduce the utilization of medications (Solomon, 2005; Goldman, 2004; Harris, 1900; Lohr, 1886).

*Applications of the behavioral model to pharmaceutical use by HIV populations* have come largely through analyses of data from the AIDS Costs and Utilization Survey (ACSUS), a longitudinal study that was conducted over six waves from March 1991 to November 1992 (Fleishman, Hsia & Hellinger, 1994). A study applied the behavioral model to the ACSUS data to test three hypotheses about drug utilization and found that social class and enabling variables were more strongly associated with drug use than were demographic characteristics (Smith, 1996). The study showed that women who used antiretroviral (ARV) drugs at a rate significantly lower than men and that individuals who lost their health insurance coverage (an enabling resource variable) experienced significantly lower rates of ARV drug use than those who had stable health insurance coverage (Smith, 1996).

Logistic regression models were used to analyze responses to a mailed survey completed by 4,066 elderly Pennsylvania Medicare enrolled individuals about their maintenance of common health problems (Stuart & Grana, 1998). The survey required responses about health insurance, income and medication utilization. Results showed that persons with Medicare and prescription coverage were between 6% and 17% more likely to utilize prescription medications to treat their health problems than were persons with Medicare coverage alone. The supplemental prescription drug coverage significantly increased the odds of prescription medication adherence for 10 of the 22 conditions

examined. The study further showed that income had a strong independent effect on medication utilization. Persons with annual incomes greater than \$18,000 were 18% more likely to utilize prescription medications than were persons with annual incomes less than \$6,000. This study showed that economic factors such as income impact medication decisions by the elderly (Stuart & Grana, 1998).

*Income.* More than three decades ago, Wan and Soifer (1974) demonstrated that such need variables as health status and responsiveness to illness were more important predictors of health services use than the enabling resources insurance status and income. The relationships of predisposing characteristics and enabling resources to health outcomes and health care services use show that income is now the leading predictor that delays the delivery of health care services to individuals with low incomes (Shi & Stevens, 2005; Rust, Fryer, Phillips, Daniels, Struthers & Satcher, 2004; Smedley, Stith & Nelson, 2002; Satcher, 2000). Income and health insurance coverage status predicted the extent of the ability to pay for needed health services including total service costs and out of pocket expenses that may be in the form of insurance co-payments (Hanson et al. 2003; Shi & Stevens, 2005; Rust et al., 2004; Smedley, et al., 2002; Coyle & Santiago 2002; DeJong, et al. 2002; Satcher, 2000).

Patients who have low incomes and either no health insurance or unaffordable health insurance coverage co-payments also lack accessibility to health care resources (Hanson et al. 2003; Coyle & Santiago, 2002; DeJong et al. 2002). These patients are unable to get prescriptions filled in a timely manner or receive dental and mental health care health services. The poor are considered a vulnerable population because income is important in being able to access the health care system and to be compliant with

physicians' directives and prescription regimens (Hanson et al. 2003; Coyle & Santiago, 2002; DeJong, et al. 2002). Patients must be given viable options that establish links with accessible and affordable sources of care (Shi & Stevens, 2005; Rust et al., 2004; Smedley et al., 2002; Satcher, 2000).

***Regular source of care.*** The lack of a regular source of care is associated with a greater likelihood of delayed or missed medical and dental care, in addition to corresponding delays in filling prescriptions (Shi & Stevens, 2005; Smedley, et al., 2002; Satcher, 2000; NCHS, 1998). Enabling and need resources continue to provide explanations of the variation in health service utilization (Andersen, 1995; Andersen & Aday, 1978; Andersen & Aday, 1974; Andersen, 1968). Bush and Osterweis (1978) showed that the best predictor of prescription medication use was perceived morbidity and perceived availability of care.

**Research on need.** Evaluated and / or provider-diagnosed need differs from patient perception of need (Andersen & Aday, 1978; Aday & Andersen, 1974). The factors that affect utilization and outcomes of those seeking care may be either individual or health system related properties (Hulka & Wheat, 1985). Non-urgent ED users also report various reasons for not seeking primary care prior to ED visits, including accessibility and perception of need (Afilalo et al., 2004). Results also indicated that the current diversion strategies to re-route non-urgent ED care patients have been unsuccessful and a multifaceted approach would be better suited for designing new intervention strategies that can be utilized to promote access to and utilization of primary care (Afilalo et al., 2004).

Need was found to be the principal determinant of ED visits among older patients and determinants of ED utilization (McCusker, Karp, Cardin, Durand & Morin, 2003). When controlling for need, predisposing characteristics and enabling resources promoting increased access to primary care were associated with reduced ED utilization. In this study of 66,216 non-institutionalized participants aged 65 years and older who had an ED indexed visit during a one year period, multinomial logistic regression two level models were used to analyze the data. Results showed that prescription medication access was considered a factor that promoted primary care use and deterred ED use for non-urgent visits among patients managing ongoing chronic conditions (McCusker et al., 2003). Secondary data analysis was performed on the model's constructs to determine reasons for presenting to ED rather than PCP for non-urgent use among 1,783 adult patients (Afilalo et al., 2004). Additional factors for non-urgent ED visits included access and perception of need at the individual level (Afilalo et al., 2004).

### **Research on Health Behavior**

For this study, the mediating construct of health behavior was employed as one of the two outcome variables. Per the model, health behavior such as personal health practices and use of health services may impact and be impacted by outcomes. The literature shows that the environment construct of the model that measure diet, exercise and self-care recognize these variables as personal health practices (Andersen, 1995). The personal health practices and use of health services as measured by the construct of health behavior show these variables as determinants of health behavior and are illustrated by the feedback loop that shows possible interaction. This possible interaction

suggests a higher level of association between health behavior as an outcome variable construct and not just a mediating construct (Andersen, 1995).

Health behavior is an important element in an individual's health and well-being (Kaiser, Kaiser & Barry, 2009; Glanz & Maddock, 2006; DHHS, 2000). These actions are personal choices concerning risk reduction and health promotion (Kaiser et al., 2009; Glanz & Maddock, 2006; DHHS, 2000). Personal health practice is a health behavior component that was added to the model to show the impact of health delivery system components through social networks (Andersen, 1995).

**Personal health practices.** Personal health practices are behaviors at the individual level that influence health status; these behaviors include adherence to medication regimens (Andersen & Davidson, 2007). Logistic regression analyses were conducted on data collected from a series of interviews on each of 1,586 patients with HIV. It was determined that having a usual source of care and health insurance increased the likelihood of medication compliance while having at least one hospital admission and being a woman decreased the likelihood of medication compliance (Smith & Kirking, 1999).

Individual health reflects the social, mental, physical and environmental factors that surround the person (Shi & Stevens, 2005). Health status measures that capture quality of life and longevity are some of the more recent measures that reflect the economic consequences of poor health. The burden of illness has both indirect and direct effects on the individual. The most conventional measures for health outcomes are variables that measure symptoms, prevalence, incidence, morbidity, and mortality (Shi & Stevens, 2005).

**Use of health services.** Health services use is considered a behavior (Kaiser et al., 2009; Andersen, 1995; Andersen, 1968). This behavior is the formal use of health service and community resources and is inclusive of type of visit, type of facility and nature of visit (Kaiser et al., 2009; Andersen, 1995; Andersen, 1968).

### **Research on Outcomes**

Health outcomes are the result of complex and interrelated factors that provide insight about chronic health conditions (Hanson et al., 2003; Coyle & Santiago 2002; DeJong et al., 2002). When there is a difference between health outcomes and status, disparities are fostered. Barriers to care and the causations that impede health seeking behavior and health services use are the inequalities that create underserved populations. The medically vulnerable are considered those individuals who are poor, uninsured, disabled and elderly (Hanson et al., 2003; Coyle & Santiago, 2002; DeJong et al., 2002). Their needs for community services are increased as a result. These special populations then become a priority of the many health initiatives that are geared toward identifying improvement strategies for increased access and healthier outcomes (Hanson et al., 2003; Coyle & Santiago 2002; DeJong et al., 2002).

Research shows that women exist longer and have fewer fatal health condition risks than men (Asiskovitch, 2010; Bartley, 2004). Gender is one of many factors that impact health outcomes (Asiskovitch, 2010; Arber & Thomas, 2001). Health-related behaviors among the female population have been modified by social, cultural and economic changes in the past decade (Asiskovitch, 2010; Waldron, 2000). These structural-social changes have led women to live a healthier lifestyle (Asiskovitch, 2010; Waldron, 2000). The differences are explained by men's increased exposure to health-



damaging behavior, gaps in health outcomes (Asiskovitch, 2010; Case & Paxson, 2005; Annandale & Hunt, 2000). These differences are referred to as gaps in health outcomes (Asiskovitch, 2010; Case & Paxson, 2005; Annandale & Hunt, 2000). A primary determinant of health outcomes among women is increased income and higher education (Asiskovitch, 2010; Arber & Thomas, 2001; Grossman, 1999). Those women who do not have the same economic and social dependence of their male counterparts have access to fewer resources for and less access to health care (Asiskovitch, 2010; Arber & Thomas, 2001; Bartley, 2004; Kawachi, Kennedy, Gupta, & Prothrow-Stith, 1999).

The life expectancies of men and women are explained by health outcomes and health disparities (Asiskovitch, 2010; Cutler, Deaton & Lleras-Muney, 2006). Some studies show that income, education and employment status of both the individual and the entire household is the primary impact on health outcomes (Asiskovitch, 2010; Grossman, 1999). Improved access to health care is realized by those with higher incomes; those with increased incomes are correlated with higher education; and lastly, more education is correlated with more positive health behaviors (Asiskovitch, 2010; Grossman, 1999).

**Perceived health status.** Perceived health status is a measure of the patient's condition in terms of pain, comfort and function levels as related to disability and daily living (Andersen & Davidson, 2007). Research shows that perceived health status has been a significant predictor in measuring health services use (Johnson & Wolinsky, 1993). In a study of 4,558 households in racially mixed North Carolina communities, the level of perceived health status declined as the number of PCP visits increased (Hulka & Wheat, 1995).

**Evaluated health status.** Evaluated health status is the diagnosis of a patient by a provider and may include a degree of functionality, established clinical guidelines and measures from tests regarding a condition (Andersen & Davidson, 2007). The prognosis was not necessary to capture for this study. The identification of the condition was required because this study focused on the disease and the treatment and management of the illness options. A prognosis would have required the provider to engage further in outlining the expected quality of life and lifestyle modifications rather than just the disease identification based on the clinical outcome. Health outcomes are critical to patient assessment and are influenced by biological, social, individual, community and economic factors. While the definition includes good and positive indicators, the most common use of health outcome measurements is to evaluate health problems, disease, disability and death (Shi & Stevens, 2005).

### **Modification of the Theoretical Framework**

A modification of the Andersen Behavioral Model of Health Services Use was used in this study [Appendix B]. Adaptations were population characteristics, health behavior and outcomes. The construct of environment was not utilized as the focus of this study was to illustrate the multiple influences on health services use and on health status at the individual level. Treating the construct of environment as exclusionary provided the host CHC with a level of consistency because data were collected from three of the seven physical locations. Any possible differences among patient population would have been difficult to maintain as the operations and logistics of each of the seven sites differ to some degree based largely on capacity and services offered. Including the construct of environment would have dismissed any level of consistency in examining the enabling

resource which is a service provided by the host CHC to only the three sites secured for this study. The health care system and external environment variables would have been difficult to collapse as each of the CHCs sites were constructed to meet differing needs of the population in a defined physical location.

There are feedback loops in this emerging model to show that outcome may affect predisposing characteristics and health behavior and the reverse (Andersen, 1995). This emerging model portrayed the recursive ability of the constructs, particularly the many influences impacted by health services use (Andersen, 1995). The section measuring prescription medication history, defined as a personal health practice under the model's construct for health behavior, required some development based on information identified in the literature as having significance to the research. This 17-item section requires information on the patient's experience with prescription medication access, experience with prescription non-compliance as it relates to cost and access, and knowledge of prescription assistance programs.

### **Research Hypotheses**

**Main research hypothesis.** Andersen's Behavioral Model of Health Services Use, an Emerging Model - Phase 4, consists of four domains that are used to explain health services use: environment, population characteristics, health behavior and outcomes. The main research hypotheses are based on the modified model. The constructs of the modified model are population characteristics, health behavior and outcomes. This study uses multivariate statistical analyses of longitudinal data collected from an identified population group to address the following main research question: To what extent is the Andersen Behavioral Model of Health Services Use able to identify the

greatest predictor of outcomes among predisposing characteristics, enabling resources, need, personal health practices, use of health services, perceived health status and evaluated health status among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

**Individual construct research questions.** A total of 22 bivariate hypotheses and 3 multivariate hypotheses were integrated to test the model's ability to identify the impact of increased medication access on avoidable health care encounters to include visits and telephone calls to physician office; visits to nurse triage and ED; and ultimately on clinical outcomes [Appendix C].

Chapter III provides the study's methodology and the plan of analysis for the data.

## CHAPTER III

### METHOD

The specific goal of this study was to test the ability of the Andersen's Behavior Model of Health Services Use (Andersen, 1995) to explain the utilization behaviors and outcomes of adult uninsured patients with at least one physician-diagnosed chronic condition that requires prescription therapy seeking care at a local community health center in the Hampton Roads area. The model proposes that health services use and outcomes are related to such population characteristics as pre-disposing, enabling and individual need for care factors (Broyles, McAuley & Baird-Holmes, 1999; Andersen, 1995; Andersen & Aday, 1978; Aday & Andersen, 1974; Andersen, 1968).

#### **Research Design**

This study was a longitudinal, quasi-experimental design covering a period of 90 days. There exists no random assignment or random selection (Creswell, 2002; Trochim, 2001). All patients captured during the defined time period who met the criteria of being a new patient were eligible to be participants and were invited to participate. The longitudinal design was selected for this study as it is especially appropriate for addressing issues and supporting research methods that require more than the traditional cross-sectional approach and use of existing data. It is particularly valuable when the focus is directly on change and the phenomena are themselves inherently longitudinal. This design included an initial health assessment and a follow-up health assessment. In this study, the treated group was those patients who were eligible for stop-gap prescription medication and the comparison group, those patients who were not eligible for stop-gap prescription medication.

The effects of access to stop-gap medication during a three month period on utilization and change in clinical outcomes was best explored by a longitudinal quasi-experimental design because the evaluation requires establishing the effect of a treatment, before and after the introduction of said treatment and the review of medical records (Creswell, 2002; Trochim, 2001). A limitation to employing the longitudinal design is that it does not control for the effects of history, nor does it account for the issue that different results may be obtained if a different time period were in place (Trochim, 2001). The longitudinal design was both practical and economical for this research. Detecting utilization patterns and change in clinical outcomes was possible for this study as data was examined over a 90 day period.

### **Research Method**

In this study the immediate prescription medication access provided by the stop-gap program was the treatment. This design lends itself to allowing for a quasi-experimental structure for the purposes of analysis if pre-test data is not captured as expected due to group attrition rates (Creswell, 2002; Trochim, 2001). The host CHC's patient population, which is largely uninsured, has an increased rate of non-compliance with physician recommendations and appointment scheduling. In addition, the incoming new patients tend to not have a current primary care medical home, but were instead coming in at the recommendation of an ED physician after emergency care or referred by a community service organization as affordable and accessible.

This study employed real-time evidence-based practice, which provides the immediate benefits of a health service program on patient outcomes. In a study about the effects of diabetes management program, those patients enrolled were more likely to

follow-up with specialty care visits, control their blood sugar levels, and more importantly, the utilization of hospital services was decreased among the patients in this study (Norris et al., 2002). A health services management program focusing on improved access to prescription medication is likely to show a decrease in health services utilization as prescription needs are met. Although most efforts of change are met with the complexity of the overall process, the model does permit for the examination of the benefit of implementation of an enhanced service delivery model for uninsured adult patients at a local community health center in real-time over a period of 90 days.

### **Theoretical Framework**

To what extent is the Andersen Model of Health Services Use able to identify the greatest predictor of such outcomes as perceived health status and evaluated health status, the dependent variable, among the independent variables of predisposing characteristics, enabling resources, need, personal health practices, and use of health services, among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting? Individual construct hypotheses derived from the model will describe the relationship between population characteristics (predisposing characteristics, enabling resources and need) and outcomes (perceived health status and evaluated health status); the relationship between health behaviors (personal health practices and use of health services) and outcomes (perceived health status and evaluated health status); and the relationship between population characteristics (predisposing characteristics, enabling resources and need) and health behaviors (personal health practices and use of health services) all among uninsured

patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting.

**Data collection procedure.** The data collection comprised of three parts: patient survey, laboratory tests and chart review. Data was collected from participants in the form of researcher-designed surveys on two separate occasions, at baseline and then three months later. A flier with contact information explaining the study was available at the host sites inviting patients to participate in a survey. Patients could elect to complete the survey at the visit or take it with them to complete. If they elected to take the survey with them to complete, they were given a postage paid envelope for convenience supplied by the host CHC. At the end of five business days, the patient received a follow-up phone call. If the patient reported that the survey had not been completed nor mailed, then the survey would be administered via the telephone. Those not approached on site were called about the survey and mailed the informational letter for potential participation with contact information included. If the patient agreed to participate on the phone call, the consent form and medical record access form were mailed with a postage paid envelope for the patient to return. Once those forms were returned, the survey was completed via telephone with the patient or returned via mail. The rotation for data collection was two full weeks at each of the three clinical sites over a six-week period, rotating one full week at each site.

Physician diagnosis, prescriptions and clinical values from laboratory tests appropriate to the condition were collected from the medical records on two occasions: at baseline, which was after the patient's first visit when laboratory results were available and again three months from the date of the first medical record review. At the start of



each medical record review, the diagnosis from the physician's report on the notes sheet for the encounter and the list of prescriptions from the prescriptions section was collected. The medical record was reviewed to capture the laboratory test results appropriate to the diagnosis. The medical record of patients receiving a physician's diagnosis of diabetes and a prescription were further reviewed to capture blood glucose serum level, a blood sugar level and/or a fasting blood sugar level. The medical record of those patients receiving a physician's diagnosis of hypertension and a prescription were further reviewed to capture the systolic and diastolic readings. The medical records of those patients receiving a physician's diagnosis of hyperlipidemia and a prescription were further reviewed to capture the total cholesterol level and triglyceride level.

**Data collection source.** This study used longitudinal surveys and medical records as data sources. The setting for the study was a local community health center with medical and dental sites throughout Hampton Roads. The host CHC is a private, non-profit community health center that was established in 1978. It provides primary health care to both the insured and the uninsured. CHCs are committed to playing an active role in eliminating health disparities. Three of this host CHC's medical facilities were the data collection sites for this study: two on the Peninsula in Newport News and one on the Southside in Suffolk. The facilities were opened weekly from Monday – Friday from 8:00am until 5:00pm. Evening hours were available until 7:00pm one night each week at each of the locations.

To enhance chronic disease management model for uninsured patients diagnosed with chronic conditions requiring prescription regimens, the host CHC added a pharmaceutical component to its health care delivery model, improving access to

prescription medication with both an immediate and long-term facet. The Pharmacy Care of Hampton Roads (PCHR) provides stop-gap medications for patients who are found eligible for pharmaceutical assistance programs but may be required to wait up to 90 days to receive their medications. Prescription medication costs constitute a significant burden for a large portion of patients who are both uninsured and managing chronic condition (Piette et al., 2005). This burden of costs therefore links to the patient's likelihood of medication non-compliance as a result of limited access condition (Piette et al., 2005).

The host CHC is one of many CHCs working diligently to offer patients ready access to high quality, science-based, state of the art medical care that affords the patient a higher degree of health-specific decision making and self-management (Corrigan et al., 2003). The host CHC has several ongoing collaborative efforts that endorse joint community health education; health promotion; and disease prevention, treatment and management with hospital systems, specialty care providers, diagnostic centers, health foundations, and pharmacies. Its vision is to provide seamless, appropriate-leveled coordinated care to each patient as a sound response to needs of the patient care population by offering care on a sliding fee scale for payment according to established household income guidelines. CHCs provide primary care which enables patients to receive needed medical services and improve health status by controlling chronic conditions before they are worsened (Corrigan et al. 2003).

The host CHC, in its attempt to enhance chronic disease management model for its patients diagnosed with metabolic syndrome, increased pharmaceutical access for persons without health insurance. One of the requirements for FQHCs is increased patient access to pharmaceuticals. The current delivery model for uninsured patients was

enhanced by improving access to affordable prescription medication. The pharmacy component was established by the host CHC and its partnership with a local community collaboration. For this research, three of the host CHC's clinical sites were used to approach potential participants. The enhancement is as follows: an eligibility worker or pharmaceutical assistance program (PAP) coordinator for prescription assistance evaluates a patient using an electronic web-based enrollment system based on income and the type of medication the provider has prescribed for them. If the patient was found to be eligible for the free medications provided by pharmaceutical companies, then in 30 – 90 days the patient would begin to receive their prescriptions at their home address directly from the pharmaceutical company. In addition, if the patient qualified for PAP, the patient would be provided monthly prescription medications from the pharmacy component for up to 90 days or until the patient began receiving the free medication from the pharmaceutical companies. PAP eligible patients were those meeting additional income requirements and if the prescription was available on the limited pharmacy program formulary.

Health service provider organizations, such as the host CHC's pharmacy program, are VHCF affiliates able to purchase 340B medications for qualified distribution partners. They further have access to donated bulk medications from manufacturers through the Rx Partnership Virginia and donated generic medications from generic pharmaceutical manufacturers. In addition affiliates may purchase generic medications at discounted prices and on their own initiative, seek donated short-dated medication from various agencies.

At the host CHC, patients eligible for PAP are qualified to receive stop-gap medication from its pharmacy program, the enhancement to its current service delivery model. Once applications are processed by PAP coordinators via The Pharmacy Connection (TPC), prescriptions, proof of income and patient information sheets containing financial data are submitted to the pharmacy program via fax or mail to be filled and made available to the patient at one of the three clinical sites.

A preliminary hypothesis was that the return on investment for implementing a chronic care disease management model can be tremendous if the model can be demonstrated through improved health status and reduction in health care cost. Therefore, the question that remains is, how can health system organizations at the community level provide an effective chronic disease management model where access, both immediate and sustainable, cost of services, and health education were afforded to the patient to impact the toll of chronic illnesses. This study sought to evaluate such a plan, particularly as it relates to increased prescription access for uninsured adult patients managing chronic conditions.

**Recruitment and eligibility.** Patients categorized as underinsured, uninsured or self pay and seeking primary care at an initial visit at one of the three clinical sites of the host CHC during a defined period were the population of interest. Anticipated maximum sample size for this study was approximately 670 patients based on calculations per interviews with the host community health center's administrative staff. These calculated recommendations were based on management's staff's experience and expertise. The host community health center for this project has three clinical provider sites available for this study. The clinical management staff reported that for any day, there was the

potential for 20 new patients at each site—this includes the scheduled new patients in addition to unscheduled walk-in new patients. Therefore during the defined 6-week period for this study, there was the potential for 1800 new patients (20 patients X 3 sites = 60 people; 60 people X 5 days= 300 people; 300 people X 6 weeks = 1800 people). Management staff reported that of those 1800 new patients, approximately 75% would be uninsured/self-pay. Of the 1,350 uninsured potential new patients, an expected maximum successful capture rate was 50% (n=670), due to the number of potential patients meeting this study's requirements, the number of patients willing to respond, time constraints, number of research assistants available, length of the survey tool, and the proposed budget. Therefore, the expected maximum sample size was 670 patients at baseline.

All patients captured during the defined six-week time period at baseline and meeting the criteria of being uninsured and a first time patient or not seen by the host CHC providers in the past twelve months were invited to participate. Management staff reports that typically of all new patients presenting, most receive a physician diagnosis of at least one of the top five chronic disease states of asthma, diabetes, heart conditions, hypertension and hyperlipidemia (particularly elevated blood pressure) and require a prescription. The potential participants were secured from new patients seeking health care at the host CHC on their very first visit or that have not been seen in the past 12 months and deemed as underinsured, uninsured or self-pay by the finance department. The researcher was housed in the financial department. Fliers were posted at each of the three clinical sites [Appendix D]. Those wishing to know more about the study were provided with an informational letter describing the study [Appendix E]. If they agreed to participate, they signed a consent form [Appendix F] and an authorization to provide

the researchers access to their medical records [Appendix G]. The information from the consent form was used as a script to verbally share the study's information and particulars with the patient if they asked for more information beyond what they had read in the potential participant letter.

All data were treated as confidential and stored in a secure locked area to which only the researcher had access. Each participant was assigned a number identification code; all health assessments and medical record reviews were numerically coded with no identification information appearing on the assessment sheets. Consent forms were stored in a locked area separate from the health assessments and medical record reviews. Two waves of data were collected, a summer wave and a winter wave.

**Survey development.** The Centers for Disease Control and Prevention's [CDC] Behavior Risk Factor Surveillance System [BRFSS] Questionnaire (CDC, 2010) was initially developed to monitor the prevalence of behavioral risks associated with premature morbidity and mortality at the state-level (CDC, 2010; Mokdad, Stroup & Giles, 2003). The questionnaires were designed to collect self-reported health and health-risk behaviors that impact the overall health of the individual and the populace as a whole. The data could be collected via telephone for the BRFSS (CDC, 2010; Mokdad et al., 2003). For this research, questionnaires were administered in person, by telephone or the participant could have elected to complete them in the absence of the researcher.

Collection of retrospective data is sensitive to bias and unreliability as this self-report data depends heavily on accurate reporting on the behalf of the subject (Bourque & Fielder, 2003). The questions adapted from the BRFSS were appropriate to this study. The line items were not in an exploratory stage, and they were used to collect the

intended data from a standard population (Bourque & Fielder, 2003). For adults aged 18 – 64, the BRFSS provides consistent and timely data for the U.S., captures a large sample size, and has particular measures for health care coverage and access (RWJ Foundation, 2006).

Coefficients with a value higher than 0.75 was reported as excellent, 0.40 to 0.75 was considered as moderate to good, and less than 0.40 was reported as low (Gordis, 2000). The majority of the measures used in the BRFSS are reported as at least moderately reliable and valid (Nelson, Holtzman, Bolen, Stanwyck & Mack, 2001). Blood pressure screening, height, weight, and BMI, and several demographic characteristics were highly reliable. One of the measures that were found to be both moderately reliable and valid included clinical and laboratory test recalls. Important to this study is the measure's ability to test for valid and reliable self-report data overall as the majority of the information was from patient's recall. The analysis showed few measures reported as having low validity and only one measure reported as having low reliability (Nelson et al., 2001). Based on the model, the instrument for this study included the following categories: population characteristics, health behaviors, and outcomes.

Retest reliability was reported as 0.75 and higher for the Self-Reported Health and Healthy Days measures, and 0.58 to 0.71 for other measures (CDC, 2005). Reliability was lower for older adults. The demographic subgroups such as gender illustrated no standard pattern for differing reliability and modest change in reliability by time interval for the first and second interview. The retest reliability of the measures for self-reported health and number of healthy days set of core questions was considered moderate to

excellent (CDC, 2005).

The Georgetown University's Women Entering Care study sought to examine the cognitive-behavior therapy and medication treatment at six months and again at 12 months among low-income minority women receiving assistance from local social service and community-based agencies (Green, Krupnick, Chung, Siddique, Krause, Revicki, Frank, & Miranda, 2006). The survey was developed to capture if these women had a social support network in their lives. Miranda et al. (2006) report the survey was overall moderate to good. The test-retest correlation was reported as .89, and individual item kappas had a median kappa of .73. The relationship between the questionnaire and a follow-up interview was .77 for total number of events. The individual item kappas for validity between the questionnaire and the interview ranged from .26 to .90, with a reported median kappa of .64 (Green et al., 2006). The survey was designed to maximize external validity to make the survey generalizable to public care and minority patients. This survey is appropriate for this study (Miranda et al., 2006).

The Medical Expenditure Panel Survey [MEPS], administered by the Agency for Health care Research is a nationally representative survey of non-institutionalized populations (Kirby et al., 2006; Medical Expenditure Panel Survey, 2006). The MEPS is used in the U.S. by the Department of Health and Human Services to survey individuals, families, medical providers and employers (Medical Expenditure Panel Survey, 2006). This study adapted the four statements to measure attitudes about health and health care just as Kirby and colleagues had in a study that examined racial and ethnic disparities in health care (Kirby, et al., 2006) [Appendix H].



To evaluate the reliability and validity of the Medical Outcomes Study Short-Form version 2 [SF-12v2] in the 2003-2004 MEPS, researchers examined the data collected in the self-administered mail-out questionnaire and face-to-face interviews of 20,661 (Cheak-Zamora, Wyrwich & McBride, 2009). Internal consistency and test-retest reliability and construct, discriminate, predictive and concurrent validity were tested. Both the Mental Component Summary Scores [MCS] and the Physical Component Summary Scores [PCS] were shown to have high internal consistency reliability [ $\alpha > .80$ ]. PCS showed high test-retest reliability [ICC = .78] and MCS showed moderate reliability [ICC = .60]. The PCS had high convergent validity for the EQ-5D items [except self-care] which measure health related quality of life and physical health status [ $r > .56$ ]. MCS showed moderate convergent validity on EQ-5D and mental health items [ $r > .38$ ]. Component summary scores demonstrated adequate reliability and validity (Cheak-Zamora et al., 2009).

The pretest entire questionnaire consisted of nine sections: perception of health status/quality of life, health care utilization prior 12months history, self-reported disease states, prescription medication history, previous physician rating, and perception of health locus of control, demographic information, social support / emotional support and appointment compliance. These questions were based on literature review and adapted from the following: the Commonwealth Fund Health Survey (Commonwealth Fund, 2006), the CDC's Behavior Risk Factor Surveillance System Questionnaire 2005 (CDC, 2005), the Medical Expenditure Panel Survey [MEPS] which is administered by the Agency for Health care Research (Kirby et al., 2006; MEPS, 2006), and the Georgetown University's Women Entering Care [WECare] (Miranda et al., 2006) grant-funded study

measuring the effectiveness of depression treatment women seeking care at a minority public care center for gynecology services (Miranda et al., 2006).

### **Pilot Study**

Members of the expert panel selected for this study included a pharmacist, CHC administrator, certified health educator, laboratory technician, CHC technical advisor, licensed practical nurse [LPN], and physician. This panel reviewed CDC's BRFSS, the Georgetown University WeCare Survey and the MEPS for consideration. They submitted their feedback regarding line items and section headings for the development of a draft instrument. A pilot study was conducted using the draft instrument.

The developed survey was administered to 10% of the initial data collection goal of 200 participants. A second wave of data was collected to test if there were any statistical differences among the participants based on health seeking behaviors in the different seasons. The participants were those individuals who attended a free community health fair sponsored by a local faith-based initiative for the uninsured. Access to other local CHCs in Hampton Roads was not sought for this study due to time and budgetary constraints. Twenty-one people completed the pilot study.

The expert panel made two recommendations and both were incorporated. The first recommendation was that the section on attitudes about health and health care required modifying. Initially, the questionnaire required each patient to provide their opinion on four statements regarding their own health and health care. The first item initially read "You are healthy enough that you don't need health insurance." Results showed that participants would either not answer these line items or ask for assistance. The expert panel recommended the addition of the phrase "do you feel" to precede the

statement to make each a question. The expert panel further recommended that the questionnaire be administered to participants rather than have them to complete it on their own accord. A consensus was reached on face validity for the developed instrument as the measures appeared suitable enough to obtain the information sought for this study.

### **Survey Instrument**

**Section 1:** Perception of Health Status and Quality of Life variables covers questions 1-5 on the tool. This section was adapted from the CDC's Behavior Risk Factor Surveillance System Questionnaire (CDC, 2005). This 5-question section included one question relating to what the patient believed was the health problem that provoked them to make a physician visit. The final four questions of this section related to the patient's perception of physical health, mental health. This section measured self-reported health status, a need variable for the population characteristics construct of the model.

**Section 2:** Past 12 months Health Care Utilization covered questions 6-15 on the tool. This 10-item section required responses to the patient's health utilization behaviors in the past 12 months such as if the patient had a regular place for health care, and the number of and reasons for visits to either a primary care physician, an emergency department, a specialty care physician, and hospital admissions. This section was adapted from the CDC's BRFSS (CDC, 2005).

**Section 3:** Self-Reported Disease States covered questions 16-63 on the tool. This 48-item section required responses on the patient's recall of physician diagnoses, treatments and recommendations for modifications in health behaviors in the past 12 months. This section was adapted from the CDC's BRFSS (CDC, 2005).

**Section 4:** Prescription Medication History covered questions 64-80 on the tool. This section was partly adapted from the Kaiser Family Foundation and the Commonwealth Fund 1997 National Survey of Health Insurance (Commonwealth Fund, 2006) that was administered to low- and modest wage workers who were largely at-risk of being uninsured, having little access to medical care due to cost of care, and were particularly non-compliance with prescription regimens for the purpose of this study [Appendix J].

**Section 5:** Attitudes about Health and Health Care covered questions 81-84 on the tool. This four-item section was adapted from the Medical Expenditures Panel Survey (MEPS), administered by the Agency for Health care Research, is a nationally representative survey of noninstitutionalized populations. Four statements were used in this study to measure attitudes about health and health care on a five point Likert scale assigned the following values: 1 – Strongly Disagree, 2 – Disagree, 3 – Not Sure, 4 – Agree, and 5 – Strongly Agree. Kirby and colleagues used these measures in a study that examined racial and ethnic disparities in health care (Kirby et al., 2006) [Appendix M].

**Section 6:** Demographic Information covered questions 85-100 on the tool. This 14-item section was developed based on information identified in the literature as having significance. The questions related to age, gender, marital status, education, employment, income, insurance status, and number of people in household.

**Section 7:** Social / Emotional Support Network was covered by question number 101 on the tool. This section was adapted from the Georgetown University's WECare grant funded project for treating depression in predominantly young minority women. This section listed the social and emotional support resources and asked the

patient to identify those that apply to their individual situation.

**Medical records review.** The medical records were reviewed after the initial visit to determine if the patient received a physician diagnosis and a prescription for one of the five chronic disease states of asthma, high blood pressure, high cholesterol, heart disease or diabetes; those patients were used in the study's analysis; a developed medical record data abstraction form for pre- and post-tests was utilized to collect these data [Appendices J and K]. The medical records of those patients used in the study's analysis were reviewed on a second occasion, three months from the date of the first review to capture laboratory values a second time. The medical record review required that the physician's recommendations, laboratory test values, clinical outcomes, prescription regimens, treatment plans, diagnoses and height and weight variables to calculate body mass index were located. This review also provided any information on specialty care visits, hospital admissions and emergency department visits that had been forwarded to the community health center on the patient's behalf.

The posttest questionnaire was comprised of four sections requesting information that accounts for the past 90 days: physician diagnosis, prescription medication history, perception of health status / quality of life and health care utilization history. These questions were based on the above sections' follow-up requirement. Although the post-test was self-report, it included a post medical records review which revealed a report of actual service utilization. Therefore the overall health assessment included a combination of subjective measures and actual measures to increase the likelihood of accurate responses.

## Variables

### Population Characteristics

**Predisposing Characteristics.** Respondents were asked to supply responses to the following:

**Gender.** This item was a dichotomous variable with the responses male and female available for selection. Only male and female categories were considered for the proposed study. Males was coded as “1” and females was coded as “2”.

**Age in years.** This item required a ratio level response and was listed as open-ended. This variable was recoded to coordinate the ratio level data into ranges such as 18 – 29, 30 – 49 years, 50 – 64 years, and a final category of 65 years and older.

**Race.** Which one of these groups best represents your race, a nominal level variable that offered the following selections: Caucasian / White, African American / Black, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, Hispanic or Latino of any race. “Other” was an alternate selection and respondents were asked to provide an explanation if this line item was selected. For data entry purposes, a list was compiled of the selections that respondents provided in the open-ended response category if they selected “other” in this selection list.

**Marital Status.** What is your current marital status: The response categories were Married, Divorced, Widowed, Separated, Never Married / Single, Member of an unmarried couple. This provides a full range and there was no anticipation of respondents requiring an “other” selection for open-ended responses. For data entry purposes at recoding, divorced, widowed, separated, never married/single were coded as “0” and married or member of an unmarried couple were coded as “1”.

Past 12 months Health Care Services Use. The questions for past 12 months health services use were adapted from the CDC's BRFSS (CDC, 2005). They asked about the number of visits in the past 12 months for primary care, emergency room visits, hospitalizations and specialty care visits.

- If not, where was the last place you went to for health care? (Nominal, open-ended)
- In the past 12 months, was there a time when you needed to see a doctor but could not because of cost? (Nominal, yes / no)
- In the past 12 months, did you see a specialty care doctor for yourself? (Nominal, yes / no)
- If so, for what condition? (Nominal, open-ended)
- In the past 12 months, were you hospitalized? (Nominal, yes / no)
- If so, for what condition? (Nominal, open-ended)
- In the past 12 months, have you been to the Emergency Room for care for yourself? (Nominal, yes / no)
- If so, for what condition? (Nominal, open-ended)

The post-test items were:

- Do you currently have regular place that you go to for health care? (Nominal, yes / no)
- If so, where? (Nominal, open-ended)
- If not, where was the last place you went to for health care? (Nominal, open-ended)
- In the past 3 months, was there a time when you needed to see a doctor but could not because of cost? (Nominal, yes / no)
- In the past 3 months, did you see a specialty care doctor for yourself? (Nominal, yes / no)

- If so, for what condition? (Nominal, open-ended)
- In the past 3 months, were you hospitalized? (Nominal, yes / no)
- If so, for what condition? (Nominal, open-ended)
- In the past 3 months, have you been to the Emergency Room for care for yourself? (Nominal, yes / no)

Employment Status. This nominal variable request provided a range of selection responses were made available to respondents: Working for wages full-time, Working for wages part-time, Self-employed, Out of work for more than one year, Out of work for less than one year, Unemployed, Retired, A Student, A Homemaker, Unable to work, and Receiving Disability Benefits. This provided a full range and there was no anticipation of respondents requiring an “other” selection for open-ended responses.

Attitudes about health and health care. Attitude was operationalized as attitudes about health and health care. Attitudes about health and health care were measured by the extent to which the participant agreed or disagreed with the following four statements preceded by the words “do you believe”: you are healthy enough that you really don’t need health insurance; health insurance is not worth the money it costs; you are more likely to take risks than the average person; and you can overcome illness without help from a medically trained person (Kirby et al., 2006). In this study, the higher the summary score in this section to measure attitude, the more likely the patient was to have more unnecessary health care visits during the follow-up period. The scale ranged 1-5 (from strongly disagree to strongly agree) and the summary score ranged from 4 to 20 for the five point Likert scale items. Strongly disagreed scored five points and strongly agreed scored one point for each of the four items in the scale. The five possible



responses to each item were assigned the following values: 1 – Strongly Disagree, 2 – Disagree, 3 – Not Sure, 4 – Agree, and 5 – Strongly Agree. The sum of each patient's opinions to the four statements was computed and stored in a variable called Sum-Attitude. A Sum-Attitude score of zero corresponded to a patient who strongly disagreed to each of the four statements. This person felt he or she was unhealthy enough to need health insurance, that health insurance was worth the money it costs, that he or she was not likely to take more risks than the average person, and that he or she needed help from trained medical personal to overcome illness. A Sum-Attitude score of 20 corresponded to a patient who strongly agreed to each of the four statements equating to a more negative attitude. This patient strongly felt that he or she did not need health insurance, health insurance was not worth the money it costs, that he or she was more likely to take risks than the average person, and that he or she could overcome illness without help from a medically trained person.

**Enabling Resources.** Enabling resources included the following variables. Usual source of care was defined as a regular medical home for health care, but not a specialty physician nor the emergency room. For insurance status, inclusion criterion required that respondents be categorized as underinsured, uninsured or self pay as part of the inclusion criteria. Income (poverty level), social / emotional support, employment, household size, marital status, and education were the additional variables used to define the concept enabling factors.

Current Health Insurance (circle all that apply), a nominal level variable that offered the following selections: Private Insurance, Medicaid, Medicare, CHAMPUS, None or other. The status of under-insured, uninsured or self-pay was an inclusion

criterion for this study; this variable is listed to ensure that respondents are properly categorized for the purpose of this study. This variable further lends itself as an opener to inquire why and for how long the respondent had been without appropriate health insurance coverage. It further lends itself to remove any stigmas associated with being uninsured. This variable was recoded so that respondents with health insurance are coded as “1” and those without health insurance are coded as “0”.

“If you are currently uninsured, how long has it been since you have not had health insurance?” This ratio level variable required the respondent to list the number of years. For data entry purposes, the responses were recoded to reflect ranges. If less than one year, the response was coded as “0”; for one year – two years, the code was “1”; for more than 2 years but not more than 5 years, the code was “2”. For greater than 5 years, the code was “3”. A more accurate measure to account for the length of time a respondent had been uninsured is to propose the item as any time during the previous 12 months (Congressional Budget Office, 2003). When asking respondents to recall a behavior such as insurance status, it is best to ask them to report on a shorter period of time (Congressional Budget Office, 2003). If you are uninsured, what is the reason? This open-ended item requires respondents to provide a brief explanation for their lack of health insurance. For data entry purposes, a list was coordinated to report all of the open-ended responses.

Household Yearly Income. This open-ended response required ratio / ordinal level data. For data entry purposes, the responses were recoded to show income ranges. Incomes at \$10,000 annually or less, was coded “0”; incomes ranging from \$10,001 -

\$20,000 was coded at “1”; incomes ranging from \$20,001 - \$30,000 was coded as “2”. Incomes above \$30,001 was coded as “3”.

Total number of people in household (include self). This variable required a ratio level response. This line item provided information on the total number of people in the respondent household, including the respondent. This data in combination with annual income was used to establish poverty level. According to the Department of Health and Human Services, the levels are largely used for the simplification of poverty thresholds for determining federal entitlement program eligibility (DHHS: Federal Register, 2004).

Education. This line item offered the following response categories: Never attended school, Grades 1 through 8 (Elementary), Grades 9 – 11 (Some High School), High School Diploma or GED, Some College or Technical School, College Degree or Higher. For data entry purposes, recoding was applied to show less than a high school degree as “0”; a high school diploma or GED as “1”; and any college or technical school self-report attendance as “2”. This is an ordinal variable.

Stop-gap eligibility. Stop-gap eligibility was operationalized as the respondent’s participation in the Healthy Communities Access Program for prescription medication access which offers reduced cost prescriptions for the chronic disease states of asthma, diabetes, heart conditions, hypertension and hyperlipidemia for up to 90 days.

Social Networks of Support. Social networks of support are defined as the familial support or psychological enhancement to help an individual reduce their stress (Uchino et al., 1996). Research has shown that the level of social support has been found to be related to lowering rate of disease and early death (Uchino et al., 1996) and a significant relationship between emotions and health (Salovey, Detweiler, Steward, &

Rothman, 2000). A strong social network of support is necessary to achieving traits associated with overall physical well-being (Salovey et al., 2000) is presented in this study as a dichotomous variable, do you have a positive social support system in your life?, requires a yes or no response. The “no” responses were coded as “0” and the “yes” responses were coded as “1”. A list of types of social and emotional support systems was provided to assist participants in understanding the operationalization of social network of support.

**City of Residence.** This variable was captured by a nominal, open-ended response. For data entry purposes a list was created and coded appropriately. It is expected that the majority of the respondents would list either Newport News, Hampton, or Suffolk as their city of residence based on location of the clinical sites.

**Health Issues.** How do you find out about health issues? (Circle all that apply), This nominal variable category provides the following selections: My Doctor, Magazines / Books, Pamphlets, Internet / On-line, Computer software, Church programs, Television / Radio / Newspaper, Family / Friends and Other. Respondents who select other for this line item was asked to provide a brief open-ended response. For data entry purposes the open-ended responses were recoded into a list.

**Need. Self-Reported Health Status.** Self-reported health status was operationalized as patient’s perception of overall health status and quality of life. It was measured by if whether or not the patient reports that over the course of the past 30 days, their physical or mental health has impacted their daily routines and the number of days overall they believe their physical or mental health good was not good. This section was adapted from the CDC’s BRFSS (CDC, 2005). The summary score for the overall health

rating ranged from 1 to 5. A sum score of 5 was operationalized as a perception of excellent health and 1 as poor health. The higher the sum score the more positive the perception of health. Additional survey items follow [Appendix N]:

- What brings you here today? (Nominal, open-ended)
- How would you rate your overall health? (Ordinal, six point Likert scale with a with the following categories: 1- Excellent, 2 - Very Good, 3 - Good, 4 - Fair, 5 - Poor, and 6 - Not Sure. The lower the rating, the more positive the self-report health rating.
- Now thinking about your physical health, which includes physical illness and injury, in the past 30 days, how many days was your health not good? (Ratio)
- Now thinking about your mental health, which includes stress, depression, and problems with emotions, in the past 30 days, how many days was your mental health not good? (Ratio)
- During the past 30 days, how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation? (Ratio)

Self-Reported Disease State. Self-reported disease state was operationalized as the patient's report of their health as it relates to the top five chronic disease states of asthma, diabetes, heart conditions, hypertension and hyperlipidemia. The questions were adapted from the CDC's BRFSS (CDC, 2005) and asked the patient to recall any experienced symptoms as they relate to the chronic diseases. The response levels were recoded to be dichotomized for each of the five chronic disease states so that any of the experienced symptoms or affirmative responses would be coded as "1" and responses of no experienced symptoms would be coded as "0".

- What health problems do you worry about most? (Nominal, Open-ended)
- Has a doctor ever told you that you have any of the following? (Nominal, Yes/No) (Asthma, Diabetes, High Blood Pressure, High Cholesterol, Heart Conditions)

## Health Behavior

**Personal health practices.** Prescription access was operationalized as the availability of medication to manage a condition. Specific to this study, prescription access included the accessibility of the medications as it relates to cost and convenience. The most precise and appropriate approach to identify prescription medication history for this proposed research was for the development of a series of questions about prescription access, cost, perception and utilization based on the literature review. The items that coded for yes / no responses were used as dichotomous variables, with “no” responses coded as “0” and “yes” responses coded as “1”.

- Are you currently taking prescription medications? (Nominal, yes / no)
- If so, which ones? (Nominal, Open-ended)
- Do you think that your current medications cost too much? (Nominal, yes / no)
- Where do you usually get your prescription medications? (Nominal, open-ended)
- In the past year, how much did you spend monthly on prescription medications? (Ratio)
- In the past year, what has been the most that you have ever paid for one prescription medication? (Ratio)
- In the past year, have you ever not filled a prescription because you did not have the money? (Nominal, yes / no)
- In the past year, have you shared your prescription medication with other people? (Nominal, yes / no)
- In the past year, have other people shared their prescription medication with you? (Nominal, yes / no)
- In the past year, have you ever gone without your medication for a chronic condition such as asthma, diabetes, heart conditions, high blood pressure or high cholesterol because you could not afford it? (Nominal, yes / no)
- In the past year, have you ever split pills or alternated days to make a prescription last longer? (Nominal, yes / no)

- In the past year, have you ever borrowed money to pay for your prescription medication? (Nominal, yes / no)
- In the past year, have you ever had to choose between paying for your prescription medication or taking care of other responsibilities like food, clothing, shelter, utility bills? (Nominal, yes / no)
- In the past year, have you ever told a health professional that you were not taking a prescription medication because you could not afford it? (Nominal, yes / no)
- In the past year, have you ever received samples from a health care professional (doctor or nurse) after telling them that you could not afford a prescription? (Nominal, yes / no)
- In the past year, has a health professional (doctor or nurse) ever told you about any programs where you could possibly get cheaper prescription medications? (Nominal, yes / no)
- If so, what did he or she tell you? (Nominal, open-ended response category variable)

**Health Services Use.** This variable was measured by the number of encounters during the follow-up period for ED visits, specialty care visits and hospital admissions. The operationalization for the measure of health care utilization mirrors that used in the secondary analysis of data from the MEPS for 2000 (Viera et al., 2006) and a study of health care services utilization among children of migrant workers migrant workers (Weathers, Minkovitz, O'Campo, & Diener-West, 2003). For this study, the major outcome variable was use of health services over the last three months and clinical values as a subsequent outcome variable. The variable was operationalized by ten line items. An affirmative response was coded as "1", and no visits was coded as "0". The dependent variable for the study is health care service utilization and was dichotomized as yes or no for data entry purposes. The baseline items were:

- Do you currently have regular place that you go to for health care? (Nominal, yes / no)
- If so, where? (Nominal, open-ended)

## **Outcomes**

**Perceived Health Status.** This variable was measured by self-reported health status at follow-up.

**Evaluated Health Status.** The variables for measuring provider diagnosed disease state were from the baseline medical records review [Appendix J]. It was operationalized as the provider reported disease state of asthma, diabetes, heart conditions, hypertension or hyperlipidemia.

## **Population and Sample**

The study population consisted of 427 patients from three community health facilities serve as study subjects. Convenience sampling was utilized for this study, the selection of participants was based on availability, which were uninsured new adult patients and accessibility, which was consent to participate in the study (Creswell, 2002; Trochim, 2001). The patients were an intact group as they were all of the uninsured adult patients seeking care at the facility during the assigned week (Trochim, 2001). A major disadvantage of this technique is that the sample may not be representative of the population as a whole (Creswell, 2002; Trochim, 2001).

The inclusion criteria for participation in this study included the following: the participant must have been at least 18 years old; be categorized as either underinsured, uninsured or self-pay by the financial department personnel at the host community health center; and be a new patient. After the initial physician encounter was completed, the medical record was reviewed for the additional inclusion criteria which is a physician-diagnosis of at least one of the five chronic disease states of asthma, diabetes, heart conditions, hypertension or hyperlipidemia with a prescription to treat, manage, lower, or



control the chronic condition. Those patients meeting all inclusion criteria were invited to participate in the study. Once processed for eligibility to participate in the stop-gap program, they were categorized into either the treatment group or the comparison group. The treatment group included those patients who were eligible to receive prescription medication from the stop-gap program, and the comparison group, those patients who were not eligible to receive prescription medication from the stop-gap program.

### **Protection of Human Subjects**

Permission to conduct the research was granted by the Human Subjects Institutional Review Board of the Old Dominion University as Project Number 06-042 on June 5, 2006 for data collection and on November 19, 2009 as Project Number 09-141 for data analysis [Appendix L]. The Human Participant Protections Education for Research Teams Certificate Training offered on-line by the National Institutes of Health was successfully completed in March 2006 for data collection and again in November 2009 for data analysis; and read thoroughly and agreed to adhere to the Health Insurance Portability and Accountability Act (HIPAA) Training Manual provided on-line by the Department of Health and Human Services' National Institutes of Health entitled "Protecting Personal Health Information in Research: Understanding the HIPAA Privacy Rule" in April 2006 and November 2009.

In addition, participation in this study required informed consent. In the informed consent document requiring the patient's signature, it was explained that the participant might experience two potential types of risks. First, those risks associated with talking about health status and the worries that may surface when discussing such in detail. As a patient, participants had access to a health educator for discussion and the provision of

resources for additional help if necessary. The other potential type of risk that participants might experience involves those risks associated with the possibility of linking their names to their responses on the health assessment tool. A release of confidential information as a result of participating in this study was a potential risk. In an attempt to reduce the risk of the possibility of releasing confidential information and linking names to survey responses, number identifications were assigned to each survey. Secondly, the one master list of names with appointed number identifications was created and only the responsible project investigator and researcher were able to access said list. The list was not kept at the community health center site. And, as with any research, there is some possibility that the participant may be subject to risks that have not yet been identified.

### **Statistical Analysis Plan**

Data was entered and analyzed using the Statistical Package for Social Science (SPSS version 14.0; SPSS Inc., Chicago, Illinois). A master's prepared researcher assisted in data collection, data cleaning, and data entry. To increase the level of accuracy, the researcher and the research assistant reviewed each survey for cleaning. The research assistant entered the data and the researcher reviewed each entry to ensure accuracy. A third person reviewed the work performed by the researcher and the research assistant.

Hypotheses were generated for each category according to the constructs in the model for examination of the relationship between population characteristics and health behavior with outcomes. Chi-squares were established to determine the impact of the independent variables health services use [Appendix N]. A Cronbach's alpha was established to examine the consistency of the constructs that have summed scale ratio

scores to ensure the set of variables appropriately measures the intended construct. The Paired *t* test was used to test for relationships between the data at the bivariate level, but appropriate to measurement level and number of outcomes to compare pre and post test data. For the multivariate hypotheses, the logistic regression analysis for One or More Physician / Nurse Triage Visits; One or More Specialty Care Visits; and One or More Emergency Room Visits was explored as guided by the Andersen's Behavioral Model of Health Services Use. The *p* value was .05 for the bivariate hypotheses and the logistical regression tests. The results of the assessments at pre-test and post-test were compared primarily to determine the change in prescription access over the past 12 months and over the past three months.

### **Limitations of the Study**

This research represented a small case study analysis of one community health center and was not generalizable. The data was subject to the limitations of self-reported information which had the potential for misrepresentations, misreporting (under-reporting and over-reporting) and recall bias. This small sample of 427 implied the external validity of the study may be limited. This small sample size further limited the ability to perform sub-group analyses and statistical inferences, but it was hypothesized that patients who have access to the stop-gap medication program would experience improved health status. While the study is limited to community health centers with minority populations, the information concerns high-risk groups and is likely to be important in helping to craft policy.

This study employed mainly convenience sampling. The major disadvantage was that the sample may not be representative of the population as a whole, but the data

collected can still provide fairly significant findings (Creswell, 2002; Trochim, 2001). Participation in the study is voluntary. Self-report data was used for a main source of information and there existed threats to relying upon the recall memory and bias towards responding to survey items. Another concern was the sensitivity and specificity of clinical and laboratory test results (Creswell, 2002; Trochim, 2001). It was probable that the proportion of participants who were identified as having a chronic condition and prescribed a medication regimen could very well modify their behaviors to lower, reduce or control the condition without prescription medication.

A potential limitation as in any study is measurement error (Miranda et al., 2006). This is particularly so in studies where the participants are largely low-income and female and standardized measures may be less reliable and less valid than when administered to middle income populations (Miranda et al., 2006).

Limitations were inherent in this research and may have affected both external validity and internal validity (Creswell, 2002; Trochim, 2001). Participants were from one community health center system with locations in two Hampton Roads' cities. As a result, group characteristics may not be representative of a larger national sample; therefore the selection-treatment interaction threat limited the generalizability of the study. In addition, patients might have either consciously or unconsciously changed their performance or responses so the experimenter effect was considered. Multiple treatment interference was yet another potential threat to external validity, as the sample of participants consisted of new patients, who might or might not have returned for follow-up appointments. And lastly, reactive affects, as subjects have a tendency to change their behaviors when they are participating in a study. Unexpected events are likely to occur

between the pre- and posttest, and may affect health care utilization behaviors and clinical outcomes (Trochim, 2001; Creswell, 2002). For instance, patients may have incorporated substantial lifestyle modifications such as diet and exercise and may no longer be required to adhere to prescription regimens. Given these potential threats to external and internal validity, it is suggested that generalizations beyond this study's sample population be completed with caution. In terms of validity, it is difficult to identify all of the possible impacts of intervention and overall care at the community health center level that could impact health services use and health outcomes (Miranda et al., 2006).

## CHAPTER IV

### RESULTS

Three clinical sites and nine providers were used for recruitment and care of the 427 total participants; 259 were recruited from location one in downtown Newport News, 101 were recruited from location two in Newport News, and 67 were recruited from the location in downtown Suffolk. Recruitment was scheduled for one week at each of the three sites. Had a researcher been at each site each week during the designated recruitment, there may have been as many as three times this total number of participants eligible to participate. There were no noted refusals to participate. The primary self-reported reason for the patients' visits varied. Reasons included but were not limited to routine checks, common illnesses, pain management, and disease management. The follow-up survey was completed either at the same medical site as the pre-test, or at a free cancer screening event or a free community health fair. The two sponsored events were made available by the host community health center to ensure improved follow-up and to limit the number of participants lost to follow-up due to cost. This project yielded 100% follow-up (n=427).

#### **Initial Health Assessment Results**

##### **Section I: Perception of Health Status / Quality of Life**

At the initial health assessment, 3.3% of the participants rated their overall health as very good, 26.5% rated their health as good, 35.4% rated their health as fair, and 34.9% rated their health as poor. In regard to physical health defined to include physical illness and injury, study participants had an average of 4.68 days of poor physical health

in the past 30 days with a standard deviation (SD) of 5.78 days. Because the SD is greater than the mean, this results shows there is more variation in the rating.

More than half (59.3%) reported to have had at least one day of poor physical health in the past 30 days; with 13 participants within this group having reported that their physical health was not good 20-21 days out of the past 30 days and 6 reported not having had even one day of good physical health in the past 30 days. In regard to mental health defined to include stress, depression, and problems with emotions, participants had an average of 4.76 days of poor mental health in the past 30 days with standard deviation of 5.27 days. Moreover, 57.4% reported to have had at least one day of poor mental health; with 6 of these respondents having reported the past 30 days as poor mental health days. Study participants had an average of 6.24 days during which their physical or mental health kept them from completing their typical activities such as self-care, work or recreation during the past 30 days with standard deviation of 5.31 days. Of the 427 participants only 102 (23.9%) reported that their physical or mental health did not keep them from doing their typical activities during the past 30 days. The other 325 participants reported that their physical or mental health impeded their ability to do usual activities at least 2 of the past 30 days.

## **Section II: Health Care Utilization History**

At the initial assessment, none of the participants in this study had a medical home for health care. Participants reported that the most recent place they had visited for health care were ED (n=177, 41.5%), health departments (n=70, 16.4%), health fairs, prison doctors and private doctors for their health care needs. For the purpose of this study such agencies as the ED, local public health departments, prison clinics and health

fairs are not operationalized as regular sources of care because they do not provide comprehensive primary health care and maintenance on a continual basis. All of the participants were unable to be evaluated by a physician due to cost at some time during the past 12 months. Also in the past 12 months, 15.5% saw a specialty care doctor, 66.0% visited an ED, and 14.1% were hospitalized to help meet their health care needs.

### **Section III: Self-Reported Disease States**

Patients were asked what health problems they worried about the most; 81.5% reported to worry about diabetes and 61.1% reported to worry about high blood pressure. Many other health problems were named, including cancers, heart attacks, sexually transmitted diseases, and obesity. With regards to physician diagnosed diseases, 7.3% had been told they have asthma, 30.7% had been told they have diabetes, 81.5% had been told they have high blood pressure, 5.2% had been told they have high cholesterol, and 2.6% had been told they have heart disease. Participants were able to report more than one health problem about which they worried.

All the participants who reported to have been professionally diagnosed with asthma (n=31, 7.3%) still had asthma at the initial assessment and 61.3% (n=19) of them were diagnosed before they were 18 years old. Of these asthmatics, 87.1% (n=27) reported having symptoms of asthma once or twice a week and 9.7% had trouble sleeping due to their asthma once or twice a week. In the past year, 22.6% of the asthmatic participants visited an ED because of their asthma, 83.9% (n=26) saw a health professional for treatment of worsening asthma symptoms, and 83.9% were unable to work or carry out usual activities due to their asthma at least once. Only one person



reported taking prescription asthma medication to prevent an asthma attack from occurring. No one reported using a prescription asthma inhaler during an asthma attack.

Of the 30.7% of study participants who reported to have been physician diagnosed with diabetes, 12.9% had gestational diabetes in the past. None of the study participants reported to be taking insulin, taking diabetes pills, checking their own blood sugar, or checking their own feet for any sores or irritations. A majority, 62.6% (n=82), of the study's participants who self-reported has having been diagnosed with diabetes by a health care professional had seen a health professional for their diabetes in the past year. During all of these visits a health professional checked patients' feet for sores or irritations, but none of the health professionals talked to patients about how their diabetes affects their eyes, or gave patients appropriate eye exams to determine if any diabetes related eye conditions had manifested.

Of the 427 participants overall, 81.5% (n=348) reported to have been diagnosed with hypertension by a health professional. Of those 348 patients, 57.5% (n=200) had been told by a health professional on two or more visits they had high blood pressure and 30.5% (n=61) of patients were diagnosed only during pregnancy. Only 25% (n=87) of those with hypertension were currently taking medicine for their high blood pressure. In the past year, to help control high blood pressure 75% (n=261) of study participants with hypertension had been told by a health professional to change their eating habits and reduce sodium consumption. Also in the past year, 69.8% (n=243) of study participants with hypertension had been told by a health professional to reduce their alcohol consumption and exercise regularly to help control high blood pressure. None of the study participants with hypertension reported any change in their eating habits or exercise

habits to help lower or control their high blood pressure; only 27% had reduced sodium intake, and 57.2% had reduced alcohol consumption.

All of the study participants with high cholesterol had their blood cholesterol levels evaluated 12 to 24 months prior to the initial assessment. In the past year, a health professional informed each study participant with high cholesterol to exercise and change eating habits to help lower blood cholesterol, but none of the participants had taken either of these actions.

The 2.6% or 11 of the 427 study participants with heart disease had all been hospitalized for a heart attack and had not gone to any kind of outpatient rehabilitation after leaving the hospital. All participants with heart disease took aspirin daily or every other day. They had also all been diagnosed with angina or coronary heart disease. None of the study participants with heart disease had a history of a stroke.

#### **Section IV: Prescription Medication History**

While 100% of study participants have been diagnosed with asthma, diabetes, high blood pressure, high cholesterol, or heart disease, only 19.7% of study participants were taking a prescription medication to help control these conditions. Prescription medications reported included Advair, Albuterol Inhaler, Amaryl, Avandia, Combivent, Glipizide, Glyburide, Hctz, Humalin, Lantus, Metformin, Norvasc, and Verapamil. Of the 84 study participants who were taking prescription medications for chronic conditions, 10.7% (n=9) felt that their prescriptions were reasonably priced; 89.3% (n=75) thought their prescriptions cost too much. In the past year, 10.3% of study participants spent \$8 -\$16 monthly on prescription medication; the other 89.7% of study

participants reported no monthly expense for medication because they were unable to fill due to cost.

### **Monthly Costs of Prescription Medications**

Also in the past year, the maximum reported amount paid for a prescription was \$45; most often the maximum reported cost was \$10 or less. Furthermore, 86.2% went without medication because they could not afford it. In the past year, 42.4% split pills or alternated days to make a prescription last longer, 80.8% borrowed money to pay for prescription medication, and 96.3% had to choose between paying for prescription medication or taking care of other responsibilities like food, clothing, shelter, and utility bills. Likewise, 76.8% of study participants had family members share their prescription medications with them and 37.5% reported to have shared their prescription medication with others including family members, friends and cellmates. In the past year, 80.8% told a health professional that they were not taking a prescription medication because they could not afford. Lastly, in the past year, 79.6% received samples from a health care professional after telling them that they could not afford a prescription and 14.1% had a health professional tell them about a program for cheaper prescription medication. These 14.1% of the study participants were referred to social services or the program available at the host community health center.

### **Section V: Attitudes about Health and Health Care**

Each patient was asked about their opinion on four statements regarding their own health and health care. The first statement read “(Do you feel) You are healthy enough that you don’t need health insurance. (?)” Participant responses were 58.1% strongly disagree, 22.2% disagree, 14.8% not sure, and 4.9% agree. The second statement read

“(Do you feel) Health insurance is not worth the money it costs. (?)” Responses were 21.8% strongly disagree, 5.2% agree, and 73.1% strongly agree. The third statement read “(Do you feel) You are more likely to take risks than the average person. (?)” The responses were 21.8% disagree, 5.2% agree, and 73.1% strongly agree. The fourth statement read “(Do you feel) You can overcome illness without the help from a medically trained person. (?)” Participant responses were 26.9% strongly agree, 24.8% disagree, and 48.2% agree.

### **Section VI: Demographic Information**

Low income and uninsured persons require access to affordable medications. On the Virginia Peninsula and South Hampton Roads, defined sections of Newport News, Suffolk, Portsmouth and Virginia Beach, are homes to a Medically Underserved Population (MUP) whose economic and demographic profiles are consistent with poverty, lack of health insurance, serious health disparities and an inability to purchase much needed medications to manage multiple chronic diseases

Table 1 outlines the demographics of study participants as self-reported at pre-test. Participants were 22.7% Caucasian / White, 61.8% Black / African American, 1.4% Asian, 13.8% Hispanic or Latino of any race, and 0.2% Moroccan. Participant ages range from 19 to 68 with 2.6% less than 20 years old, 17.6% in their twenties, 30.9% in their thirties, 23.2% in their forties, 15.0% in their fifties, and 10.8% in their sixties. Participant mean age was 41.26 years (SD=12.6). Study participants were 20.8% male and 79.2% female. Average participant height was 5'6" with standard deviation of 4" and ranged from 4'11" to 6'3". The average participant weight was 171.10 lbs. with standard deviation of 38.595 lbs. and ranged from 103 lbs. to 316 lbs.

None of the participants had health insurance. Participants reported not having health insurance ranging from three to 16 years with a mean of 6.87 years (SD=2.9). Reasons indicated for not having health insurance were unemployment (20.4%), not working (46.6%), part-time worker (29.0%), and health insurance not offered (4.0%). Reported household annual incomes ranged from \$7,000 to \$19,000 with 28.3% of participants not responding. Employment status was reported as 1.4% working for wages full-time, 42.4% working for wages part-time, 1.2% self-employed, 49.2% out of work for more than one year, 1.4% out of work for less than one year, and 4.4% unemployed. Participants found out about health issues from their doctor (20.6%), magazines / books (2.6%), church programs (56.9%), television / radio / newspaper (33.5%), and family / friends (44.0%).

Marital status of study participants was 24.8% married, 41.0% divorced, 5.2% widowed, 23.7% single, and 5.4% member of an unmarried couple. The highest grade or year in school completed was 24.8% elementary (grades 1-8), 41.0% some high school (grades 9-11), 12.6% high school diploma or GED, and 21.5% technical school / some college. The total number of people in participant households, including the participant, averaged 5.6 persons with standard deviation of 1.7 and ranged from 3 people per household to 12 people per household. A majority of study participants (52.7%) were responsible for one or more children. A majority of study participants (58.1%) had a positive social support system in their lives. Wives, daughters, sons, live-in boyfriends, and parole officers were all named as social / emotional support providers (Table 1).

Table 1

## Self-Reported Demographics of Full Study Participants at Baseline (N=427)

<b>Demographics</b>	<b>N</b>	<b>%</b>
<b>Gender</b>		
Male	89	20.8
Female	338	79.2
<b>Age (M=41.26; SD=12.6)</b>		
18-39	218	51.1
40-64	202	47.3
65 and older	7	.16
<b>Race</b>		
Caucasian	97	22.7
African American	264	61.8
Hispanic / Latino	59	13.8
Asian	6	1.4
Other	1	0.2
<b>Marital Status</b>		
Not Married	321	75.3
<b>Annual Household Income</b>		
No Income	306	71.7
Less than \$20,000	121	28.3
<b>Past 12 months health services use</b>		
Had ED Visit in Past 12 months	282	66.0
Hospitalized in Past 12 months	60	14.1
<b>Employment Status</b>		
Unemployed	235	55.0
<b>Insurance Status</b>		
Uninsured	427	100
<b>Household Size (M=5.57; SD=1.74)</b>		
3 – 4	104	24.4
5 – 6	219	51.2
7 or more	104	24.4
<b>Body Mass Index</b>		
Normal	175	41.0
Overweight / Obese	252	59.0
<b>Education</b>		
Less than HS Diploma	181	65.8
HS Diploma / GED / Tech School / Some College	146	34.1
<b>Stop-gap Medication Program Eligible</b>	263	61.6
<b>Has Positive Social Support</b>	248	58.1
<b>No Regular Source of Care</b>	427	100
<b>Health Status</b>		
Very Good / Good	127	29.8
Fair	151	35.4
<b>Two or More Disease States</b>	149	34.9

### **Baseline Medical Records Review**

For the baseline medical records review (BMRR) each participant's height and weight were recorded and body mass index (BMI) was calculated; participant BMIs averaged 27.5 with a standard deviation of 6.0. Participants were categorized as 41.0% normal, 29.0% overweight and 30.0% obese where a BMI of 18.5 – 24.9 was considered normal, 25.0 – 29.9 was considered overweight and 30.0 and above was considered obese (Prentice & Jebb, 2001; Mei et al., 2002). Providers diagnosed 21 participants with asthma (4.9%), 298 participants with diabetes (69.8%), 21 participants with heart conditions (4.9%), 298 participants with hypertension (69.8%), and 86 participants with hyperlipidemia (20.1%). Blood glucose serum level was established by a clinician for 291 participants with a mean of 265.10 (SD=84.38). Of these participants 72.9% had a high blood glucose serum level defined as blood glucose level of 200 or higher (National Diabetes Statistics, 2007; National Health Interview Survey, 2007). Systolic and diastolic readings were taken and recorded by a clinician for 367 study participants (85.9%) with a mean systolic reading of 186.71 (SD=22.63), and mean diastolic reading of 102.39 (SD=18.21). Of these participants all 367 had high blood pressure defined as a systolic reading of 140 or higher or a diastolic reading of 90 or higher (American Heart Association, 2006; NCHS, 2006). Clinicians established total cholesterol level for 87 participants with a mean total cholesterol reading of 299.14 (SD=49.54). Of these participants all 87 had high cholesterol defined as total cholesterol level 200 and over (American Heart Association, 2007; NCHS, 2006; CDC, 2003; National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, 2002; Third Report of the National Cholesterol Education

Program, 2001; *Healthy People 2010*, 2000; Cohen, 1997). The prescription medications reported in the BMRR were as follows: Actos, Advair, Amaryl, Atenolol, Avandia, Benicar, Berapamil, Cartia, Clonidin, Combivent, Furosemide, Glipizide, Glyburide, Hydrochlorothiazide (HCTZ), Humalin, Isosorbide, Lantus, Lipitor, Lisinopril, Metformin, Niaspan, Nifedipine, Norvasc, Singulair, Toprol, Triamter, Verapamil, Zetia, and Zocor. Initially, when the stop-gap medication program was made available to the host CHC, seven medications were available for three chronic conditions (Table 2). After 90 days in operation, the formulary was expanded to offer medications for five chronic conditions (Table 3). The medication formulary available from the stop-gap prescription medication program remained limited to some degree by condition and type of medication.



**Table 2****Original Stop-Gap Prescription Medication Program Formulary**

<b>Condition</b>	<b>Prescription Medication Available</b>
<b>Asthma</b>	Singulair Chewable Singulair
<b>Hyperlipidemia</b>	Zocor
<b>Hypertension</b>	Cozaar Hyzaar

**Table 3****Current Stop-Gap Prescription Medication Program Formulary**

<b>Condition – Asthma</b>	<b>Condition – Hypertension</b>
Proventil MDI (Albuterol)	Capoten (Captopril)
Ventolin MDI	Prinivil (Lisinopril)
Theo-Dur Tablets	Prinzide (Lisinopril / HCTZ)
Prednisone	Zestril (Lisinopril)
Singulair Chewable	Zestoretic (Lisinopril / HCTZ)
Singulair	Inderal (Propranolol)
	Lopressor (Metoprolol)
<b>Condition – Cardiovascular Health</b>	Tenormin (Atenolol)
Coumadin Tablets (Warfarin)	Diltiazem
Persantine (Dipyridamole)	Diltiazem Sustained Release
Enteric Aspirin Tablets	Verapamil Long Acting
Lanoxin Tablets (Digoxin)	Procardia XL (Nifedipine ER)
Imdur (Isosorbide Mononitrate)	Aldactone (Spirolactone)
Isordil (Isosorbide Dinitrate)	Hydrochlorthiazide (HCTZ)
Nitrostat SL 0.4mg Tablets	Lasix (Furosemide)
Nitro-Dur Patch	Maxzide (Triamterene / HCTZ)
	Potassium KCL Tablets
<b>Condition – Diabetes</b>	Catapres (Clonidine) Tablets
Diabeta (Glyburide)	Cardura (Doxazosin)
Glucophage (Metformin)	Apresoline (Hydralazine)
Glucotrol (Glipizide)	Metoprolol
Glucotrol XL (Glipizide)	Cozaar
Diabinese (Chlorpropamide)	Hyzaar
Humalog	
Humulin 70/30	<b>Condition - Hyperlipidemia</b>
Humulin L	Lopid (Gemfibrozil)
Humulin N	Mevacor (Lovastatin)
Humulin R	Gemfibrozil
Humulin U	Zocor
Lantus	
Glipizide ER	
Repaglinide (Prandin)	
Pioglitazone (Actos)	
Glyburide (Micronized)	

Physician directions after the baseline visit included instructions on smoking cessation, behavioral medication compliance, diet modification, testing blood sugar, case management services, and referrals for the electrocardiogram. Physician referrals after the baseline visit included referral consultation to the Adult Case Manager, the Medical College of Virginia, the Hampton and Newport News Community Services Board; and specific medical consultations for the following procedures: electrocardiogram, health education session for chronic disease management, lung test, and respiratory evaluation.

### **Three Month Follow-Up Health Assessment**

#### **Section I: Physician Diagnosis**

The host community health center has an informal policy where personnel are encouraged to have patients take ownership of their health. For this purpose, there was a survey item on the three month follow-up that required participant to self-report the physician diagnosis they received at the initial visit. By implementing this question on the tool, it aligned with the host CHC's guidelines on patients knowing their conditions as part of the role they must play in their own health maintenance. For the purpose of consistent reporting, the medical record was used to collect the data required for this line item. Specifically, the completed encounter form is for the initial visit where the physician denotes the diagnosed conditions and all other encounters for the visits, including labs, directives, and referrals was used for this portion of the assessment.

#### **Section II: Prescription Medication History**

All study participants were given at least one prescription to fill at their initial visit. The stop-gap prescription medication program administrators at the Pharmacy Care of Hampton Roads rated 263 study participants (61.6%) as qualifying for the program.

Those participants who did not qualify for the stop-gap prescription medication program were ineligible because either one or none of their prescribed medications were available on the stop-gap formulary. Participants who did not qualify for stop-gap prescription medication did not fill their prescriptions. Of the participants who qualified for stop-gap prescription medications, 92.4% were able to get all of their prescription medications through stop-gap prescription medication program. Study participants who qualified for stop-gap prescription medications spent between \$3 and \$15 monthly during the past 90 days on prescription medications with a mean cost of \$8.76 (SD=\$3.22) spent monthly. Of the participants who qualified for stop-gap prescription medications, only 5 still thought their current medications cost too much. There was no cost for stop-gap medications; patients paid only a \$3 administrative fee per prescription per one month's supply. The most that study participants who qualified for stop-gap prescription medications spent on one prescription was \$3 (93.5%), \$6 (1.5%), or \$9 (4.9%) with a mean of \$3.34 (SD=\$1.34).

Table 4 reports the prescription history at the initial health assessment and again at the 90day follow-up of those patients who were stop-gap eligible. Of the overall respondents, at follow-up they reported the following: 38.4% had not filled a prescription because they did not have the money; 37.2% of study participants had shared their prescription medication with other people; 9.1% had other people share their prescription medication with them. Also, 16.4% went without medication for a chronic condition such as asthma, diabetes, heart conditions, high blood pressure, or high cholesterol because they could not afford it, 4.0% split pills or alternated days to make a prescription last longer, and 56.9% of study participants borrowed money to pay for their prescription.

Furthermore, 19.4% told a health professional that they were not taking a prescription medication because they could not afford it, 14.3% received samples from a health care professional (doctor or nurse) after telling them that they could not afford a prescription, and 98.8% of study participants had a health professional (doctor or nurse) tell them about any program where they could possibly get cheaper prescription medications. Study participants did not indicate being told about a program other than the in-house pharmacy program at the host CHC for cheaper prescription medications.

**Table 4****Prescription History Among Stop-Gap Eligible Participants (N=263)**

<b>Prescription History Variable</b>	<b>Pre n</b>	<b>%</b>	<b>Post n</b>	<b>%</b>
Did not have money	205	77.9	5	1.9
Shared with others	74	28.1	154	58.6
Others shared with them	198	75.3	5	1.9
Could not afford	224	85.2	5	1.9
Split pills or alternated days	118	44.9	0	0
Borrowed money	206	78.3	142	54.0
Other responsibilities	252	95.8	5	1.9
Reported to provider	204	77.6	17	6.5
Received samples	204	77.6	12	4.6
Cheaper programs	43	16.3	258	98.1

### **Section III: Perception of Health Status / Quality of Life**

At post-test when participants rated their overall health, 4.4% rated it as excellent, 55.3% rated it as very good, 5.9% rated it as good, 16.6% rated it as fair, and 17.8% rated it as poor. Self-reported health status at the initial health assessment when compared to the follow-up health assessment was impacted by stop-gap eligibility. Among the 263 patients in stop-gap eligible group, 99 (37.6%) respondents reported their health status as poor at baseline, at follow-up there were no reports of poor health status; 85 (32.3%) respondents reported a fair health status at baseline, at follow-up only 7 (2.7%) respondents reported a fair health status; 70 patients (26.6%) reported their health status as good, at follow-up 5 (1.9%) reported their health status as good; at baseline, 9 (3.4%) respondents reported their health status as very good, and at follow-up 234 (89.0%) reported their health status as very good; and lastly, as baseline no respondents reported their health status as excellent, at follow-up 17 (6.5%) reported their health status as excellent. In regards to a participant's physical health, which includes physical illness and injury, in the past 30 days, participants averaged 2.12 days of poor physical health with a standard deviation of 4.33 days. Only 28.6% of study participants had at least one day of poor physical health. In regard to a participant's mental health, which includes stress, depression, and problems with emotions, in the past 30 days, participants averaged one day (SD=2.99) of poor mental health. Only 15.9% had one or more days of poor mental health. Also in the past 30 days, 75.4% of participants had zero days during which poor physical or mental health kept them from completing their usual activities, such as self-care, work or recreation. Participants averaged 2.22 days (SD=5.10) during which their physical or mental health impeded their ability to do their usual activities.

#### **Section IV: Health Care Utilization History**

In the past three months, only 1.4% of study participants had a time when they needed to see a doctor but could not due to the cost. In the past three months, five participants saw a specialty care doctor; this was a behavioral medicine specialist for all five. None of the study participants were hospitalized during the past three months. Only 11 participants had been to the ED for care for themselves in the past three months; reasons included breathing and blood sugar problems. All 427 participants indicated that they plan to make the host CHC their primary care medical home, reasons by ranking were low cost (51.5%), good service (24.6%), close proximity (10.1%), medication availability (6.3%), doctor-medication combined at one place (6.3%), and effectiveness (1.2%).

#### **Follow-up Medical Records Review**

At the follow-up visit, clinicians did not record participant weight or height. Providers diagnosed 25 participants with asthma (5.9%), 321 participants with diabetes (75.2%), 23 participants with heart conditions (5.4%), 393 participants with high blood pressure (92.0%), and 105 participants with high cholesterol (24.6%). Blood glucose serum level was established by a clinician for 342 participants (80.1%) with a mean of 212.62 (SD=78.52). Of these participants, 50.6% had a high blood glucose serum level. Systolic and diastolic readings were taken and recorded by a clinician for 58 participants (86.4%) with a mean systolic reading of 167.11, (SD=22.79) and a mean diastolic reading of 89.63 (SD=10.26). Of these participants, 97.3% had high blood pressure. A clinician recorded the total cholesterol level for 86 participants with a mean total cholesterol reading of 290.13 (SD=56.80). Of these participants 97.7% had high cholesterol.



Clinicians reported the total number of telephone encounters with participants during the three months between the initial and follow-up assessments: 55.5% had none, 11.2% had one, 15.2% had two, and 18.0% had three. The average number telephone encounters was 0.96 with a standard deviation of 1.19 calls. Self-reported reasons for the telephone encounters included shortness of breath, dizziness, headache, nausea, blackout, not feeling well, returning a call, general check-up, medication check, medication need, behavioral medication need, appointment scheduling, and Community Services Board appointment scheduling. Also during the three months between the initial and follow-up assessments: 23.9% had a physician or nurse triage visit, 6.3% had a specialty care visit, 6.6% had an ED visit, and no one was admitted to a hospital. Reasons recorded for the physician or nurse triage visit include high blood sugar, chest tightness, continuous headaches, nausea, and vital signs. All of the specialty care visits were for behavioral medications. ED visits were for blackouts, blood in the stool, blood sugar levels, headaches, nausea, problems urinating, and shortness of breath.

### **Data Analysis**

#### **Main Research Question**

To what extent is the Andersen Behavioral Model of Health Services Use able to identify the greatest predictor of outcomes among predisposing characteristics, enabling resources, need, personal health practices, use of health services, perceived health status and evaluated health status among uninsured patients who are managing physician-diagnosed chronic conditions with prescription medications at the community health center level?

## Population Characteristics

**Predisposing Characteristics.** After running the frequencies and other descriptive statistics for all items in the four collection tools, new variables were created and some variables recoded for further analysis. The predisposing variable race was reported as Caucasian (22.7%), African American (61.8%), Hispanic or Latino of any race (13.8%), Asian (1.4%) and other (0.2%); then regrouped as predominantly Caucasian (24.4%), African American (61.8%), and Hispanic or Latino of any race (13.8%). A participant's employment status was regrouped as not working (55.0%) and working (45.0%); working was defined to include working for wages, working for wages part-time, and self-employment.

Table 5 gives the frequency table and the histogram for the attitudes about health and health care sum scores of the 427 study participants. Responses were generated from a five point Likert scale. The higher the summary score in this section to measure attitude, the more likely the patient is to have more unnecessary health care visits during the follow-up period and a more negative attitude. The necessity of the third statement, "(Do you feel) You are more likely to take risks than the average person. (?)" was questioned but was found to be necessary for reliability of the instrument, as Cronbach's alpha for the four statements was 0.786. The five possible responses to each item were assigned the following values: 1 – Strongly Disagree, 2 – Disagree, 3 – Not Sure, 4 – Agree, and 5 – Strongly Agree. The sum of each patient's opinions to the four statements was computed and stored in a variable called Sum-Attitude. A sum-attitude score of zero corresponded to a patient who strongly disagreed to each of the four statements equating to a more positive attitude. This patient strongly felt they were unhealthy enough to need

health insurance, that health insurance was worth the money it costs, they were not likely to take more risks than the average person, and they needed help from trained medical personal to overcome illness. A Sum-Attitude score of 20 corresponded to a patient who strongly agreed to each of the four statements. This patient strongly felt that they did not need health insurance, health insurance was not worth the money it costs, they were more likely to take risks than the average person, and they could overcome illness without help from a medically trained person.

**Table 5****Attitudes about Health and Health Care Sum Score Frequency Table**

<b>Attitudes about Health and Health Care Sum Score</b>	<b>N</b>	<b>%</b>
<b>5, Most Negative Attitude</b>	54	12.6
<b>6</b>	33	7.7
<b>7</b>	6	1.4
<b>11</b>	16	3.7
<b>13</b>	50	11.7
<b>14</b>	50	11.7
<b>15</b>	130	30.4
<b>16</b>	50	11.7
<b>17</b>	33	7.7
<b>18, Most Positive Attitude</b>	5	1.2
<b>Total</b>	427	100.0

**Enabling Resources.** A participant's insurance status was further defined by the length of time they had been without health insurance; 42.9% of study participants had been without insurance for 0 – 5 years and 57.1% had been without health insurance for more than five years. The enabling resource of whether or not a participant had a regular medical home was also not usable for analysis because none of the study participants had a regular medical home. Household size was grouped into three groups: 3 – 4 people (24.4%), 5 – 6 people (51.3%) and 7 or more people (24.4%). A participant's marital status was recoded as married or not married with 24.8% as married and 75.2% as not married. The enabling resource of education was grouped as less than high school (65.8%), high school diploma or GED (12.6%), and some college or technical school (21.5%). The enabling resource main variable of interest was a patient's stop-gap eligibility and 61.6% (n=263) of the respondents were eligible.

**Need.** A participant's need was measured by the self-reported health status and the self-reported disease state captured at the initial health assessment. Self-reported health status was grouped as very good / good (29.7%), fair (35.4%) and poor (34.9%). Self-reported disease state was measured as the number of patient-reported chronic diseases and grouped as 0-1 (63.2%) and 2 or more (36.8%).

### **Health Behavior**

Two main sets of outcome variables were used in analysis: health behavior (personal health practices and use of health services) and outcomes (perceived health status and evaluated health status). Use of health services included whether or not a patient had a telephone encounter, physician / nurse triage visit, specialty care visit, or ED visit during the three months between initial patient assessment and follow-up visit.

Personal health practice was measured by a series of questions in Section IV of the initial patient assessment on prescription history. At baseline, overall respondents reported that in the past year, 78.7% had not filled a prescription because you did not have the money; 37.5% had shared their prescription with other people; 76.8% had other people shared their prescription medication with them; 86.2% had gone without medication for a chronic condition such as asthma, diabetes, heart conditions, high blood pressure or high cholesterol because they could not afford it; 42.4% had split pills or alternated days to make a prescription last longer; 80.8% had borrowed money to pay for a prescription; 80.8% had told a health professional that you were not taking a prescription medication because you could not afford it; and 79.6% had received samples from a health care professional (doctor or nurse) after telling them that they could not afford a prescription.

### **Outcomes**

Perceived health status and evaluated health status at the 90-day follow-up were the outcomes. Provider diagnosed disease state was measured as the number of provider diagnosed chronic diseases and grouped as 0-1 (28.3%) and 2 or more (71.7%). After the initial clinical visit, 5.9% (n=25) received a physician's diagnosis of asthma; 75.2% (n=321) for diabetes; 5.4% (n=23) for heart condition; 24.6% (n=105) for high cholesterol and 92% (n=393) for high blood pressure. Clinical outcomes that were examined for improvement at follow-up were high cholesterol, high blood pressure and high blood glucose.

### **Results of Bivariate Hypotheses**

The first series of chi-square analyses were conducted between the predisposing, enabling, and need variables and health care utilization variables; the results are

summarized in Tables 6 and 7. A participant's race, prior hospitalization, income level, marital status, education, and stop-gap eligibility were significantly associated with telephone encounters at the 5% significance level. Also, for prescription medication history, a health behavior, whether or not a patient had shared their own prescription medication and whether or not a patient had borrowed money to pay for a prescription were significantly associated with telephone encounters. A participant's race, prior hospitalization, insurance status, income level, social / emotional support, employment, stop-gap eligibility, self-reported disease state, and provider-reported disease state were significantly associated with physician / nurse triage visits. Also, for prescription medication history, whether or not the patient did not have the money to fill a prescription and whether or not a patient had split pills or alternated days were significantly associated with physician / nurse triage visits. Whether or not the participant had received prescription samples was the only predictor that was significantly associated with specialty care visits. A participant's race, stop-gap eligibility, whether or not the participant did not have the money to fill a prescription, and self-reported health status were significantly associated with ED visits. Note that a patient's stop-gap eligibility was only not significantly associated with specialty care visits. Participants who were not eligible for stop-gap medications were more likely to have a telephone encounter, physician / nurse triage visit and ED visit than participants who were eligible for stop-gap medications.

Table 6

**P-Values for Pearson's Chi-square Test of Independence for Population Characteristics**

Independent Variable	p-Value Dependent Variable			
	Telephone Encounter	Physician / Nurse Triage Visit	Specialty Care Visit	ED Visit
<b>Predisposing Characteristics</b>				
Gender	.533	.113	.099	.065
Race	<0.001	<0.001	.152	<0.001
Marital Status	.018	.216	.826	.239
Prior ED Visit	.051	.745	.080	.839
Prior Hospitalization	<0.001	<0.001	.906	.099
Prior Specialty Care	.212	.279	.519	.859
Employment	.502	.017	.098	.580
<b>Enabling Resources</b>				
Insurance Status	.500	.014	.528	.429
Income Level	.005	.002	.988	.129
Household Size	.099	.277	.137	.086
Education	.048	.129	.875	.579
Stop-Gap Eligibility	<0.001	<0.001	.505	<0.001
Social/Emotional Support	.210	.014	.898	.770
<b>Need</b>				
Health Status	.246	.356	.915	.009
Disease State	.100	<0.001	.658	.273
Provider-Diagnosed Disease State	.539	.007	.242	.401



Table 7

## P-Values for Pearson's Chi-square Test of Independence for Health Behavior

Independent Variable	p-Value			
	Telephone Encounter	Physician / Nurse Triage Visit	Specialty Care Visit	ED Visit
Did not have money	.553	.007	.545	.004
Shared with others	<0.001	.361	.962	.158
Others shared with them	.254	.206	.287	.248
Could not afford	.078	.104	.877	.941
Split pills or alternated days	.282	<0.001	.532	.399
Borrowed money	.019	.059	.054	.072
Reported to provider	.713	.786	.155	.193
Received samples	.755	.504	.026	.110

The second series of chi-square analyses was conducted between the predisposing, enabling and need variables and clinical outcomes; results are summarized in Tables 8 and 9. High cholesterol at the follow-up visit was not significantly associated with any predictor, even stop-gap eligibility. High blood glucose at the follow-up visit was significantly associated with a participant's race, prior hospital visit, prior specialty care, insurance status, income level, social / emotional support, employment, household size, marital status, education, stop-gap eligibility, high blood glucose at baseline, and self-reported health status. Also, for prescription medication history, whether or not a participant had other people to share prescriptions with them, whether or not a participant could not afford prescriptions for a chronic condition, whether or not a participant told a health professional he/she could not afford a prescription, and whether or not a participant had received prescription samples were significantly associated with high blood glucose at a participant's follow-up visit. Similar to high cholesterol, high blood pressure at the follow-up visit was not significantly associated with any predictor at the 5% level.

Table 8

**P-Values for Pearson's Chi-Square for Clinical Outcomes and Population Characteristics**

Independent Variable	p-Value		
	Dependent Variable		
Predisposing Characteristics	Follow-up High Cholesterol	Follow-up High Blood Glucose	Follow-up High Blood Pressure
Gender	.759	.373	.628
Race	.626	<0.001	.124
Marital Status	.839	.014	.769
Prior ED Visit	.732	.122	.699
Prior Hospitalization	.722	.010	.757
Prior Specialty Care	.625	<0.001	.860
Employment	.511	.003	.733
<b>Enabling Resources</b>			
Insurance Status	.622	.002	.258
Income Level	.673	.030	.487
Household Size	.557	.001	.681
Education	.307	<0.001	.093
Stop-gap Eligibility	.594	.007	.466
Social/Emotional Support	.622	.241	.446
<b>Need</b>			
High Clinical* Outcome at Initial Health Assessment	-	<0.001	-
Health Status	.491	<0.001	.825
Disease State	.813	.358	.806
Provider-Diagnosed Disease State	.277	.101	.275

**Table 9****P-Values for Pearson's Chi-Square for Clinical Outcomes and Health Behavior**

<b>Independent Variable</b>	<b>p-Value</b>		
	<b>Follow-up High Cholesterol</b>	<b>Follow-up High Blood Glucose</b>	<b>Follow-up High Blood Pressure</b>
Did not have money	.584	.449	.474
Shared with others	.650	.151	.777
Others shared with them	.191	<0.001	.772
Could not afford	-	.027	.723
Split pills or alternated days	.622	.771	.461
Borrowed money	.722	.022	.474
Reported to provider	.307	<0.001	.945
Received samples	.307	<0.001	.864

### **Results for Multivariate Hypotheses**

Research Question: to what extent does the Andersen model predict the number of triage telephone encounters, the number of triage visits, and the number of physician visits during a 90 day follow-up period among urban patients that are uninsured and managing physician-diagnosed chronic conditions with prescription medications in the community health center setting?

A series of logistic regression models based on the model was applied to two groups of outcome variables: health behavior and use of health services between initial patient assessment and follow-up and patient clinical outcomes at follow-up. Every predictor variable for the constructs of predisposing characteristics, enabling resources and need that had a chi-square p-value  $< .250$  was included in the logistic regression models reported in Tables 6, 7, 8 and 9.

The analysis from the best selected model in Tables 10, 11 and 12 show that only six variables were significant in determining whether or not a participant had a triage telephone encounter between initial assessment and follow-up visit. The eligibility for stop-gap prescription medication, pre-test self reported health status, marital status, education level, whether or not a person had borrowed money to pay for prescription medication and information provided by health professional about prescription medication were the key variables to determine the triage telephone encounter.

Patients who self-reported poor health was more likely to have telephone encounter. A person with poor health was 71 times more likely to have a triage telephone encounter than the participant who self-reported excellent health; additionally, this patient was 100% more likely to have a triage telephone encounter than the patient who

self-reported good health. A patient with less than a high school diploma or GED was 11 times more likely to have telephone encounter than the person who has a high school education or GED. A patient who had borrowed money in the past 12 months to pay for prescription medication was eight times more likely to have triage telephone encounter than the person who had not borrowed money. A patient who had been told by a health professional in the past 12 months about programs where they could possibly get cheaper prescription medication was 26 times more likely to get have a triage telephone encounter calls than the person who had not been told about such programs.

Table 10

**Logistic Regression Model for Triage Telephone Encounters for Population Characteristics**

<b>Predisposing Characteristics</b>	<b>Estimate</b>	<b>Odds Ratio e<sup>B</sup></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
Male	0.124	1.28	0.393 – 4.172	0.301	0.682
Age Range 18-29 years	-0.983	0.326	0.019 – 5.631	0.751	0.191
Age Range 41-50 years	-0.102	0.787	0.054 – 11.388	0.637	0.873
Age Range 51-64 years	0.947	2.245	0.228 – 22.068	0.604	0.117
Currently Not Married No Past 12 months	-2.113	0.015	0.001 – 0.27	0.744	0.005
Health Services Use	0.566	3.101	0.638 – 15.08	0.404	0.161
Currently unemployed	-1.189	0.093	0.01 – 0.858	0.568	0.036
Attitude	-0.173	0.841	0.592 – 1.195	0.179	0.334
<b>Enabling Factors</b>					
Less than High School Diploma / GED	1.197	10.961	0.131 – 917.649	1.13	0.289
Not Stop-gap Eligible	-2.795	0.004	0.001 – 0.022	0.449	<0.001
<b>Need</b>					
Pre-test Self-reported health status as Very Good	-1.071	0.046	0.001 – 6.397	1.366	0.433
Pre-test Self-reported health status as Good	0.917	0.335	0.022 – 5.059	0.827	0.267
Pre-test Self-reported health status as Fair	-1.859	0.021	0.001 – 1.233	1.017	0.068
Pre-test Self-reported 2 or more Disease states	-0.638	0.279	0.012 – 6.238	0.793	0.421

Note: Full model statistic:  $\chi^2(24) = 236.430$ ; Nagelkerke pseudo  $R^2 = .653$ ; Goodness of fit:  $\chi^2(8) = 13.640$ ,  $p = .092$ ; Reduced model statistic:  $\chi^2(8) = 223.481$ ; Nagelkerke pseudo  $R^2 = .602$ ; Goodness of fit:  $\chi^2(8) = 6.411$ ,  $p = .493$ .

**Table 11****Logistic Regression Model for Triage Telephone Encounters for Health Behavior**

<b>Prescription History</b>	<b>Estimate</b>	<b>Odds Ratio e<sup>B</sup></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
Did not have money	0.165	1.391	0.355 – 5.454	0.349	0.636
Borrowed money	1.032	7.878	1.095 – 56.67	0.503	0.040
Could not afford	-0.541	0.339	0.035 – 3.290	0.580	0.351
Cheaper programs	1.623	25.660	3.315 – 198.65	0.522	0.002
<b>Use of Health Services</b>					
Encounters During Follow-up Period	-0.070	0.870	0.156 – 4.84	0.438	0.870

Note: Full model statistic:  $\chi^2(24) = 236.430$ ; Nagelkerke pseudo  $R^2 = .653$ ; Goodness of fit:  $\chi^2(8) = 13.640$ ,  $p = .092$ ; Reduced model statistic:  $\chi^2(8) = 223.481$ ; Nagelkerke pseudo  $R^2 = .602$ ; Goodness of fit:  $\chi^2(8) = 6.411$ ,  $p = .493$ .



**Table 12****Logistic Regression Model for Triage Telephone Encounters for Outcomes**

<b>Independent Variable</b>	<b>Dependent Variable</b>				
	<b>Estimate</b>	<b>Odds Ratio e<sup>B</sup></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
<b>Evaluated health Status</b>					
Improved Blood Glucose at Post-test	-0.074	0.863	0.144 – 5.157	0.456	0.872
Improved Systolic Blood Pressure at Post-test	0.270	1.715	0.3 – 9.818	0.445	0.545
Improved Diastolic Blood Pressure at Post-test	-0.659	0.268	0.042 – 1.685	0.470	0.160

Note: Full model statistic:  $\chi^2(24) = 236.430$ ; Nagelkerke pseudo  $R^2 = .653$ ; Goodness of fit:  $\chi^2(8) = 13.640$ ,  $p = .092$ ; Reduced model statistic:  $\chi^2(8) = 223.481$ ; Nagelkerke pseudo  $R^2 = .602$ ; Goodness of fit:  $\chi^2(8) = 6.411$ ,  $p = .493$ .

Tables 13 and 14 show the full model and reduced model for ED visit analysis. The analysis shows that only four variables are significant in determining ED visit during the three months between initial assessment and follow up visits. The eligibility for stop-gap prescription, education level, whether or not a person had borrowed money to pay for prescription medication, and use of health services are the significant variables to determine the ED visit.

A patient who was not eligible for stop-gap prescription medication was 34 times more likely to have an ED visit than a patient who was eligible for stop-gap prescription medication. A patient who was more educated (more than HS diploma) was nine times more likely to have an ED visit than the patient who had not graduated from high school nor had a GED. A patient who had borrowed money in the past 12 months to pay for prescription medications was 6.3 times more likely to visit the ED for care than the patient who had not borrowed money. The patient who had one or more ED visits, specialty care visits or a hospital admission before follow-up was seven times more likely to visit the ED for care than the patient who had not before follow up.

Table 13

## Logistic Regression Full Model for One or More ED Visits

Variable	Estimate	Odds Ratio $e^B$	95% CI	B (SE)	p-value
<b>POPULATION CHARACTERISTICS</b>					
<b>Predisposing Characteristics</b>					
Male	-0.880	0.172	0.012 – 2.457	0.679	0.195
No Use past 12 months	0.498	2.707	0.642 – 11.418	0.367	0.175
Currently unemployed	0.453	2.475	0.228 – 26.879	0.609	0.457
Attitude	0.182	1.199	0.633 – 2.273	0.326	0.578
<b>Enabling Factors</b>					
Less than HS Diploma	-1.823	0.026	0.001 – 0.497	0.752	0.015
Stop-gap Eligible	-1.70	0.033	0.003 – 0.336	0.589	0.004
Two or more Disease States	0.326	1.920	0.17 – 21.671	0.618	0.598
<b>HEALTH BEHAVIOR</b>					
<b>Prescription History</b>					
Did not have money	-0.184	0.692	0.054 – 8.920	0.652	0.778
Borrowed money	1.590	24.032	1.528 – 378.027	0.703	0.024
Cheaper programs	-1.116	0.107	0.01 – 1.149	0.605	0.065

Note: Full model statistic:  $\chi^2(21) = 111.345$ ; Nagelkerke pseudo  $R^2 = .460$ ; Goodness of fit:  $\chi^2(8) = 19.792, p = .011$ .

Table 14

## Logistic Regression Reduced Model for One or More ED Visits

Variable	Estimate	Odds Ratio $e^B$	95% CI	B (SE)	p-value
<b>POPULATION CHARACTERISTICS</b>					
<b>Enabling Factors</b>					
Less than High School Diploma / GED	-1.823	0.026	0.001 – 0.497	0.752	0.015
Stop-gap Eligible	-1.700	0.033	0.003 – 0.336	0.589	0.004
<b>HEALTH BEHAVIOR</b>					
<b>Prescription History</b>					
Borrowed money	1.590	24.032	1.528 – 378.027	0.703	0.024

Note: Reduced model statistic:  $\chi^2(4) = 134.124$ ; Nagelkerke pseudo  $R^2 = .376$ ; Goodness of fit:  $\chi^2(4) = 1.227, p = .874$

Tables 15, 16 and 17 show the full model for the analysis of physician or nurse triage visit.

Table 15

**Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Population Characteristics**

Variable	Estimate	Odds Ratio $e^B$	95% CI	B (SE)	p-value
<b>Predisposing Characteristics</b>					
Gender – Male	-1.040	0.125	0.033 – 0.474	0.34	0.002
Age Range 18-29 years	-1.505	0.092	0.006 – 1.326	0.729	0.039
Age Range 41-50 years	-0.177	0.349	0.037 – 3.302	0.482	0.713
Age Range 51-64 years	0.806	0.933	0.104 – 8.362	0.535	0.132
Currently Not Married	-1.593	0.041	0.005 – 0.347	0.542	0.003
No Past 12 months Health Services Use	0.133	1.304	0.354 – 4.81	0.333	0.690
Currently unemployed	0.146	1.338	0.194 – 9.229	0.493	0.767
Attitude	-0.307	0.735	0.573 – 0.943	0.127	0.016
<b>Enabling Factors</b>					
Less than HS Diploma / GED	-1.501	0.05	0.007 – 0.354	0.501	0.003
Stop-gap Eligibility	-2.356	0.009	0.002 – 0.039	0.375	<0.001
Two or more Disease States	-1.272	0.079	0.005 – 1.354	0.726	0.080

Table 16

**Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Health Behavior**

<b>Variable</b>	<b>Estimate</b>	<b>Odds Ratio <math>e^B</math></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
<b>Personal Health Practices</b>					
Did not have money	-0.485	0.379	0.101 – 1.429	0.338	0.152
Borrowed money	1.676	28.558	4.38 – 186.07	0.478	0.001
Reported to provider	-0.469	0.392	0.038 – 4.053	0.596	0.432
Cheaper programs	1.438	17.747	3.144 – 100.163	0.442	0.001
<b>Use of Health Services</b>					
No Encounters During Follow-up Period	0.113	1.255	0.2 – 7.854	0.468	0.809

Table 17

**Logistic Regression Full Model for One or More Physician or Nurse Triage Visits for Outcomes**

<b>Variable</b>	<b>Estimate</b>	<b>Odds Ratio e<sup>B</sup></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
<b>Evaluated health Status</b>					
Improved Blood Glucose at Post-test	-0.336	0.51	0.098 – 2.65	0.420	0.424
Improved Systolic Blood Pressure at Post-test	0.250	1.649	0.414 – 6.574	0.353	0.479
Improved Diastolic Blood Pressure at Post-test	-0.312	0.536	0.092 – 3.133	0.450	0.489



Table 18 shows the reduced model for determining physician/nurse triage visit during the three months between initial assessment and follow up visits. The analysis from the best selected model shows that only seven variables were significant in determining physician/nurse triage visits during the three months between initial assessment and follow up visits.

The eligibility for stop-gap prescription, gender, marital status, education level, whether or not a person had borrowed money to pay for prescription medication, sum score of attitude and information provided by health professional about prescription medication were the significant variables to determine one or more physician's triage visit.

A participant who was not eligible for stop-gap prescription medication was 35 times more likely to have a physician or nurse triage visit than the patient who is eligible for stop-gap prescription medication. Females were 6.5 times more likely to have one or more physician or nurse triage visits compared to males. A married person was 43.5 times more likely to have a physician or nurse triage visit than an unmarried/divorced person. Married females were therefore more likely to have a physician or nurse triage visit. A participant who was more educated (more than HS diploma) was 13.5 times more likely to have one or more physician or nurse triage visits than the participant who had not graduated from high school nor had a GED. A participant who had borrowed money in the past 12 months to pay for prescription medication was seven times more likely to have a physician or nurse triage visit than the person who had not borrowed money. A participant who had been told by a health professional about programs where they could

possibly receive cheaper prescription medications was 12 times more likely to have a physician or nurse triage visit than the participant who had not been told about such programs.

**Table 18****Logistic Regression Reduced Model for One or More Physician or Nurse Triage Visits**

<b>Variable</b>	<b>Estimate</b>	<b>Odds Ratio <math>e^B</math></b>	<b>95% CI</b>	<b>B (SE)</b>	<b>p-value</b>
<b>POPULATION CHARACTERISTICS</b>					
Gender – Male	-0.934	0.154	0.047 – 0.509	0.304	0.002
Not Married	-1.885	0.023	0.006 – 0.091	0.350	<0.001
Attitude	-0.320	0.726	0.615 – 0.857	0.085	<0.001
Less than HS Diploma	-1.304	0.074	0.017 – 0.324	0.378	<0.001
Stop-gap Eligible	-1.793	0.028	0.009 – 0.081	0.275	<0.001
<b>HEALTH BEHAVIOR</b>					
Borrowed money	0.976	7.037	2.116 – 23.399	0.307	0.002
Cheaper programs	1.247	12.113	2.723 – 53.881	0.381	0.001

### **Impact of Stop-Gap Prescription Medications**

It has been shown that access to stop-gap prescription medications is significant in predicting telephone encounters, physician / nurse triage visits and ED visits when using logistic regression based on the Andersen model. Additionally, it has also been shown that access to stop-gap prescription medications is significantly associated with the same health care utilization variables, telephone encounters, physician / nurse triage visits and ED visits, at the bivariate level. Multivariate hypothesis 23 was supported. Predisposing, enabling resources and need will predict health service utilization during the follow-up period. Furthermore, it has been shown that access to stop-gap medications is significantly associated with the clinical outcomes of high blood pressure and high blood glucose at follow-up. Multivariate hypothesis 24 was supported. Access to stop-gap prescription medications was the largest predictor of health care services use when controlling for such factors as predisposing characteristics, enabling resources, need and health behaviors.

To further investigate the impact of access to stop-gap prescriptions on changes in clinical outcomes, three new variables were computed by taking the difference between clinical outcomes at baseline and clinical outcomes at follow-up for a patient's systolic reading, diastolic reading, blood glucose serum level, and total cholesterol reading. A series of independent t tests were used to determine if there is any difference between the change in clinical outcomes between those who have access to stop-gap medications and those who do not (Tables 19 & 20).

For all four clinical outcomes, the mean follow-up readings were lower than the mean baseline readings for participant's who had access to stop-gap medications; in other

words the average clinical outcomes improved for these participants. For participants who did not qualify for stop-gap prescriptions the mean total cholesterol at follow-up was higher than the mean total cholesterol at baseline. For the other three clinical outcomes, participants without access to stop-gap medications had improvement in their averages. The change in both systolic readings between follow-up and baseline was significantly different for participants with access to stop-gap medications and participants without access to stop-gap medications. The change in diastolic readings between follow-up and baseline was also significantly different for participants with access to stop-gap medications and participants without access. Participants with access to stop-gap medications saw more positive changes in both their systolic and diastolic readings between initial assessment and follow-up than participants without access to stop-gap medications. The change in blood glucose was not significantly different between participants with access and those without access to stop-gap medications. The change in total cholesterol was significantly different between participants with access and those without access. Participants with access to stop-gap medications saw an average improvement in their total cholesterol while participants without access did not improve their average. Multivariate hypothesis 25 was supported. The largest predictor of a positive change in outcomes was access to stop-gap prescription medications when controlling for such factors as predisposing characteristics, enabling resources, need and health behaviors.

Table 19

## Clinical Outcome Means (SD)

<b>Clinical Outcome Means</b>	<b>Eligible for Stop-Gap Medications</b>	<b>Baseline Measurement</b>	<b>Follow-Up Measurement</b>	<b>Change in Clinical Outcome*</b>
<b>Systolic Reading</b>	<b>Yes</b>	186.49 (22.300)	158.72 (16.883)	27.75 (13.913)
	<b>No</b>	187.11 (23.327)	182.72 (24.169)	5.10 (17.366)
<b>Diastolic Reading</b>	<b>Yes</b>	102.21 (17.618)	87.25 (7.298)	14.95 (13.840)
	<b>No</b>	102.74 (19.363)	94.08 (13.163)	9.11 (13.192)
<b>Blood Glucose Serum</b>	<b>Yes</b>	253.05 (80.975)	199.31 (71.318)	55.98 (51.641)
	<b>No</b>	288.84 (86.312)	234.88 (84.996)	51.35 (59.574)
<b>Total Cholesterol</b>	<b>Yes</b>	295.02 (41.833)	275.91 (42.891)	19.11 (22.363)
	<b>No</b>	305.88 (60.174)	314.13 (68.955)	-6.75 (51.433)

\*Change is defined as Baseline Measurement – Follow-Up Measurement.

**Table 20**

**Comparing the Central Tendency of the Change in Clinical Outcomes of Stop-Gap Eligible and Non-Eligible Groups Using the Student's T-test\***

<b>Clinical Outcomes</b>	<b>t</b>	<b>Sig.</b>	<b>Mean Difference</b>	<b>Std. Error Difference</b>	<b>95% Confidence Interval of the Difference</b>	
					<b>Lower</b>	<b>Upper</b>
Change in Systolic Reading	13.521	<0.001	22.642	1.675	19.349	25.935
Change in Diastolic Reading	3.951	<0.001	5.842	1.479	2.930	8.754
Change in Blood Glucose Serum Level	.656	.513	4.638	7.073	-9.324	18.599
Change in Total Cholesterol	3.225	.002	25.861	8.018	9.916	41.806

\*Change in clinical outcomes is defined as Baseline - Follow-Up readings

Additionally, a series of ANCOVAs for follow-up clinical outcomes compared the central tendencies of participants with and without access to stop-gap medications while controlling for baseline clinical outcomes (Tables 21 - 24).

After controlling for baseline systolic reading, the participants who qualified for stop-gap medications had significantly lower systolic readings at follow-up than did those in the group which did not have access to stop-gap medications. On average, after adjusting for baseline systolic reading, those who qualified for stop-gap prescriptions had a systolic reading that was 22.8 points lower than those who did not qualify.



**Table 21****ANCOVA for Follow-Up Systolic Reading**

<b>Source of Variance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>f-ratio</b>	<b>p-value</b>
<b>Covariate</b>					
Baseline Systolic Reading	76985.661	1	76985.661	465.668	<0.001
<b>Main Effect</b>					
Stop-gap Eligibility Group	42673.634	1	42673.634	258.123	<0.001
Error	59846.907	362	165.323		
<b>Total</b>	<b>180490.532</b>	<b>364</b>			

After controlling for baseline diastolic reading, participants who had access to stop-gap prescriptions had significantly lower diastolic readings at follow-up than did those who did not qualify for stop-gap medications (Table 22). On average, after adjusting for baseline diastolic readings, study participants who qualified for stop-gap prescriptions had diastolic readings that were 6.3 points lower than those who did not have access.

**Table 22****ANCOVA for Follow-Up Diastolic Reading**

<b>Source of Variance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>f-ratio</b>	<b>p-value</b>
Covariate					
Baseline Diastolic Reading	15971.773	1	15971.773	316.232	<0.001
Main Effect					
Stop-Gap Eligibility Group	3193.882	1	3193.882	63.237	<0.001
Error	18333.835	363	50.506		
<b>Total</b>	<b>37730.801</b>	<b>365</b>			

After controlling for baseline blood glucose serum measurement, study participants with access to stop-gap medications had significantly lower diastolic readings at follow-up than did those who did not have access to stop-gap medications (Table 23). On average, after adjusting for baseline blood glucose level, those who had access to stop-gap prescriptions had a blood glucose level that was 14.1 points lower than those who did not have access.

**Table 23****ANCOVA for Follow-Up Blood Glucose Serum**

<b>Source of Variance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>f-ratio</b>	<b>p-value</b>
Covariate					
Baseline Blood Glucose	1073571.475	1	1073571.475	430.479	<0.001
Main Effect					
Stop-Gap Eligibility Group	12370.509	1	12370.509	4.960	.027
Error	718243.139	288	2493.900		
<b>Total</b>	<b>1898017.278</b>	<b>290</b>			

After controlling for baseline total cholesterol, participants who qualified for stop-gap medications had significantly lower follow-up total cholesterol measurements than did those who did not qualify (Table 24). On average, after adjusting for baseline total cholesterol, those who qualified for stop-gap prescriptions had a total cholesterol measurement at follow-up that was 28.0 points lower than those who did not qualify.

**Table 24****ANCOVA for Follow-Up Total Cholesterol**

<b>Source of Variance</b>	<b>Sum of Squares</b>	<b>df</b>	<b>Mean Square</b>	<b>f-ratio</b>	<b>p-value</b>
<b>Covariate</b>					
Baseline Total Cholesterol	142305.214	1	142305.214	115.13	<0.001
<b>Main Effect</b>					
Stop-Gap Eligibility Group	15470.986	1	15470.986	12.52	.001
Error	102594.823	83	1236.082		
<b>Total</b>	<b>274247.593</b>	<b>85</b>			

## CHAPTER V

### SUMMARY AND CONCLUSIONS

#### Summary

The purpose of this study was to determine the utility of the Andersen's Behavioral Model of Health Services Use (Andersen, 1995) in examining health services use among adults over a 90 day period. This real-time study involved analyses of longitudinal data collection and a prospective medical records review to address the main research question: To what extent is the Andersen Behavioral Model of Health Services Use able to identify the greatest predictor of outcomes among predisposing characteristics, enabling resources, need, personal health practices, use of health services, perceived health status and evaluated health status among adult uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting and three additional individual construct research questions derived from the model:

1. Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and outcomes (perceived health status and evaluated health status) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?
2. Does there exist a statistically significant relationship between health behaviors (personal health practices and use of health services) and outcomes (perceived health status and evaluated health status) among uninsured patients who



manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

3. Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and health behaviors (personal health practices and use of health services) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

Importantly, other questions not asked but answered in this research about uninsured adult patients at the community health center level was the change in status of and how does stop-gap eligibility influence outcomes.

#### **Summary of Construct Research Question Analyses**

**Construct research question 1.** Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and outcomes (perceived health status and evaluated health status) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

There was a statistically significant relationship between population characteristics and outcomes. High blood glucose at follow-up visit was significantly associated with race, prior hospital visit, prior specialty care visit, insurance status, income level, social support, employment, household size, marital status, education, stop-gap eligibility, high blood glucose at baseline, and self-reported health status. For prescription history, whether or not sharing prescription medication had been reported, whether or not affordability for a chronic condition was an issue, whether or not a health

professional had been informed of cost concerns, and whether or not prescription medication samples were received were significantly associated with a high blood glucose clinical outcome at follow-up visit. Access to stop-gap prescription medications did impact outcomes at follow-up positively. After controlling for baseline diastolic reading, having access to stop-gap prescriptions significantly lowered diastolic readings at follow-up.

**Construct research question 2.** Does there exist a statistically significant relationship between health behaviors (personal health practices and use of health services) and outcomes (perceived health status and evaluated health status) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

There was a statistically significant relationship between health behavior and outcomes. For prescription medication history, having lower prescription adherence impacted the number of health care encounters in the follow-up period. Fewer encounters meant increased prescription access, and lack of prescription access meant increased encounters.

**Construct research question 3.** Does there exist a statistically significantly relationship between population characteristics (predisposing characteristics, enabling resources and need) and health behaviors (personal health practices and use of health services) among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting?

There was a statistically significant relationship between population characteristics and health behavior. Race, prior hospitalization, insurance status, income

level, social / emotional support, employment, stop-gap eligibility, self-reported disease state, and provider-reported disease state were significantly associated with physician / nurse triage visits. Race, prior hospitalization, income level, marital status, education, and stop-gap eligibility were significantly associated with telephone encounters. Race, stop-gap eligibility, whether or not the money to fill a prescription was available, and self-reported health status were significantly associated with ED visits. Ineligibility for stop-gap prescription medications impacted health care encounters, those who were ineligible had more health care encounters. Participants who were not eligible for stop-gap medications were more likely to have a telephone encounter, physician / nurse triage visit and emergency department visit than participants who were eligible for stop-gap medications. A participant who was not eligible for stop-gap prescription medication was 35 times more likely to have a physician or nurse triage visit than the patient who was eligible for stop-gap prescription medication. Race, prior hospitalization, insurance status, income level, social support, employment status and stop-gap eligibility, self-reported disease state and provider-diagnosed disease state were significantly associated with physician and or nurse triage visit. For prescription medication history, lower prescription adherence impacted health care encounters, those with lower prescription adherence experienced more encounters. For prescription medication history, whether or not there was money available to fill prescriptions and whether or not splitting pills and alternating days were significantly associated with physician and or nurse triage visits. Whether or not a sharing prescription medication had occurred and borrowing money to pay for a prescription were significantly associated with triage telephone encounters.

Race, prior hospitalization, income level, marital status, education, and stop-gap eligibility were significantly associated with triage telephone encounters.

### **Summary of Multivariate Analyses**

Access to stop-gap prescription medications was one of the largest predictors of health care utilization when controlling for such factors as predisposing characteristics, enabling resources, need and health behavior. The largest predictor of a positive change in outcomes was access to stop-gap prescription medications when controlling for such factors as predisposing characteristics, enabling resources, need and health behavior. Predisposing, enabling resources and need predicted health service utilization during the follow-up period. Furthermore, access to stop-gap medications was significantly associated with the clinical outcomes of high blood pressure and high blood glucose at follow-up.

### **Discussion**

#### **Importance of Andersen's Behavioral Model of Health Services Use**

The fourth phase of the Andersen model, which was employed in this study, provided a construct for one of the more dynamic health services use variables, outcomes (Andersen, 2008). This version allowed feedback loops to illustrate the inter-relationships of population characteristics, health services use, outcomes and the reverse. Employment of this version of the model allows for challenging and creative study design implementation and data analysis. This version also offers the user and the audience an enhanced understanding of health services use for health policy recommendations. Phase five has been used in studies where individual level data is accompanied with health organization and community level variables. This phase further

allows for the examination of the provider and patient interaction and the significance of this relationship to health care delivery, particularly counseling, prescription therapy and overall communication (Andersen, 2008).

Employment of the Andersen's Behavioral Model of Health Services Use over the past 4 decades has been one of the reasons for the progress health and social scientists have made in health services research (Andersen, 2008). The model's author has significantly contributed to the progress of this issue and has grown the model into different products to capture the 75 year history of survey data for health care service use nationally. The predictors and determinants of health services use continue to be extremely multifaceted and its examination will require frameworks and tools that are complex and able to meet the needs of the promised complexity of the next decade. Health services use at the individual level is dynamic and so should its theory application and examination be (Andersen, 2008).

The Andersen model was employed for this study to gain insight on how the predictors of predisposing, enabling and need factors impact the change in clinical outcomes and the number of non-urgent triage telephone encounters, physician visits and ED visits of each uninsured patient diagnosed with a chronic condition. The implications of how predisposing, enabling and need factors impact preventable health care visits as measured by real-time utilization and as defined by chronic condition managing providers are discussed. Particularly, how the enabling factor of stop-gap prescription medication access can impact appropriate health care utilization and clinical outcomes.

This study increases the understanding of social science researchers and medical providers about the factors that impact the uninsured who are diagnosed with chronic

conditions that require ongoing medication therapy. Prior research defined hardship as the patient being uninsured at any time during the past year or the patient having experienced some unmet need in terms of health care service over the past year (Long, 2003). This research revealed that hardships arise when a patient fails or is at risk of failing to meet his needs, including food, adequate housing and health care (Long, 2003).

The theoretical definitions and study-driven operationalizations of health care hardships focused have primarily on circumstance at the individual level, but did not provide the reasoning for the present circumstance (Long, 2003). The prior behaviors and situations, particularly those outside of the individual's control may have an impact that is not always captured by the current design of a study. The inability to obtain health care among those low-income individuals is prudent to a patient's misuse of emergency care such as ED visits; their lack of preventive care; and their under-use or no-use of prescription medication correct punctuation (Long, 2003). The participants in this study experienced some unmet need within the past year prior to the survey implementation, and patients who were among those who did not qualify for the enabling intervention, continued to experience an unmet need for health care service, particularly accessible and affordable prescription medication. Previous research supports this study. Enabling health service programs such as the stop-gap prescription medication programs are appropriate for individuals who can only spare a small portion of their incomes and even modest fee contribution programs still may present a hardship to individuals (Long, 2003).

The preliminary findings were used to implement a more comprehensive formulary for uninsured patients of the host community health center. In addition, there

were administrative changes to include newer enrollment policies and programs for long-term medication assistance that would extend beyond the 90 days of this stop-gap program. The host community health center additionally utilized the stages of this study's results to apply for additional funding opportunities to make its pharmacy services available to other community service organizations through collaborative partnerships.

Uninsured patients have primarily three options when they are in need of health care: to utilize community-based medical centers that will accept the uninsured; to visit EDs for care management of non-urgent conditions; or to avoid health care until their problem exacerbates into the secondary or tertiary stages (The Planning Council, 2007). The host community health center is one of only two federally-qualified community health centers in this region, and as such it is required to provide care to those individuals with limited means. The host community health center is equipped to provide a medical home to those patients with chronic conditions requiring consistent care (The Planning Council, 2007).

**Population Characteristics.** In this study, there was a statistically significant relationship between population characteristics and health behavior. None of the patients had health insurance nor a prescription benefit plan. Patients without an effective health insurance plan and appropriate medication coverage have not only a likelihood of decreased medication adherence but also an increase in the number of visits to emergency departments for non-urgent care, specialty care visits and hospital admissions; and thus a decrease in overall health status and quality of life (Solomon, 2005; Goldman, 2004; and Lohr, 1986). Baseline data showed that patients had low medication adherence behaviors.

Lack of prescription access can result in pain, worsening of the condition and increased risk for other related health problems. Prescription drug utilization has increased dramatically and is reported as the fastest growing component of total health care expenditures. Study results suggest that, low income and uninsured persons need better access to affordable medications (Solomon, 2005; Goldman, 2004; and Lohr, 1986).

**Health Behavior.** In this study, there was a statistically significant relationship between health behavior and outcomes. Personal health services use is a primary factor of health behavior in Andersen's model. Although originally included to measure broad units of individual care utilization, it was determined that population characteristics would impact use and type. The progression of the model has included more exact measures of health services use as they related to specific clinical conditions, service and provider types and illness severity (Andersen & Davidson, 2007). In this study of uninsured adults managing chronic conditions with prescription medication, we hypothesized that the enabling resource would impact both utilization intermediately and outcomes.

**Outcomes.** In this study, there was a statistically significant relationship between population characteristics and outcomes. A primary outcome of health behavior was self-reported perception of health status at the individual level. Additionally, there was the evaluated health status which was provider-reported. The social and varying levels of function, disability and comfort were used by the individual to gauge their perception of health status and the provider was expected to use health care tools and the established clinical based practices to determine conditions and diagnosis. There is an expectation of improvement. It is expected that outcomes will change positively.



### **Policy Recommendations**

Research shows that low adherence to prescribed medical regimens is an ubiquitous problem (Haynes, McDonald, & Garg, 2002). Access to medication therapy for chronic diseases reduces morbidity and mortality. The availability of a responsive and effective health care system will determine access to quality care, especially in secondary and tertiary prevention. Additionally, support from the patient's community plays an increasingly important role in promoting long-term adherence to lifestyle and pharmacologic regimens (DHHS, 2000).

Individuals and families facing limited or no access to medications are likely to be uninsured, with annual incomes below 200% of poverty (VHCF, 2005). Adults in this population are often in need of multiple drug therapy to maintain treatment of multiple chronic diseases. Low-income and uninsured patients who require chronic condition drug therapy typically must rely on the use of medication assistance programs available through pharmaceutical manufacturers. On occasion, changes in therapy and unpredictable product availability can impact continuity of patient care, treatment plans and patient outcomes. Policy leaders should consider addressing the access to medication issue among safety-net patients at several levels: 1) develop a best practice approach to medication access; 2) maximize use of Federal Upper Limit (FUL) generic medications; 3) maximize patient access to 340B discounted medications; 4) formalize access to pharmacist expertise (VHCF, 2005).

### **Future Research**

This study's findings imply that research on this topic of accessibility of prescription medication for the uninsured managing chronic conditions should be further

explored with emphasis on prescription affordability and chronic disease management provided at the primary care level. Adult uninsured patients absent a primary care visit in the past 12 months and with a provider-diagnosed chronic condition present with a unique set of circumstances. Because this patient population has an increased likelihood of co-morbid conditions, there is an increased likelihood of inadequate access to specialty care and medical supplies.

As safety-net providers, CHCs should collaborate with specialty and diagnostic care providers in the community and at the hospital-based level to ensure that uninsured patients are provided improved access to specialty and diagnostic care. Specialty and diagnostic care providers should be as invested as the CHC is in the health maintenance of medically underserved patients by providing fee schedules that can accommodate the working poor, the uninsured and the under-insured. Future studies should further collect data from the hospital based or community based specialty and diagnostic care providers to further explore this scope.

Sorensen et al. (2004) report that identifying affordable drug therapy options for the uninsured is a frequent problem among prescribers. Although there are medication sample availability and manufacturer-sponsored assistance programs to address these affordability issues, these sources have the potential to introduce additional health disparities through various mechanisms such as including reduced access to the drug of choice, inconsistencies with access, and drug regimen complexities that adversely affect adherence. Providers must consider all sources of affordable medications and openly discuss both the treatment options and the anticipated outcomes of each option with patients to ensure they are indeed prescribing agents that optimize outcomes while

balancing patient affordability (Sorensen, Song & Westberg, 2004). CHCs who offer both short-term and long-term access to affordable prescription medication on-site are the premiere agents in accomplishing this goal for those persons identified as having a low-adherence to prescription medication in-take.

Low adherence to prescribed medical regimens is problematic (Haynes et al., 2002). The usual adherence rate is about half for medications and is much lower for lifestyle behavioral modifications. Particularly so of uninsured patients with either undiagnosed or newly diagnosed chronic conditions, there is an increased likelihood of dropping out of care prematurely. Accurate measures of low adherence are lacking for many regimens. Such simple measures as directly asking patients and watching for appointment nonattendance and treatment non-response will detect most problems. For short-term regimens, approximately two weeks or less, adherence to medications is readily achieved by giving clear instructions (Haynes et al., 2002). Improving adherence to long-term medication regimens requires combinations of information. The successful presentation about the regimen, counseling about the importance of adherence and how to organize medication taking, reminders about appointments and adherence, rewards and recognition for the patient's efforts to follow the regimen, and enlisting social support from family and friends are all methods that are best presented by a health educator or health navigator at the community health level.

Successful interventions for long-term regimens are all labor-intensive but ultimately can be cost-effective. Prior to the start of data collection at the host community health center, all physicians and staff received information about the stop-gap prescription medication program including eligibility and the formulary. At baseline for

participants, all received information about the stop-gap prescription medication program and were encouraged to ask any of the staff they encountered to screen them for eligibility.

Future research is needed to further understand the impact of encounters between patients and community health educators. In addition to the provider visit, each participant in this study was afforded an encounter with a certified health educator. Those possible health behaviors at follow-up may be the result of the health education encounter. Future research should consider a standardization of the health education encounter and an examination of its impact on health behavior and outcomes.

Future research should further examine the provision of specific information to a patient via the Internet on how to manage a health problem. In a study reviewing the effectiveness of Web-based information on prescriptions [WebIPs] provided to patients, researchers found that providers are directing their patients to specific websites on the Internet for specific health problems (Ritterband, Borowitz, Cox, Kovatchev, Walker, Lucas, & Sutphen, 2005). Prescription compliance is a barrier to clinical outcome improvement and the avoidable physician / nurse triage visits and telephone encounters. The Internet is being used increasingly as a source for information on prescriptions, with clinicians directing patients to specific, credible Web sites. As with any health care intervention, patients' lack of compliance is a barrier to effectiveness. WebIPs cannot be helpful if patients do not review the information prescribed for them, do not have access to the Internet or have minimal computer skills (Ritterband et al., 2005).

Further analysis should examine the relationships between geographical disparities and health services utilization. Perhaps a link may exist between health

services use and spatial context of available health services both in terms of facilities and programs (Graves, 2009). Geographical Information Systems (GIS) may be beneficial to health disparities research and how to influence the geographical enablers to ultimately promote healthier outcomes. Health outcomes are influenced by a combination of items. Because individual level predispositions affect behaviors and use, GIS mapping may be visually instrumental in improving access (Graves, 2009).

### **Conclusions**

Examination of the impact of enabling resources enhances the understanding of the preventable health care visits over the 90 day period among uninsured adults managing physician-diagnosed chronic conditions.

Results from this study were utilized to assist the host CHC in applying for funding to expand its scope of services to include access to medication therapy that was not limited to the five disease states as was the case when this data was collected. Expanded services provided additional medications that included other chronic diseases, antibiotic therapy, arthritis, depression, and gastro-intestinal illnesses. This project addressed a coordinated system of care objectives by developing a best practice approach to medication access. The host community health center can now utilize a decision analysis model based on six key criteria: Medicaid eligibility, qualification as a 340B provider, patient's immediate need for medication, qualification as an eligible PAP beneficiary, availability of donated medications, and a determination of cost effectiveness as established by quality improvement standards and review by an operations committee. This project further offered infrastructure development for the host CHC, which it can utilize to address its attempt to re-engage the formerly active coalition of partners who

used the project programs. By successfully implementing a re-engagement strategy, the pharmacy program can address individual concerns of each of the 10 safety-net organizations regarding overall programs and operations.

Community health care centers serve as safety-net providers for the underserved and vulnerable populations of low-income and uninsured patients who are in need of care without regard to health insurance status or the ability to pay (Corrigan et al., 2003). More importantly, CHCs have been developed to provide adequate assessments and to develop corresponding plans to meet the needs of patients and the local community. The patient population base for CHCs include low income, uninsured, homeless and migrant workers. With such a diverse patient population, CHCs envision the eradication of the nation's current racial and socioeconomic gaps in health care by continually improving its health care delivery systems (Corrigan et al., 2003).

CHCs are also responsible for a number of successful, cost-effective and resource-sharing projects that meet the needs of their patient population. Thus, programs have been specifically designed for the treatment of chronic disease management. CHCs also seek to achieve seamless health care delivery to the surrounding community by minimizing the costs for quality health care. Moreover, one of the major goals of CHCs is to improve the overall coordination of care without the duplication of services provided (Braccia et al., 2005). As such, they serve as community builders and partners that strive to be catalysts for change. CHCs also form effective relationships with health service providers through open lines of communication to ensure a continuum of quality health care for its patient population (Braccia et al., 2005).

The majority of patients entering the health care system do so at the primary care level (Corrigan et al., 2003). Some individuals enter the health care system using emergency services for routine health care. Fortunately, primary care is also where many patients receive the bulk of their medical care and information as opposed to the emergency room (Corrigan et al., 2003). Although disease prevention is the most effective health care construct, when the intervention of primary care is delayed, specialty care should be available to the patient (O'Fallon & Dearry, 2002). Thus, patients that do not have access to a primary health care facility are more likely than not to suffer from inadequate health care.

Minorities receive less adequate health care when compared to non-minorities (Institute of Medicine of the National Academies, 2005). A recent report from the Institute of Medicine of the National Academies found that minorities are less likely to receive appropriate cardiac prescription medications or bypass surgery. However, these individuals are more likely to undergo surgical procedures that result in the amputations of the lower extremities due to complications that are the result of acute diabetes. Such instances are caused by a lack of adequate health care that may have provided alternative treatment plans other than amputation. Therefore, a level of consistency and equity of care is necessary because this will serve to ensure that all populations receive needed health care on a continual basis (Institute of Medicine of the National Academies, 2005).

CHCs have been successful in increasing prescription medication access for uninsured patients by linking them to available resources (Morris, 2005). Several pharmaceutical companies have developed programs for those that are in need of medical services but mass awareness campaigns have not been publicly implemented. Thus, many

patients are unaware of their availability (Morris, 2005). For these reasons, community health centers in Washington, Montana and West Virginia have implemented pharmaceutical service programs to help patients obtain medications (Morris, 2005; Clifton, Byer, Heaton, Haberman & Gill, 2003; Dent, Stratton & Cochran, 2002).

The CHC in Spokane, Washington has developed a telepharmacy program that increases access to prescription drugs and corresponding pharmacist consulting services among low-income patients (Clifton et al., 2003). The program was well-received and a high percentage (63%) strongly agreeing that the telepharmacy program improved patient access to medications and pharmacy services (Clifton et al., 2003).

The CHC in Missoula, Montana has established an on-site pharmacy for its indigent patients (Dent, Stratton & Cochran, 2002). This program's aim is to improve patient care and therapeutic outcomes, implement pharmaceutical care programs, establish clinical pharmacy services and develop an ambulatory care training resource for pharmacy students (Dent et al., 2002). There was also the initiation and corresponding implementation of pharmacist-assisted programs that helped with the prescription management for medical conditions such as: diabetes, hypertension, dyslipidemia, asthma, anticoagulation and peptic ulcer disease. Specifically, the number of prescriptions filled among the CHC patients that participated in the programs increased from an average of 219 each month to 838 in total. Additionally, the mean cost per prescription decreased from \$16.55 per month to \$0.51 per month (Dent, Stratton & Cochran, 2002). Therefore, the decreasing costs have increased accessibility. Research conducted at CHCs has determined that medical staff members will generally suggest the use of generic brand medications as opposed to brand-name medications to help ease



some of the financial burden for their patients (Morris, 2005). As a result, there must always be an open line of communication between patients and empathetic providers so that there can be a proactive approach that helps patients obtain needed medication.

To meet the demand for additional health care service points for the nation's uninsured and medically underserved populations, the American Recovery and Reinvestment Act of 2009 earmarked \$2 billion for the existing 7,900 CHC individual projects (NACHC, 2010). Reports show that less than one third of the projects had been awarded these funds. In June 2009, \$851 million in capital improvement funds were allocated for CHCs; a total of 2,617 projects were disbursed \$342 million (NACHC, 2010).

With the U.S. Senate's passing of the Patient Protection and Affordable Care Act combined with the modified House of Representatives' 3590 Reconciliation Act of 2010, the health care reform package will impact the nation's community health centers in terms of operational capacity over a period of five years (NACHC, 2010). CHCs will receive \$11 billion in funding that will allow them to expand their services and either improve existing or construct new facilities. The health care reform package further makes provision for CHCs to be paid at the same rate of pay for service as other health care provider agencies and to establish residency programs for training health care providers in teaching programs. These are all efforts to increase capacity for primary care at the community level for the medically underserved (NACHC, 2010). Once these recovery investment plans have been implemented, an in-depth evaluation will need to determine efficiency and sufficiency.

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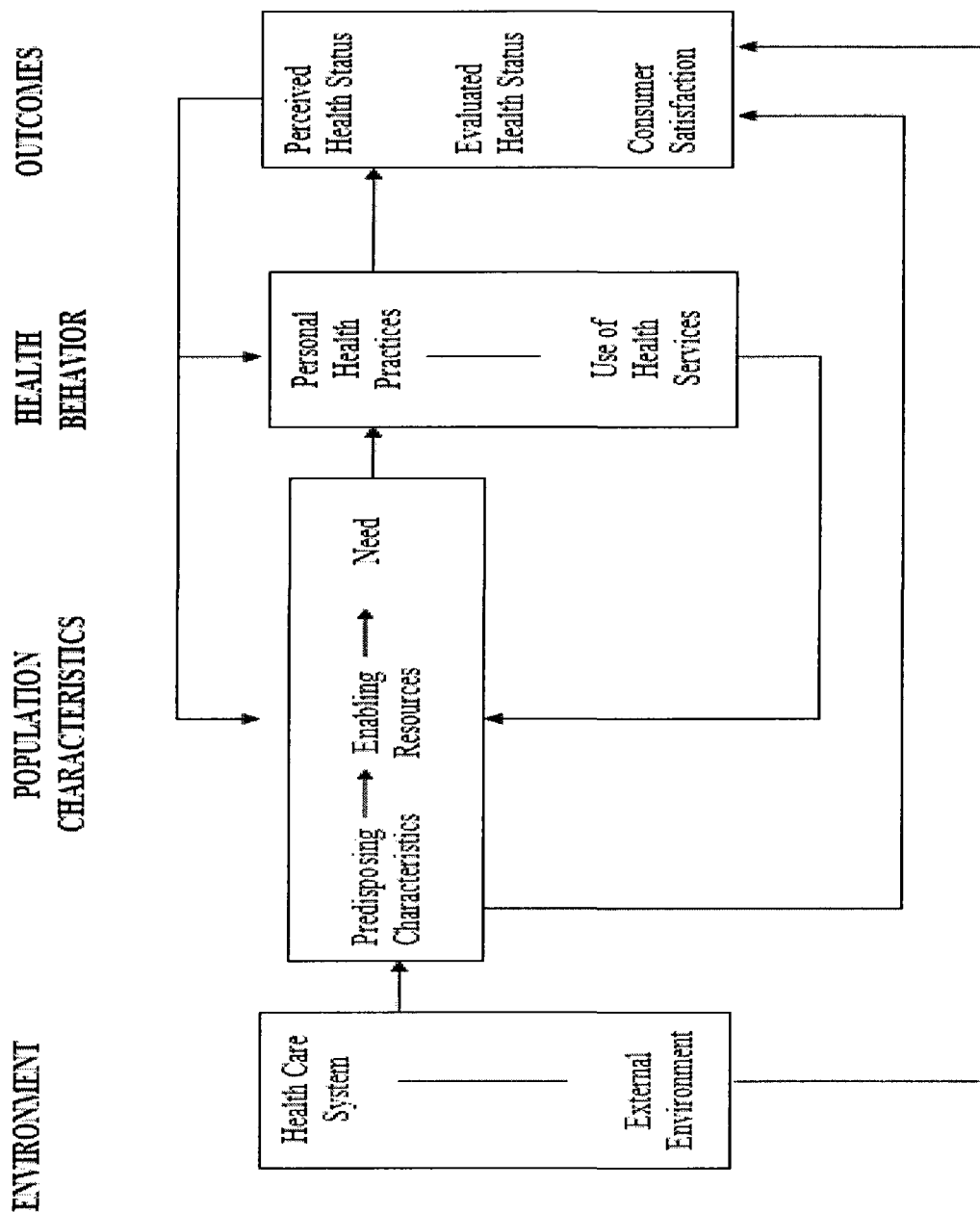
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## APPENDIX A

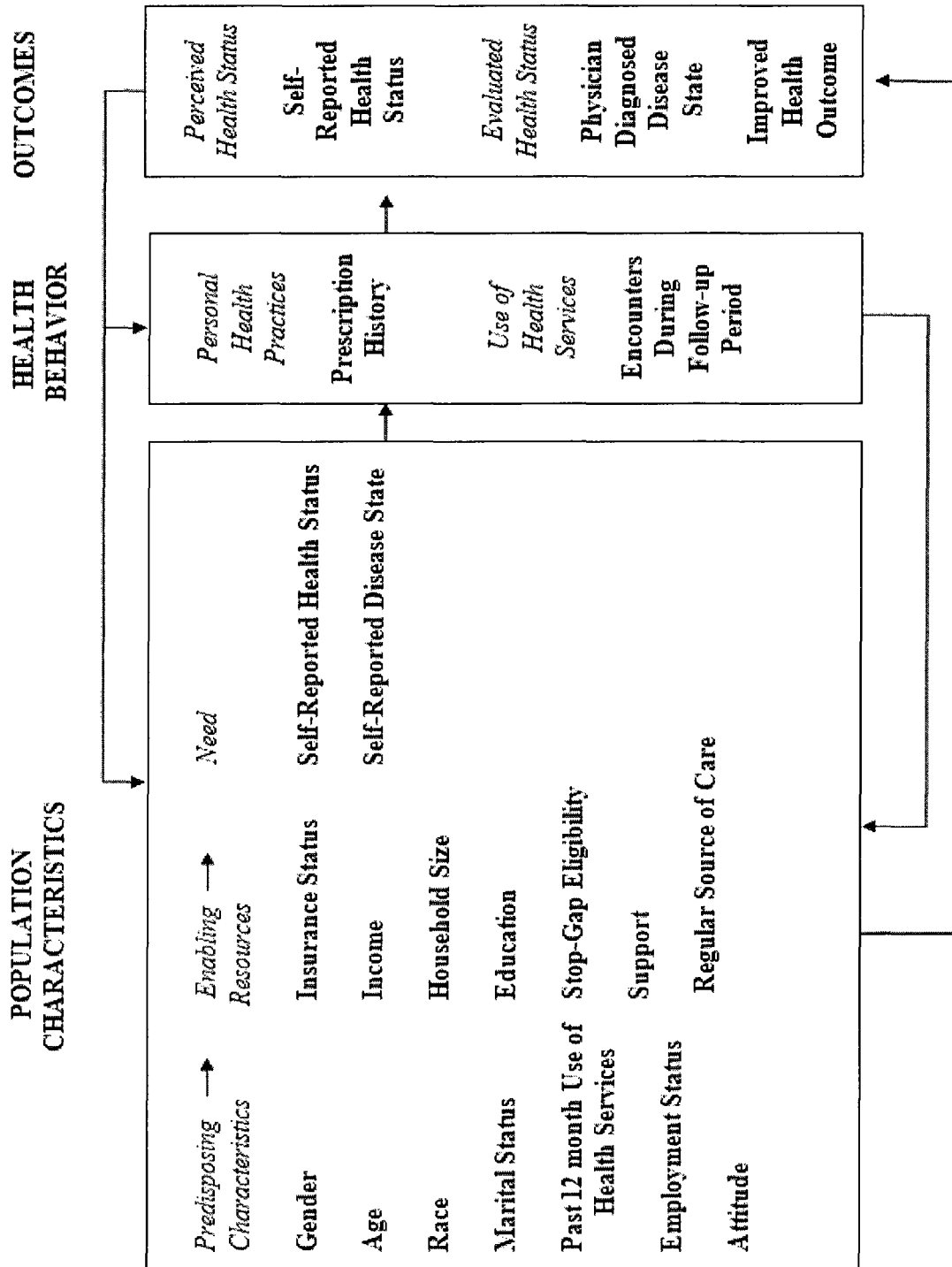
## ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES USE



An Emerging Model – Phase 4. Adapted from: Andersen, R. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1-10. © March 1995 by the American Sociological Association, Washington, D.C. Permission Granted.

APPENDIX B

MODIFICATION OF THE ANDERSEN BEHAVIORAL MODEL OF HEALTH SERVICES USE



## APPENDIX C

### DETAILED CONSTRUCT HYPOTHESES

#### Population Characteristics

Population characteristics will be associated with outcomes among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting.

#### Predisposing Characteristics

1. Men will have a statistically significant higher number of health care encounters in the follow-up period than women.
2. Younger patients will have a statistically significant higher number of health care encounters in the follow-up period than older patients.
3. African Americans will have a statistically significant higher number of health care encounters in the follow-up period than other groups defined by race
4. Patients who are single will have a statistically significant higher number of health care encounters in the follow-up period than patients who are married.
5. Patients who have had a health care visit in the past 12 months will have a statistically significant higher number of health care encounters in the follow-up period than patients who have not.
6. Currently unemployed patients will have a statistically significant higher number of health care encounters in the follow-up period than employed patients.
7. Patients who have a more negative attitude toward health and health care will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a more positive attitude.

### **Enabling Resources**

Enabling resources will be associated with health care services use and clinical outcomes.

8. Patients who do not have insurance will have a statistically significant higher number of health care encounters in the follow-up period than patients who have insurance.
9. Patients who have a lower income will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a higher income.
10. Patients with more than 4 people in the household will have a statistically significant higher number of health care encounters in the follow-up period than patients who have 4 or fewer people in the home.
11. Patients who do not have at least a high school diploma / GED will have a statistically significant higher number of health care encounters in the follow-up period than patients with at least a high school diploma / GED.
12. Patients who do not have access to stop-gap prescription medications will have a statistically significant higher number of health care encounters in the follow-up period than patients who have access to stop-gap prescription medications.
13. Patients who do not have a social support system will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a social support system.



14. Patients who do not have a regular source of care will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a regular source of care.

**Need**

Need will be associated with health services use and clinical outcomes.

**Self Reported Health Status**

15. Patients with a lower self-report health status score will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a higher self-report health status score.

**Self Reported Disease States**

16. Patients who self-report two or more disease states will have a statistically significant higher number of health care encounters in the follow-up period than patients who report one disease state.

**Health Behavior**

Health behavior will be associated with outcomes among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting.

17. Patients who have lower prescription adherence will have a statistically significant higher number of health care encounters in the follow-up period than patients who have access to stop-gap prescription medications.

**Outcomes**

Outcomes will be associated with health services use.

**Perceived health status**

18. Patients with a lower self-report perceived health status will have a statistically significant higher number of health care encounters in the follow-up period than patients with a higher self-report perceived health status.

**Self-report health status**

19. Patients with a lower self-reported health status will have a statistically significant higher number of health care encounters in the follow-up period than patients with a higher self-reported health status.

**Evaluated health status**

20. Evaluated health status will influence health services utilization.

**Provider diagnosed disease state**

21. Patients who have a physician-diagnosis of one or more chronic disease states will have more health care encounters in the follow-up period than patients who have a physician diagnosis of one disease state.

**Improved health outcome**

22. Patients who have improved health outcomes will have fewer health care encounters during the follow-up period.

**Multivariate hypotheses for population characteristics**

23. Access to stop-gap prescription medications as an enabling resource will be the largest predictor of health care services use during the follow-up period.

**Multivariate hypotheses for health behavior**

24. Access to stop-gap prescription medications will be the largest predictor of health care services use when controlling for predisposing characteristics, enabling resources, need and health behavior.

**Multivariate hypotheses for outcomes**

25. The largest predictor of a positive change in health outcomes will be access to stop-gap prescription medications when controlling for population characteristics and health behavior.

## APPENDIX D

## FLIER

You may be invited to participate in a  
study about

**Prescription Medication Access and  
Chronic Disease Management**

if you are a new patient and you have one of the  
following conditions:



**Asthma**  
**Diabetes**  
**Heart Conditions**  
**High Blood Pressure**  
**High Cholesterol**

Researchers from **Old Dominion University** will  
be on site to determine if you are eligible.

If you decide to participate, you will have to fill out a  
survey at your visit and again in 3 months.

**You will receive a free gift if you participate!!**

For details, contact Jewel Goodman at PCHR at (757) 952-0172

**APPENDIX E**  
**POTENTIAL PARTICIPANT LETTER**

July, 2006

Dear Potential Participant:

We are researchers from Old Dominion University. The purpose of this study is to collect information that can be used to help the Peninsula Institute for Community Health (PICH) determine if improved access to prescription medications actually makes a difference in your overall health if you have asthma, diabetes, heart conditions, high blood pressure or high cholesterol and no health insurance.

As a PICH patient you have access to eligibility workers who can process an application for you to see if you are eligible for Pharmaceutical Assistance Programs (PAPs) where you can receive certain medications free or reduced cost medications from pharmaceutical companies. Not all health providers offer patients this service. If you are found to be eligible, you sometimes have to wait up to 90 days to get the PAP medications, but PICH can also link you to the Pharmacy Care of Hampton Roads (PCHR) where you can receive certain prescription medications for reduced cost while you wait to get the PAP medications. We believe that increasing your access to prescription medications is important to your health and we would like you to participate in a study about this important issue to determine if this is actually true.

You are being invited to take part in this study because you are a new patient at PICH, or you have not been here for treatment in the past 12 months. We believe that you can provide a great deal of insight and information into how PICH can better assist patients who are receiving treatment for asthma, high blood pressure, diabetes, heart conditions and high cholesterol with improved access to prescription medications.

We would like you to complete a questionnaire; it should take about 20 minutes. In addition we will need your permission to access your medical records and access the application packet that the PAP eligibility worker completes for you. Your information will not be shared with anyone. Three months from today, you will be asked to complete the questionnaire again. You will be provided assistance in completing the questionnaires and be given a tote bag for your participation.

Your participation is confidential so your name will not be attached to any of the information about you when this report is shared with PICH. The report will be a summary of the information from all participants. Any questions and concerns you have will be answered and addressed before you agree to participate and at any time during the 3 months. If you wish to be removed from the study at any time, let us know and your information will be removed.

We recognize the sensitive and personal nature of the medical information we are asking you to share with us, but we hope to show how important it is for PICH to be able to improve your access to prescription medications as your health provider. We appreciate you considering our request.

Respectfully,

Jewel Goodman, MPA  
Lead Researcher  
PhD Student

Dr. Stacey B. Plichta  
Responsible Project Investigator  
Dissertation Committee Chair

**APPENDIX F****INFORMED CONSENT DOCUMENT****OLD DOMINION UNIVERSITY**

**PROJECT TITLE:** An Evaluation of the Peninsula Institute for Community Health's Enhanced Service Delivery Model for Chronic Care: Stop-Gap Medication Access and Health Services Utilization.

**INTRODUCTION**

The purposes of this form are to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES to participating in An Evaluation of the Peninsula Institute for Community Health's (PICH) Enhanced Service Delivery Model for Chronic Care: Stop-Gap Medication Access and Health Services Utilization.

**RESEARCHERS**

The Researchers are from Old Dominion University's (ODU) College of Health Sciences' School of Community and Environmental Health. Responsible Project Investigator is Dr. Stacey B. Plichta. Jewel Goodman is lead researcher.

**DESCRIPTION OF RESEARCH STUDY**

Several studies have been conducted looking into the subject of prescription access for the uninsured. These studies have not explained well the benefit of stop-gap medication programs for patients who must take several prescription each day, but do not have health insurance. Pharmaceutical companies have programs that provide free and reduced cost medication, but it can take up to 90 days before you get the medicine. Stop-gap programs can provide you the prescriptions you need at a very low cost while you are waiting during the 90 days. We are trying to determine if immediate access to prescription medications for uninsured PICH patients with asthma, diabetes, heart conditions, high blood pressure or high cholesterol makes a difference in their health status at the end of three months. We would like you to complete a survey today and another survey three months from today. We also want you to give us access to your medical records to collect the results from your laboratory tests the doctor may order for you. If you say YES, then your participation will last for approximately 30 minutes today and then 30 minutes again three months from today for a total of just 1 hour. The surveys can be completed while you are at PICH for your doctor's visit, via the telephone or mailed to you for your convenience. The survey will ask questions about how often you seek medical care, your satisfaction with your doctor, how you get your prescription medications, your beliefs about health care, how often and why you may sometimes miss doctor's appointments, symptoms that you experience, overall health status, and social support. We will also need some additional demographic information about you and your household. If you take the survey with you to complete, you will be given a postage paid envelope for convenience supplied by PICH to return the survey to us in the mail. Your name will not be on the survey, just an identification number. The researcher will have a

list of the identification numbers and names on it that will be kept confidential. When you return to PICH in three months we will ask you to complete another survey. This second survey can be completed at your PICH visit, over the telephone or sent to you in the mail with a postage paid envelope for your convenience to return to us. A maximum of 670 patients may be participating in this study.

### **EXCLUSIONARY CRITERIA**

To participate in this study you should be self-pay, underinsured or uninsured and this will be determined by the PICH finance department. Once you see the doctor, we will review your medical records to see if you received a diagnosis of asthma, diabetes, heart conditions, high blood pressure or high cholesterol from your PICH doctor and received a prescription. To the best of your knowledge, you should not have been seen by a PICH doctor in the past 12 months, which would keep you from participating in this study.

### **RISKS AND BENEFITS**

**RISKS:** You may experience two potential types of risks. First, those risks associated with talking about health status and the worries that may surface when discussing in detail. But as a PICH patient, you will have access to a health educator to talk to and resources for additional help if necessary. The other type of risk that you may experience involves those risks associated with the possibility of linking your name to your responses on the survey. A release of confidential information as a result of participating in this study is a potential risk. The named investigator has attempted to reduce the risk of the possibility of releasing confidential information and linking names to survey responses by assigning number identifications to each survey, and then by having only one master list of names with appointed number identifications that only she and the responsible project investigator will have access to. This list will not be kept at the community health center site. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

**BENEFITS:** There are no direct benefits to you as a result of participating in this proposed study. However, by discussing health status, experienced chronic condition symptoms, and medication needs, you may have a clearer understanding of how the Pharmaceutical Assistance Programs may help you meet your prescription medication needs.

### **COSTS AND PAYMENTS**

The researchers want your decision about participating in this study to be absolutely voluntary. Yet they recognize that your participation may pose some inconvenience. In order to thank you for your time, you will receive an incentive for your participation in the form of a tote bag with the PICH logo.

### **NEW INFORMATION**

If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.



**CONFIDENTIALITY**

All information obtained about you in this study is strictly confidential unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify you.

**WITHDRAWAL PRIVILEGE**

It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study -- at any time. Your decision will not affect your relationship with ODU nor PICH or otherwise cause a loss of benefits to which you might otherwise be entitled.

**COMPENSATION FOR ILLNESS AND INJURY**

If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of harm arising from this study, neither PICH, ODU nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in this research project, you may contact Dr. Stacey B. Plichta, the Responsible Project Investigator, at 757-683-4989 or Dr. David Swain, the current IRB chair, at 757-683-6028 at ODU, who will be glad to review the matter with you.

**VOLUNTARY CONSENT**

By signing this form, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand this form, the research study, and its potential risks and benefits. The researchers should have answered any questions you may have had about the research. If you have any questions later on, then the researchers should be able to answer them: Jewel Goodman, 757-952-0172.

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you should call Dr. David Swain, the current IRB chair, at 757-683-6028, or the ODU Office of Research, at 757-683-3460. And importantly, by signing below, you are telling the researcher YES, that you agree to participate in this study. The researcher should give you a copy of this form for your records.

---

**Subject's Printed Name**


---

**Subject's Signature**


---

**Date**
**INVESTIGATOR'S STATEMENT**

I certify that I have explained to this subject the nature and purpose of this research, including benefits, risks, costs, and any experimental procedures. I have described the rights and protections afforded to human subjects and have done nothing to pressure, coerce, or falsely entice this subject into participating. I am aware of my obligations under state and federal laws, and promise compliance. I have answered the subject's questions and have encouraged him/her to ask additional questions at any time during the course of this study. I have witnessed the above signature(s) on this consent form.

---

**Investigator's Printed Name**


---

**Investigator's Signature**


---

**Date**

**APPENDIX G**  
**AUTHORIZATION TO DISCLOSE HEALTH INFORMATION**  
**FOR THE PURPOSE OF RESEARCH CONDUCTED BY**  
**OLD DOMINION UNIVERSITY STUDENT**

Patient Id: \_\_\_\_\_

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City, State and Zip: \_\_\_\_\_

DOB: \_\_\_\_\_

Phone: \_\_\_\_\_

This acknowledgement gives my consent for the researchers from Old Dominion University to gain access to my medical records for the purpose of the Chronic Disease Management Study.

I understand the following to be true:

- This private health information will not be shared with anyone else.
- I do not have to sign this authorization to get treatment.
- Once my health care information is disclosed as I have authorized, it could be redisclosed by the recipient in the form of a report, but without personal identifiers.
- Signing this authorization does not cancel any rights I have under other state or federal laws.

\_\_\_\_\_  
Patient's Signature

\_\_\_\_\_  
Date

**APPENDIX H**  
**INITIAL PATIENT HEALTH ASSESSMENT**

**Patient ID:** \_\_\_\_\_ **Survey ID:** \_\_\_\_\_  
**Site:** 1) 48<sup>th</sup> Street    2) Stoneybrook    3) Main Street

Introduction: Hello. I am a researcher from Old Dominion University. My name is \_\_\_\_\_ . We are gathering information about your health. May I ask you some questions?

**Section I: Perception of Health Status / Quality of Life**

1. What brings you here today?

\_\_\_\_\_

\_\_\_\_\_

2. How would you rate your overall health?

1) Excellent    2) Very Good    3) Good    4) Fair    5) Poor    6) Not sure

3. Now thinking about your physical health, which includes physical illness and injury, in the past 30 days, how many days was your physical health not good?

\_\_\_\_\_ Number of Days

4. Now thinking about your mental health, which includes stress, depression, and problems with emotions, in the past 30 days, how many days was your mental health not good?

\_\_\_\_\_ Number of Days

5. During the past 30 days, how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?

\_\_\_\_\_ Number of Days

**Section II: Healthcare Utilization History**

6. Do you currently have a regular place that you go to for health care?

1) Yes, go to #7                      2) No, go to #8





22. During the past 30 days, how often did you use a prescription asthma inhaler during an asthma attack to stop it?

- 1) Never
- 2) 1 to 4 times
- 3) 5 to 14 times
- 4) 15 to 30 times

23. How old were you when you were first told that you had asthma by a health professional?

\_\_\_\_\_ Age in Years

24. In the past year, how many times did you visit an Emergency Room because of your asthma?

\_\_\_\_\_ Number of Times

25. In the past year, how many times did you see a health professional for treatment of worsening asthma symptoms? (Do not include Emergency Room visits.)

\_\_\_\_\_ Number of Times

26. In the past year, how many days were you unable to work or carry out your usual activities because of your asthma?

\_\_\_\_\_ Number of Days

Note: If no additional disease states, proceed to #64.

Diabetes

27. (Women only) Was this only when you were pregnant?

- 1) Yes
- 2) No
- 3) Not Applicable

28. Are you now taking insulin?

- 1) Yes
- 2) No

29. Are you now taking Diabetes pills?

- 1) Yes
- 2) No









Note: If no additional disease states, proceed to #64.

Cardiovascular Disease / Heart Disease

56. Has a doctor ever told you that you had a heart attack?  
1) Yes, go to #57                      2) No, go to #59
57. Were you hospitalized?  
1) Yes, go to #58                      2) No, go to #59
58. When you left the hospital did you go to any kind of outpatient rehabilitation?  
Sometimes called rehab.  
1) Yes                                      2) No
59. Do you take aspirin daily or every other day?  
1) Yes                                      2) No
60. Has a doctor ever told you that you had angina or coronary heart disease?  
1) Yes                                      2) No
61. Has a doctor ever told you that you had a stroke?  
1) Yes, go to #62                      2) No, go to #64
62. Were you hospitalized?  
1) Yes, go to #63                      2) No, go to #64
63. After you left the hospital did you go to any kind of outpatient rehabilitation?  
Sometimes called rehab.  
1) Yes                                      2) No

Note: If no additional disease states, proceed to #64.

Section IV: Prescription Medication History

64. Are you currently taking prescription medications?  
1) Yes, go to #65                      2) No, go to #67

65. If so, which ones?

\_\_\_\_\_

\_\_\_\_\_

66. Do you think that your current medications cost too much?

1) Yes                      2) No

67. Where do you usually get your prescription medications?

\_\_\_\_\_

68. In the past year, how much did you spend monthly on prescription medications?

\$ \_\_\_\_\_ Amount in Dollars

69. In the past year, what has been the most that you have ever paid for one prescription medication?

\$ \_\_\_\_\_ Amount in Dollars

70. In the past year, have you ever not filled a prescription because you did not have the money?

1) Yes                      2) No

71. In the past year, have you shared your prescription medication with other people?

1) Yes                      2) No

72. In the past year, have other people shared their prescription medication with you?

1) Yes                      2) No

73. In the past year, have you ever gone without your medication for a chronic condition such as asthma, diabetes, heart conditions, high blood pressure or high cholesterol because you could not afford it?

1) Yes                      2) No



**Section V: Attitudes about Health and Health Care**

81. (Do you feel) You are healthy enough that you really don't need health insurance. (?)
- 1) Strongly Disagree      2) Disagree      3) Not Sure  
4) Agree      5) Strongly Agree
82. (Do you feel) Health insurance is not worth the money it costs. (?)
- 1) Strongly Disagree      2) Disagree      3) Not Sure  
4) Agree      5) Strongly Agree
83. (Do you feel) You are more likely to take risks than the average person. (?)
- 1) Strongly Disagree      2) Disagree      3) Not Sure  
4) Agree      5) Strongly Agree
84. (Do you feel) You can overcome illness without help from a medically trained person. (?)
- 1) Strongly Disagree      2) Disagree      3) Not Sure  
4) Agree      5) Strongly Agree

**Section VI: Demographic Information**

85. City of Residence: \_\_\_\_\_
86. Age: \_\_\_\_\_ in Years
87. Gender:      1) Male      2) Female
88. Height: \_\_\_\_\_
89. Weight: \_\_\_\_\_

90. Which one of these groups best represents your race:
- 1) Caucasian / White
  - 2) African American / Black
  - 3) Asian
  - 4) Native Hawaiian or Other Pacific Islander
  - 5) American Indian or Alaska Native
  - 6) Hispanic or Latino of any race
  - 7) Other \_\_\_\_\_
91. Current Health Insurance (circle all that apply):
- 1) Private Insurance
  - 2) Medicaid
  - 3) Medicare
  - 4) CHAMPUS
  - 5) None
  - 6) Other \_\_\_\_\_
92. If you are currently uninsured, how long has it been since you have not had health insurance?
- \_\_\_\_\_ Number of Years
93. If you are uninsured, what is the reason?
- \_\_\_\_\_
94. What is your household yearly income?
- \$ \_\_\_\_\_ Number in Dollars
95. Which of the following best describes your employment status?
- 1) Working for wages full-time
  - 2) Working for wages part-time
  - 3) Self-employed
  - 4) Out of work for more than one year
  - 5) Out of work for less than one year
  - 6) Unemployed
  - 7) Retired
  - 8) A Student
  - 9) A Homemaker
  - 10) Unable to work
  - 11) Receiving Disability Benefits

96. What is your current marital status:

- 1) Married
- 2) Divorced
- 3) Widowed
- 4) Separated
- 5) Never Married / Single
- 6) Member of an unmarried couple

97. What is the highest grade or year in school you completed (Circle one):

- 1) Never attended school
- 2) Grades 1 through 8 (Elementary)
- 3) Grades 9 – 11 (Some High School)
- 4) High School Diploma or GED
- 5) Some College or Technical School
- 6) College Degree or Higher

98. How do you find out about health issues? (Circle all that apply)

- 1) My Doctor
- 2) Magazines / Books
- 3) Pamphlets / Brochures
- 4) Internet / On-line
- 5) Computer software
- 6) Church programs
- 7) Television / Radio / Newspaper
- 8) Family / Friends
- 9) Other \_\_\_\_\_

99. Total number of people in household (include self):

\_\_\_\_\_

100. Total number of children you are responsible for:

\_\_\_\_\_

**Section VII: Social Networks of Support**

101. Do you have a positive social support system in your life?

1) Yes

2) No

The following lists those acts that are provided by a positive social and / or emotional support system.

**Social Support**

- Lets you use his/her telephone
- Buys clothes for you or your family
- Helps you find a job
- Gives you money
- Would help you if you were confined to bed for a week
- Watches the children
- Has provided shelter for you and your children
- Gives you good advice
- Takes you or your family out to movies, dinner
- Offers you advice
- Is someone to socialize with, to do things with
- Gives the children guidance
- Helps you make important decisions
- Would cover for you at work
- Suggests you get help for feeling sad
- Pays your rent, bills, or housing costs
- Lends you a car, drives you or your children to appointments
- Feeds your family

**Emotional Support**

- Is there for you no matter how bad things get
- Reassures you
- Treats you with respect
- Has time to listen to you
- Seems interested in your feelings

<p><b>Thank you for completing this health survey. Please remember to pick-up your free gift.</b></p>
---



## APPENDIX I

## THREE MONTH FOLLOW-UP HEALTH ASSESSMENT

Patient ID: \_\_\_\_\_

Provider Site:      1) 48<sup>th</sup> Street      2) Stoneybrook      3) Main Street

PICH Provider (Physician, Physician's Assistant or Nurse Practitioner): \_\_\_\_\_

Introduction: Hello. I am a researcher from Old Dominion University. My name is \_\_\_\_\_ . About three months ago you participated in a survey with us. We would now like to complete a follow-up survey. We are gathering information about your health and what has happened in the past three months. May I ask you some questions?

**Section I: Physician Diagnosis**

1. Did your PICH Doctor tell you that you had any of the following? (circle all that apply)
- 1) Asthma
  - 2) Diabetes (Sugar)
  - 3) High Blood Pressure
  - 4) Heart Conditions
  - 5) High Cholesterol

**Section II: Prescription Medication History**

2. At your last visit, were you given any prescriptions to have filled?
- 1) Yes, go to #3
  - 2) No, go to #13
3. If so, which medications were you prescribed for which conditions?

Medication:

Condition:

---



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4. Did you qualify for stop-gap prescription medications? These medications are provided by the HCAP Program from the Pharmacy Care of Hampton Roads at a reduced cost.

1) Yes, go to #7                      2) No, go to #5                      3) Not sure, go to #9

5. Since you were not eligible for HCAP prescription medications, did you get your prescriptions filled?

1) Yes, go to #6                      2) No, go to #13

6. If yes, how did you get your prescription(s) filled? Go to #11
- 

7. Were all of your prescription medications available through HCAP?

1) Yes                                      2) No

8. Of the prescription medications that were not available from HCAP, how did you get them?
- 

9. Do you think that your current medications cost too much?

1) Yes                                      2) No

10. Where do you usually get your prescriptions?
- 

11. In the past three months, how much did you spend monthly on prescription medications?

\$ \_\_\_\_\_ Amount in Dollars







## APPENDIX J

## BASELINE MEDICAL RECORDS DATA COLLECTION TOOL

Patient ID: \_\_\_\_\_ Survey ID: \_\_\_\_\_

Height: \_\_\_\_\_ Weight: \_\_\_\_\_ Body Mass Index: \_\_\_\_\_

PICH Provider (Physician, Physician's Assistant or Nurse Practitioner): \_\_\_\_\_

## Physician Diagnosis:

Asthma

Diabetes

Heart Conditions

Hypertension

Hyperlipidemia

## Established Clinical Levels / Laboratory Values at Encounter:

## Asthma

Respiratory infections \_\_\_\_\_

Not Recorded

Pulmonary (lung) functions \_\_\_\_\_

## Diabetes

Blood glucose serum level \_\_\_\_\_

Not Recorded

Blood sugar level (fasting) \_\_\_\_\_

## Heart Conditions

Electrocardiogram \_\_\_\_\_

Not Recorded

Chest x-rays \_\_\_\_\_

Blood tests \_\_\_\_\_

## Hypertension

Systolic and Diastolic readings \_\_\_\_\_

Not Recorded

## Hyperlipidemia

Total cholesterol level \_\_\_\_\_

Not Recorded

Triglyceride level \_\_\_\_\_

Prescriptions:

\_\_\_\_\_ for the condition of \_\_\_\_\_

\_\_\_\_\_ for the condition of \_\_\_\_\_

\_\_\_\_\_ for the condition of \_\_\_\_\_

\_\_\_\_\_ for the condition of \_\_\_\_\_

\_\_\_\_\_ for the condition of \_\_\_\_\_

Physician's Directions / Referrals:

\_\_\_\_\_

Number of Telephone Encounters: \_\_\_\_\_

Reason for Telephone Encounters: \_\_\_\_\_

\_\_\_\_\_

Number of Physician / Nurse Triage Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Physician / Nurse Triage Visit(s) prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Specialty Care Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Specialty Care Visit(s) prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Emergency Department Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Emergency Department Visits prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Hospital Admissions prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Hospital Admissions prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

## APPENDIX K

## FOLLOW-UP MEDICAL RECORDS DATA COLLECTION TOOL

Patient ID: \_\_\_\_\_ Survey ID: \_\_\_\_\_

Height: \_\_\_\_\_ Weight: \_\_\_\_\_ Body Mass Index: \_\_\_\_\_

PICH Provider (Physician, Physician's Assistant or Nurse Practitioner): \_\_\_\_\_

## Physician Diagnosis:

Asthma

Diabetes

Heart Conditions

Hypertension

Hyperlipidemia

## Established Clinical Levels / Laboratory Values at Encounter:

## Asthma

Respiratory infections \_\_\_\_\_

Not Recorded

Pulmonary (lung) functions \_\_\_\_\_

## Diabetes

Blood glucose serum level \_\_\_\_\_

Not Recorded

Blood sugar level (fasting) \_\_\_\_\_

## Heart Conditions

Electrocardiogram \_\_\_\_\_

Not Recorded

Chest x-rays \_\_\_\_\_

Blood tests \_\_\_\_\_

## Hypertension

Systolic and Diastolic readings \_\_\_\_\_

Not Recorded

## Hyperlipidemia

Total cholesterol level \_\_\_\_\_

Not Recorded

Triglyceride level \_\_\_\_\_



Prescriptions:

\_\_\_\_\_ for the condition of \_\_\_\_\_  
\_\_\_\_\_ for the condition of \_\_\_\_\_  
\_\_\_\_\_ for the condition of \_\_\_\_\_  
\_\_\_\_\_ for the condition of \_\_\_\_\_  
\_\_\_\_\_ for the condition of \_\_\_\_\_

Physician's Directions / Referrals:

\_\_\_\_\_

Number of Telephone Encounters: \_\_\_\_\_

Reason for Telephone Encounters: \_\_\_\_\_

\_\_\_\_\_

Number of Physician / Nurse Triage Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Physician / Nurse Triage Visit(s) prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Specialty Care Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Specialty Care Visit(s) prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Emergency Department Visits prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Emergency Department Visits prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

Number of Hospital Admissions prior to Follow-up at 3 months: \_\_\_\_\_

Reason for Hospital Admissions prior to Follow-up at 3 months: \_\_\_\_\_

\_\_\_\_\_

## APPENDIX L

## RESEARCH PROPOSAL REVIEW NOTIFICATION FORM

No.: 09-141

OLD DOMINION UNIVERSITY  
HUMAN SUBJECTS INSTITUTIONAL REVIEW BOARD  
RESEARCH PROPOSAL REVIEW NOTIFICATION FORM

TO: Zhang, Qi  
*Responsible Project Investigator*

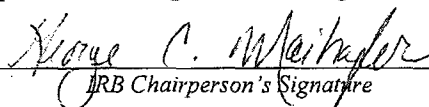
DATE: November 19, 2009  
*IRB Decision Date*

RE: Using the Andersen Behavioral Model of Health Services Use to Examine Health Service Use and Outcomes among Adult Uninsured Patients in a Community Health Center Setting

*Name of Project*

Please be informed that your research protocol has received approval by the Institutional Review Board. Your research protocol is:

- Approved (Exempt)  
 Tabled/Disapproved  
 Approved, contingent on making the changes below\*


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*IRB Chairperson's Signature*

November 19, 2009  
*date*

Contact the IRB for clarification of the terms of your research, or if you wish to make ANY change to your research protocol.

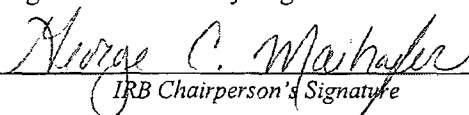
The approval expires one year from the IRB decision date. You must submit a Progress Report and seek re-approval if you wish to continue data collection or analysis beyond that date, or a Close-out report. You must report adverse events experienced by subjects to the IRB chair in a timely manner (see university policy).

\* Approval of your research is CONTINGENT upon the satisfactory completion of the following changes and attestation to those changes by the chairperson of the Institutional Review Board. Research may not begin until after this attestation.

- No changes required

## Attestation

As directed by the Institutional Review Board, the Responsible Project Investigator made the above changes. Research may begin.


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*IRB Chairperson's Signature*

November 19, 2009  
*date*

## APPENDIX M

## DETAILED SUMMARY OF THE QUESTIONNAIRES

## Pretest: Health Assessment

Model Construct	Variable Scale	Survey ID #	Variable Description / Survey Item	Response Category
	Ratio	A	Patient ID	Open-ended (ratio)
		B	Survey ID	Open-ended (ratio)
	Nominal	C	PICH Clinical Site	1) 48 <sup>th</sup> Street 2) Stoneybrook 3) Main Street
Need Perception of Health Status and Quality of Life	Nominal	Q1	What brings you here today?	Open-ended
	Interval	Q2	How would you rate your overall health?	Likert 1) Excellent 2) Very Good 3) Good 4) Fair 5) Poor 6) Not sure
	Ratio	Q3	Now thinking about your physical health, which includes physical illness and injury, in the past 30 days, how many days was your health not good?	Ratio
	Ratio	Q4	Now thinking about your mental health, which includes stress, depression, and problems with emotions, in the past 30 days, how many days was your mental health not good?	Ratio
	Ratio	Q5	During the past 30	Ratio

			days, how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?	
Predisposing Characteristics Health Care Utilization History	Nominal	Q6	Do you have a regular place that you go to for health care?	1) Yes 2) No
	Nominal	Q7	If so, where	Open-ended
	Nominal	Q8	If not, where was the last place you went to for health care?	Open-ended
	Nominal	Q9	In the past 12 months, was there a time when you needed to see a doctor but could not because of cost?	1) Yes 2) No
	Nominal	Q10	In the past 12 months, did you see a specialty care doctor for yourself?	1) Yes 2) No
	Nominal	Q11	If so, for what condition?	Open-ended
	Nominal	Q12	In the past 12 months, were you hospitalized?	1) Yes 2) No
	Nominal	Q13	If so, for what condition?	Open-ended
	Nominal	Q14	In the past 12 months, have you been to the Emergency Room for care for yourself?	1) Yes 2) No
	Nominal	Q15	If so, for what condition?	Open-ended
Need Self-Reported Disease State	Nominal	Q16	What health problems do you worry about most?	Open-ended
	Nominal	Q17	Has a doctor ever told you that you have any of the following? (circle all that apply) Asthma, Diabetes, Heart Conditions,	1) Yes 2) No

			High Blood Pressure, High Cholesterol	
Asthma	Nominal	Q18	Do you still have asthma?	1) Yes 2) No
	Ratio	Q19	Symptoms of asthma include cough, wheezing, shortness of breath, chest tightness and phlegm production. During the past 30 days, how often did you experience any symptoms of asthma?	Ratio
	Interval	Q20	During the past 30 days, how often did symptoms of asthma make it difficult for you to stay sleep?	Likert 1) Not at any time 2) Once or twice a week 3) More than 2 times a week, but not every day 4) Every day, but not all the time 5) Other
	Ratio	Q21	During the past 30 days, how many days did you take a prescription asthma medication to prevent an asthma attack from occurring?	Ratio
	Ratio	Q22	During the past 30 days, how often did you use a prescription asthma inhaler during an asthma attack to stop it?	Ratio
	Ratio	Q23	How old were you when you were first told that you had asthma by a health professional?	Ratio

	Ratio	Q24	In the past year, how many times did you visit an Emergency Room because of your asthma?	Ratio
	Ratio	Q25	In the past year, how many times did you see a health professional for treatment of worsening asthma symptoms? (Do not include Emergency Room visits.)	Ratio
	Ratio	Q26	In the past year, how many days were you unable to work or carry out your usual activities because of your asthma?	Ratio
Diabetes	Nominal	Q27	(Women only) Was this only when you were pregnant?	1) Yes 2) No 3) N / A
		Q28	Are you now taking insulin?	1) Yes 2) No
		Q29	Are you now taking Diabetes pills?	1) Yes 2) No
	Ratio	Q30	In the past year, how often did you or family and friends check your blood for glucose or sugar?	Ratio
	Ratio	Q31	In the past year, how often did you or family and friends check your feet for any sores or irritations?	Ratio
	Ratio	Q32	In the past year, how often did a health professional check your feet for any sores or irritations?	Ratio
	Nominal	Q33	Have you ever had any sores or irritations on your feet that took more than 4 four weeks to heal?	1) Yes 2) No

	Ratio	Q34	In the past year, how many times have you seen a health professional for your diabetes?	Ratio
	Ratio	Q35	A test for A 1 C measures the average level of blood sugar over the past three months. In the past year how many times has a health professional checked you for A 1 C?	Ratio
	Nominal	Q36	In the past year, did you have an eye exam in which the pupils were dilated? This would have made you temporarily sensitive to bright light?	1) Yes 2) No
	Nominal	Q37	In the past year, has a health professional ever told you that diabetes has affected your eyes?	1) Yes 2) No
	Nominal	Q38	In the past year, have you taken a course or class in how to manage your diabetes yourself?	1) Yes 2) No
Hypertension	Nominal	Q39	(Women only) Was this only when you were pregnant?	1) Yes 2) No 3) N / A
	Nominal	Q40	Have you ever been told on two or more visits to a health professional that you had high blood pressure?	1) Yes 2) Yes, only during Pregnancy 3) Yes, Border line 4) Yes, Pre-Hypertensive 5) No
	Nominal	Q41	In the past year has a health professional ever told you change your eating habits to help	1) Yes 2) No

			lower or control your high blood pressure?	
	Nominal	Q42	In the past year has a health professional ever told you to cut down on salt to help lower or control your high blood pressure?	1) Yes 2) No
	Nominal	Q43	In the past year has a health professional ever told you to reduce your alcohol use to help lower or control your high blood pressure?	1) Yes 2) No 3) N / A
	Nominal	Q44	In the past year has a health professional ever told you to exercise to help lower or control your high blood pressure?	1) Yes 2) No
	Nominal	Q45	Are you currently taking medicine for your high blood pressure?	1) Yes 2) No
	Nominal	Q46	Are you changing your eating habits to help lower or control your high blood pressure?	1) Yes 2) No
	Nominal	Q47	Are you cutting down on salt to help lower or control your high blood pressure?	1) Yes 2) No
	Nominal	Q48	Are you reducing alcohol use to help lower or control your high blood pressure?	1) Yes 2) No 3) N / A
	Nominal	Q49	Are you exercising to help lower or control your high blood pressure?	1) Yes 2) No
Cholesterol Awareness	Nominal	Q50	How long has it been since you last had your blood cholesterol checked?	1) Within the past year (anytime less than 12 months ago) 2) Within the



				<p>past 2 years (1 year, but less than 2 years ago)</p> <p>3) Within the past 5 years (2 years but less than 5 years ago)</p> <p>4) 5 or more years ago</p>
	Nominal	Q51	In the past year, have you been told by a health professional that your blood cholesterol	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q52	In the past year, has a health professional ever told you to exercise to help lower your blood cholesterol?	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q53	In the past year has a health professional ever told you to change your eating habits to help lower your blood cholesterol?	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q54	Are you exercising to help lower your blood cholesterol?	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q55	Are you changing your eating habits to help lower your blood cholesterol?	<p>1) Yes</p> <p>2) No</p>
Heart Disease	Nominal	Q56	Has a doctor ever told you that you had a heart attack?	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q57	Were you hospitalized?	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q58	When you left the hospital did you go to any kind of outpatient rehabilitation? Sometimes called rehab.	<p>1) Yes</p> <p>2) No</p>
	Nominal	Q59	Do you take aspirin daily or every other	<p>1) Yes</p> <p>2) No</p>

			day?	
	Nominal	Q60	Has a doctor ever told you had angina or coronary heart disease?	1) Yes 2) No
	Nominal	Q61	Has a doctor ever told you had a stroke?	1) Yes 2) No
	Nominal	Q62	Were you hospitalized?	1) Yes 2) No
	Nominal	Q63	After you left the hospital did you go to any kind of outpatient rehabilitation? Sometimes called rehab.	1) Yes 2) No
Enabling Resources Prescription History	Nominal	Q64	Are you currently taking prescription medications?	1) Yes 2) No
	Nominal	Q65	If so, which ones?	Open-ended
	Nominal	Q66	Do you think that your current medications cost too much?	1) Yes 2) No
	Nominal	Q67	Where do you usually get your prescription medications?	Open-ended
	Ratio	Q68	In the past year, how much did you spend monthly on prescription medications?	Open-ended
	Ratio	Q69	In the past year, what has been the most that you have ever paid for a prescription medication?	Open-ended
	Nominal	Q70	In the past year, have you not filled a prescription because you did not have the money?	1) Yes 2) No
	Nominal	Q71	In the past year, have you shared your prescription medication with other people?	1) Yes 2) No
	Nominal	Q72	In the past year, have	1) Yes

			other people shared their prescription medication with you?	2) No
	Nominal	Q73	In the past year, have you ever gone without your medication because you could not afford it?	1) Yes 2) No
	Nominal	Q74	In the past year, have you ever split pills or alternated days to make a prescription last longer?	1) Yes 2) No
	Nominal	Q75	In the past year, have you ever borrowed money to pay for your prescription medication?	1) Yes 2) No
	Nominal	Q76	In the past year, have you ever had to choose between paying for your prescription medication or taking care of other responsibilities like food, clothing, shelter, utility bills?	1) Yes 2) No
	Nominal	Q77	In the past year, have you ever told a health professional that you were not taking a prescription medication because you could not afford it?	1) Yes 2) No
	Nominal	Q78	In the past year, have you ever received samples from a health care professional after telling them that you could not afford a prescription?	1) Yes 2) No
	Nominal	Q79	In the past year, has a health professional ever told you about any programs where you could possibly get	1) Yes 2) No

			cheaper prescription medications?	
	Nominal	Q80	If so, what did he or she tell you?	Open-ended
Enabling Resources Attitudes about health and health care	Interval	Q81	(Do you feel) You are healthy enough that you really don't need health insurance?	Likert 1) Strongly Disagree 2) Disagree 3) Not Sure 4) Agree 5) Strongly Agree
	Interval	Q82	(Do you feel) Health insurance is not worth the money is costs?	Likert 1) Strongly Disagree 2) Disagree 3) Not Sure 4) Agree 5) Strongly Agree
	Interval	Q83	(Do you feel) You are more likely to take risks than the average person.	Likert 1) Strongly Disagree 2) Disagree 3) Not Sure 4) Agree 5) Strongly Agree
	Interval	Q84	(Do you feel) You can overcome illness without help from a medically trained person.	Likert 1) Strongly Disagree 2) Disagree 3) Not Sure 4) Agree 5) Strongly Agree
Predisposing Characteristics Demographics	Nominal	Q85	City of Residence	Open-ended
	Ratio	Q86	Age in Years	Open-ended
	Nominal	Q87	Gender	1) Male 2) Female
	Ratio	Q88	Height	Open-ended
	Ratio	Q89	Weight	Open-ended
	Nominal	Q90	Which one of these groups best represents	1) Caucasian / White

			your race?	<ul style="list-style-type: none"> <li>2) Black / African American</li> <li>3) Asian</li> <li>4) Native Hawaiian or Other Pacific Islander</li> <li>5) American Indian or Alaska Native</li> <li>6) Hispanic or Latino of any race</li> <li>7) Other</li> </ul>
	Nominal	Q91	Current Health Insurance (circle all that apply):	<ul style="list-style-type: none"> <li>1) Private Insurance</li> <li>2) Medicaid</li> <li>3) Medicare</li> <li>4) CHAMPUS</li> <li>5) None</li> <li>6) Other</li> </ul>
	Ratio	Q92	If you are currently uninsured, how long has it been since you have not had health insurance?	Open-ended
	Nominal	Q93	If you are uninsured, what is the reason?	Open-ended
	Ratio	Q94	What is your household yearly income?	Open-ended
	Nominal	Q95	Which of the following best describes your employment status?	<ul style="list-style-type: none"> <li>1) Working for wages full-time</li> <li>2) Working for wages part-time</li> <li>3) Self-employed</li> <li>4) Out of work for more than one year</li> <li>5) Out of work</li> </ul>

				for less than one year 6) Unemployed 7) Retired 8) A Student 9) A Homemaker 10) Unable to work 11) Receiving Disability Benefits
	Nominal	Q96	What is your current marital status:	1) Married 2) Divorced 3) Widowed 4) Separated 5) Never Married 6) Single 7) Member of an unmarried couple
	Nominal	Q97	What is the highest grade or year in school you completed (circle one):	1) Never attended school 2) Grades 1 through 8 (Elem) 3) Grades 9 – 11 (Some High School) 4) High School Diploma or GED 5) Some College or Technical School 6) College Degree or Higher
	Nominal	Q98	How do you find out about health issues?	1) My Doctor 2) Magazines/

			(circle all that apply)	Books 3) Pamphlets/ Brochures 4) Internet 5) Computer Software 6) Church programs 7) Television/ Radio/News paper 8) Family/ Friends 9) Other
	Ratio	Q99	Total number of people in household (include self):	Ratio
	Ratio	Q100	Total number of children you are responsible for:	Ratio
Enabling Resources Social and Emotional Support	Nominal	Q101	Do you have a positive social support system in your life?	1) Yes 2) No

**Posttest: Follow-up Health Assessment**

Variable Category	Variable Scale	Survey ID	Variable Description / Survey Item	Response Category
	Ratio	A	Patient ID	Open-ended
	Ratio	B	Survey ID	Open-ended
	Nominal	C	PICH Clinical Site	1) 48 <sup>th</sup> Street 2) Stoneybrook 3) Main Street
Enabling Resources Prescription Medication History	Nominal	Q1FU	Did your PICH Doctor tell you that you had any of the following? (Circle all that apply)	1) Asthma 2) Diabetes (Sugar) 3) High Blood Pressure 4) Heart Conditions 5) High Cholesterol
	Nominal	Q2FU	At your last visit, were you given any prescriptions to have filled?	1) Yes 2) No
	Nominal	Q3FU	If so, which medications were you prescribed for which conditions?	Open-ended
	Nominal	Q4 FU	Did you qualify for HCAP prescription medications? These medications are provided by the Pharmacy Care of Hampton Roads for \$3.00 per prescription.	1) Yes 2) No
	Nominal	Q5FU	Since you were not eligible for HCAP prescription medications, did you get your prescriptions filled?	1) Yes 2) No
	Nominal	Q6FU	If yes, how did you get your prescription(s) filled?	Open-ended
	Nominal	Q7FU	Were all of your prescriptions medications available	1) Yes 2) No



			through HCAP?	
	Nominal	Q8FU	Of the prescription medications that were not available from HCAP, how did you get them?	Open-ended
	Nominal	Q9FU	Do you think that your current medications cost too much?	1) Yes 2) No
	Nominal	Q10FU	Where do you usually get your prescriptions?	Open-ended
	Ratio	Q11FU	In the past three months, how much did you spend monthly on prescription medications?	Ratio
	Ratio	Q12FU	In the past three months, what has been the most that you have ever paid for a prescription medication?	Ratio
	Nominal	Q13FU	In the three months, have you not filled a prescription because you did not have the money?	1) Yes 2) No
	Nominal	Q14FU	In the past three months, have you shared your prescription medication with other people?	1) Yes 2) No
	Nominal	Q15FU	In the past three months, have other people shared their prescription medication with you?	1) Yes 2) No
	Nominal	Q16FU	In the past three months, have you ever gone without your prescription medication because you could not afford it?	1) Yes 2) No
	Nominal	Q17FU	In the past three months, have you ever split pills or alternated days to make a prescription last longer?	1) Yes 2) No
	Nominal	Q18FU	In the past three months,	1) Yes

			have you ever borrowed money to pay for your prescription medication?	2) No
	Nominal	Q19FU	In the past three months, have you ever had to choose between paying for your prescription medication or taking care of other responsibilities like food, clothing, shelter, utility bills?	1) Yes 2) No
	Nominal	Q20FU	In the past three months, have you ever told a health professional that you were not taking a prescription medication because you could not afford it?	1) Yes 2) No
	Nominal	Q21FU	In the past three months, have you ever received samples from a health care professional after telling them that you could not afford a prescription?	1) Yes 2) No
	Nominal	Q22FU	In the past three months, has a health professional (doctor or nurse) ever told you about any programs where you could possibly get cheaper prescription medications?	1) Yes 2) No
	Nominal	Q23FU	If so, what did he or she tell you?	Open-ended
Need Quality of Life	Ordinal	Q24FU	How would you rate your overall health?	Likert 1) Excellent 2) Very Good 3) Good 4) Fair 5) Poor 6) Not sure

	Ratio	Q25FU	Now thinking about your physical health, which includes physical illness and injury, in the past 30 days, how many days was your health not good?	Ratio
	Ratio	Q26FU	Now thinking about your mental health, which includes stress, depression, and problems with emotions, in the past 30 days, how many days was your mental health not good?	Ratio
	Ratio	Q27FU	During the past 30 days, how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work or recreation?	Ratio
Predisposing Characteristics Health Care Utilization History	Nominal	Q28FU	In the past three months, was there a time when you needed to see a doctor but could not because of cost?	1) Yes 2) No
	Nominal	Q29FU	In the past three months, did you see a specialty care doctor for yourself?	1) Yes 2) No
	Nominal	Q30FU	If so, what condition?	Open-ended
	Nominal	Q31FU	In the past three months, were you hospitalized?	1) Yes 2) No
	Nominal	Q32FU	If so, what condition?	Open-ended
	Nominal	Q33FU	In the past three months, have you been to the ED for care for yourself?	1) Yes 2) No
	Nominal	Q34FU	If so, for what condition?	Open-ended
	Nominal	Q35FU	Will you make PICH your primary care medical home? Why or Why not?	Open-ended

### Baseline Medical Records Review

Variable Category	Variable Scale	Survey ID	Variable Description / Survey Item	Response Category
	Ratio	A	Patient ID	Open-ended
	Ratio	B	Survey ID	Open-ended
	Ratio	BMRQ1	Height	Open-ended
	Ratio	BMRQ2	Weight	Open-ended
	Ratio	BMRQ3	Body Mass Index level	Open-ended
	Nominal	BMRQ4	PICH Provider	Open-ended
	Nominal	BMRQ5	Physician Diagnosis	1) Asthma 2) Diabetes 3) Heart Conditions 4) Hypertension 5) Hyperlipidemia
Baseline Clinical Values	Nominal	BMRQ6	Respiratory infections	Open-ended
		BMRQ7	Pulmonary (lung) functions	Open-ended
	Ratio	BMRQ8	Blood glucose serum level	Open-ended
	Ratio	BMRQ9	Blood sugar level (fasting)	Open-ended
	Nominal	BMRQ10	Heart Conditions	Open-ended
	Nominal	BMRQ11	Electrocardiogram	Open-ended
	Nominal	BMRQ12	Chest x-rays	Open-ended
	Nominal	BMRQ13	Blood Tests	Open-ended
	Ratio	BMRQ14	Systolic Reading	Open-ended
	Ratio	BMRQ15	Diastolic Reading	Open-ended
	Ratio	BMRQ16	Total Cholesterol Level	Open-ended
	Ratio	BMRQ17	Triglyceride Level	Open-ended
Prescription History	Nominal	BMRQ18	Current Prescription and Condition	Open-ended
	Nominal	BMRQ19	Current Prescription and Condition	Open-ended
	Nominal	BMRQ20	Current Prescription and Condition	Open-ended
	Nominal	BMRQ21	Current Prescription and Condition	Open-ended
	Nominal	BMRQ22	Current Prescription	Open-ended

			and Condition	
	Nominal	BMRQ23	Physician's Directions / Referrals	Open-ended
Triage Calls	Ratio	BMRQ24	Number of Patient Telephone or In-person Encounters	Open-ended
	Nominal	BMRQ25	Reason for Patient Telephone or In-person Encounters	Open-ended
Triage Visits	Ratio	BMRQ26	Number of Triage Visits	Open-ended
Specialty Care Visits	Ratio	BMRQ27	Number of Specialty Care Visits	Open-ended
	Nominal	BMRQ28	Reason for Specialty Care Visits	Open-ended
ED Visits	Ratio	BMRQ29	Number of ED Visits	Open-ended
	Nominal	BMRQ30	Reason for ED Visits	Open-ended
Hospital Admission	Ratio	BMRQ31	Number of Hospital Admissions	Open-ended
	Nominal	BMRQ32	Reason for Hospital Admissions	Open-ended

### Follow-up Medical Records Review

Model Construct	Variable Scale	Survey ID	Variable Description / Survey Item	Response Category
	Ratio	A	Patient ID	Open-ended
	Ratio	B	Survey ID	Open-ended
	Ratio	FUMR Q1	Height	Open-ended
	Ratio	FUMR Q2	Weight	Open-ended
	Ratio	FUMR Q3	Body Mass Index level	Open-ended
	Nominal	FUMR Q4	PICH Provider	Open-ended
	Nominal	FUMR Q5	Physician Diagnosis at Follow-up	1) Asthma 2) Diabetes 3) Heart Condition 4) Hypertension 5) Hyperlipidemia
Baseline Clinical Values	Nominal	FUMR Q6	Respiratory infections at Follow-up	Open-ended
	Nominal	FUMR Q7	Pulmonary (lung) functions at Follow-up	Open-ended
	Ratio	FUMR Q8	Blood glucose serum level at Follow-up	Open-ended
	Ratio	FUMR Q9	Blood sugar level (fasting) at Follow-up	Open-ended
	Nominal	FUMR Q10	Heart Conditions at Follow-up	Open-ended
	Nominal	FUMR Q11	Electrocardiogram at Follow-up	Open-ended
	Nominal	FUMR Q12	Chest x-rays at Follow-up	Open-ended
	Nominal	FUMR Q13	Blood Tests at Follow-up	Open-ended
	Ratio	FUMR Q14	Systolic Reading at Follow-up	Open-ended
	Ratio	FUMR	Diastolic Reading at Follow-up	Open-ended

		Q15	up	
	Ratio	FUMR Q16	Total Cholesterol Level at Follow-up	Open-ended
	Ratio	FUMR Q17	Triglyceride Level at Follow- up	Open-ended
Prescription History	Nominal	FUMR Q18	Current Prescription and Condition at Follow-up	Open-ended
	Nominal	FUMR Q19	Current Prescription and Condition at Follow-up	Open-ended
	Nominal	FUMR Q20	Current Prescription and Condition at Follow-up	Open-ended
	Nominal	FUMR Q21	Current Prescription and Condition at Follow-up	Open-ended
	Nominal	FUMR Q22	Current Prescription and Condition at Follow-up	Open-ended
	Nominal	FUMR Q23	Physician's Directions / Referrals at Follow-up	Open-ended
Triage Calls	Ratio	FUMR Q24	Number of Patient Telephone or In-person Encounters During Follow-up Period	Open-ended
	Nominal	FUMR Q25	Reason for Patient Telephone or In-person Encounters During Follow-up Period	Open-ended
Triage Visits	Ratio	BMRQ 26	Number of Triage Visits During Follow-up Period	Open-ended
Specialty Care Visits	Ratio	BMRQ 27	Number of Specialty Care Visits During Follow-up Period	Open-ended
	Nominal	FUMR Q28	Reason for Specialty Care Visits During Follow-up Period	Open-ended
ED Visits	Ratio	FUMR Q29	Number of ED Visits During Follow-up Period	Open-ended
	Nominal	FUMR Q30	Reason for ED Visits During Follow-up Period	Open-ended
Hospital Admissions	Ratio	FUMR Q31	Number of Hospital Admissions During Follow- up Period	Open-ended
	Nominal	FUMR Q32	Reason for Hospital Admissions During Follow- up Period	Open-ended

**APPENDIX N**  
**STATISTICAL ANALYSIS**

<b>Hypothesis</b>	<b>Construct</b>	<b>Statistical Test</b>
	<b>Predisposing Characteristics</b>	
	Predisposing characteristics will be associated with health care services use and clinical outcomes.	
<b>1</b>	Men will have a statistically significant higher number of health care encounters in the follow-up period than women.	<b>Chi-square test</b>
<b>2</b>	Younger patients will have a statistically significant higher number of health care encounters in the follow-up period than older patients.	<b>Chi-square test</b>
<b>3</b>	African Americans will have a statistically significant higher number of health care encounters in the follow-up period than other groups defined by race	<b>Chi-square test</b>
<b>4</b>	Patients who are single will have a statistically significant higher number of health care encounters in the follow-up period than patients who are married.	<b>Chi-square test</b>
<b>5</b>	Patients who have had a health care visit in the past 12 months will have a statistically significant higher number of health care encounters in the follow-up period than patients who have not.	<b>Chi-square test</b>
<b>6</b>	Currently unemployed patients will have a statistically significant higher number of health care encounters in the follow-up period than employed patients.	<b>Chi-square test</b>
<b>7</b>	Patients who have a more negative attitude toward health and health care will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a more positive attitude.	<b>Chi-square test</b>
	<b>Enabling Resources</b>	
	Enabling resources will be associated with health care services use and clinical outcomes.	
<b>8</b>	Patients who do not have insurance will have a statistically significant higher number of health care encounters in the follow-up period than patients who have insurance.	<b>Chi-square test</b>
<b>9</b>	Patients who have a lower income will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a higher income.	<b>Chi-square test</b>



<b>10</b>	Patients with more than 4 people in the household will have a statistically significant higher number of health care encounters in the follow-up period than patients who have 4 or fewer people in the home.	<b>Chi-square test</b>
<b>11</b>	Patients who do not have at least a high school diploma / GED will have a statistically significant higher number of health care encounters in the follow-up period than patients with at least a high school diploma / GED.	<b>Chi-square test</b>
<b>12</b>	Patients who do not have access to stop-gap prescription medications will have a statistically significant higher number of health care encounters in the follow-up period than patients who have access to stop-gap prescription medications.	<b>Chi-square test</b>
<b>13</b>	Patients who do not have a social support system will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a social support system.	<b>Chi-square test</b>
<b>14</b>	Patients who do not have a regular source of care will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a regular source of care.	<b>Chi-square test</b>
	<b>Need</b>  Need will be associated with health services use and clinical outcomes.	
	<b>Self Reported Health Status</b>	
<b>15</b>	Patients with a lower self-report health status score will have a statistically significant higher number of health care encounters in the follow-up period than patients who have a higher self-report health status score.	<b>Chi-square test</b>
	<b>Self Reported Disease States</b>	
<b>16</b>	Patients who self-report two or more disease states will have a statistically significant higher number of health care encounters in the follow-up period than patients who report one disease state.	<b>Chi-square test</b>
	<b>Health Behavior</b>  Health behavior will be associated with outcomes among uninsured patients who manage physician-diagnosed chronic conditions with prescription medications in the community health center setting.	
<b>17</b>	Patients who have lower prescription adherence will have a statistically significant higher number of health care encounters in the follow-up period than patients	<b>Chi-square test</b>

	who have access to stop-gap prescription medications.	
	<b>Outcomes</b>	
	Outcomes will be associated with health services use.	
	<b>Perceived health status</b>	
18	Patients with a lower self-report perceived health status will have a statistically significant higher number of health care encounters in the follow-up period than patients with a higher self-report perceived health status.	<b>Chi-square test</b>
	<b>Self-report health status</b>	
19	Patients with a lower self-reported health status will have a statistically significant higher number of health care encounters in the follow-up period than patients with a higher self-reported health status.	<b>Chi-square test</b>
	<b>Evaluated health status</b>	
20	Evaluated health status will influence health services utilization.	
	<b>Provider diagnosed disease state</b>	
21	Patients who have a physician-diagnosis of one or more chronic disease states will have more health care encounters in the follow-up period than patients who have a physician diagnosis of one disease state.	<b>Chi-square test</b>
	<b>Improved health outcome</b>	
22	Patients who have improved health outcomes will have fewer health care encounters during the follow-up period.	<b>Chi-square test</b>
	<b>Multivariate hypotheses for population characteristics</b>	
23	Access to stop-gap prescription medications will be the largest predictor of health care services use when controlling for population characteristics and health behaviors.	<b>Multiple logistic regression model analysis</b>
	<b>Multivariate hypotheses for health behavior</b>	
24	Access to stop-gap prescription medications will be the largest predictor of health services use will be access to stop-gap prescription medications when controlling for such factors as population characteristics.	<b>Multiple logistic regression model analysis</b>
	<b>Multivariate hypotheses for outcomes</b>	
25	Access to stop-gap prescription medications will be the largest predictor of a positive change in health outcomes when controlling for population characteristics and health behavior.	<b>Multiple logistic regression model analysis</b>

## APPENDIX O

## AMERICAN SOCIOLOGICAL ASSOCIATION PERMISSION LETTER



AMERICAN SOCIOLOGICAL ASSOCIATION

1430 K Street NW, Suite 600  
Washington, DC 20005

Permission No. 005544

Date: November 12, 2009

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Requestor's Name: Jewel Goodman

PERMISSION GRANTED

  
12-29-09

Author(s) of original work: Ronald M. Andersen

Title & Journal Citation: "Revisiting the Behavioral Model and Access to Medical Care: Does it Matter?,"  
*Journal of Health and Social Behavior*, Vol. 36, No. 1 (Mar., 1995), pg. 8, Fig. 7.Reprint to Appear In: *PhD Dissertation* Author(s): Jewel Goodman

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**INVITED PRESENTER:**

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