

A STATE COMPARISON TO UNDERSTAND MEDICAID DELIVERY SYSTEM
EFFECTS ON ACCESS AND USE OF PREVENTATIVE SERVICES

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By

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ABSTRACT

Since the mid-1980s, states have employed managed care organizations (MCOs) as a delivery system to coordinate the receipt of healthcare services for Medicaid beneficiaries. Though privatizing the delivery of Medicaid services can provide states more predictability in program costs, there is concern that the care delivered or facilitated by MCOs may not ensure beneficiaries receive the healthcare they need. The existing literature on this topic shows consistently mixed results on beneficiary access to care and the quality of the care received. This thesis uses the 2014 Behavioral Risk Factor Surveillance System survey to evaluate access to medical care and utilization of preventive healthcare by comparing responses between managed care states and non-managed care states. This thesis finds that there is not a consistent statistically significant difference in access and utilization in states with Medicaid managed care when compared to those without managed care. The absence of a consistent and meaningful difference resonates with much of the literature and affirms that more research is needed on this topic.

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Disclaimer: The views and opinions expressed herein are those of the author and do not necessarily reflect the views of any organization with which she is associated.

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CHAPTER 1. Introduction

Beginning in the 1980s, states began adopting cost-control strategies to reel in growing Medicaid expenditures, with many moving to a managed care delivery model. A significant amount of research in the 1990s and 2000s studied the effectiveness of managed care in coordinating care for Medicaid beneficiaries, but there has been relatively little research in more recent years. In 2019, 69.6% of the Medicaid population was enrolled in a comprehensive managed care plan, in which beneficiaries' healthcare is coordinated and restricted by a managed care organization (MCO) (*Percentage of Medicaid Enrollees in Managed Care by State and Eligibility Group, FY 2019, 2021*). Managed care organizations emphasize their ability to contain costs in Medicaid programs, though this raises questions about their ability to provide the high-quality, comprehensive care that they promise. Despite their public messaging about the improved quality of care and cost savings that result from the adoption of Medicaid managed care (MMC), the empirical research on the topic paints an inconclusive picture of how effectively MCOs ensure that beneficiaries receive the care they need or the services they are prescribed.

Using data from the Centers for Disease Control and Prevention's (CDC) 2014 Behavioral Risk Factor Surveillance System (BRFSS) survey, this thesis considers how the adoption of MMC affects beneficiaries' access to healthcare and their utilization of preventative services, with each category interpreted through several variables. This thesis focuses on these categories as they most directly relate to the purported benefits of MMC — that beneficiaries will have improved access to high-quality healthcare and that MCOs will appropriately provide preventative care to beneficiaries.

CHAPTER 2. Background

Medicaid was established by the 1965 amendments to the Social Security Act. It is a means-tested health insurance program, dedicated to insuring low-income individuals, that is jointly administered and paid for by federal and state governments. The program has extensive rules for determining eligibility, and states set dramatically different eligibility requirements for their programs. Prior to the passage of the Affordable Care Act (ACA), individuals had to meet income and asset requirements as well as fall into one of five groups: children, pregnant women, caretaker relatives, individuals with disabilities, or the elderly (Schneider et al., 2002). After the passage of the ACA, states could choose to expand Medicaid to people with an income of up to 138% of the federal poverty level (or an annual income of \$18,754 in 2022 dollars) and remove categorical and asset requirements — significantly expanding access to health insurance for childless adults — which 38 states have opted to do.

Medicaid is primarily administered by states, with each state implementing the program, integrating waivers and Section 1115 demonstrations, and developing their composition of benefits as they choose. However, states' administration of the program is under the guidance of the federal government, namely the Centers for Medicare and Medicaid Services (CMS) — an agency within the United States Department of Health and Human Services — which also pays a share of the costs, a state-specific percentage referred to as the federal medical assistance percentage (FMAP).

2.1 Service Delivery Options in Medicaid

Under Medicaid's traditional reimbursement method, states reimburse physicians for services on a fee-for-service (FFS) basis, where patients can seek care from a Medicaid provider and those providers are reimbursed according to their state's schedule of fees (Hu et al., 2015).

This framework for reimbursement ensures that providers are paid for the care they provide, but it can also incentive the provision of unnecessary services by rewarding volume.

The Health Maintenance Organization Act of 1973 laid the groundwork for new models of care delivery that could be controlled by third-party payers (Hiranandani, 2011). By the 1980s, states were looking for strategies to address their growing Medicaid expenditures and began to modify reimbursement strategies by implementing primary care case management (PCCM) in an effort to lower the costs of Medicaid and improve the quality of care (Garrett et al., 2005). Under PCCM, PCPs are paid a monthly fee to provide services directly to the patient and authorize referral to specialty services, acting as a gatekeeper to such services (Hurley et al., 1993). Though some states still employ PCCM, most states have shifted to delivering services through Medicaid managed care (MMC), where states contract with MCOs to provide a specified set of services in exchange for a capitated payment.

2.2 An Overview of Medicaid Managed Care

Medicaid managed care is a delivery system that integrates four fragmented functions of healthcare (i.e., the financiers, insurers, providers, and payers), implements control mechanisms to manage the utilization of services, and determines the prices of services as well as how much providers are compensated (Namburi et al., 2022). MMC is risk-based, meaning that the MCO is at financial risk if they spend more on healthcare services and administration than they receive from the state with which they contract (*Types of Managed Care Arrangements*). However, states can develop capitation arrangements that are risk-adjusted, so that the MCO receives a higher payment for higher risk beneficiaries that are likely to require more expensive care (Hutchinson et al., 2003). The underlying assumption is that because MCOs are at risk, they'll be incentivized to achieve savings by “negotiating discounts with providers and by encouraging

more cost-effective forms of care,” despite the fact that Medicaid reimbursement rates are already far below the rates of private payers (Garrett et al., 2005). It’s further assumed that, because MCOs accept this financial risk, it’s in their best interests to ensure that beneficiaries enrolled in their plans receive timely preventive care (Franco Montoya et al., 2020). Moving to MMC is an attractive option to states as it provides predictability in states’ budgets and allows them to balance enrollment increases with unpredictable tax revenue, though there is limited evidence that managed care ultimately reduces costs and improves access to care (Hinton et al., 2022).

Despite this, 41 states contract with MCOs to deliver healthcare to at least some Medicaid enrollees, as of July 2021. Many states have a mix of MMC and FFS (see Table 3). Some states enroll the majority of their Medicaid population while some may enroll only one population, as an MCO may not want to take on the financial risk of providing care to older or disabled adults. For example, Indiana enrolls 100% of their expansion adult population in MMC and only 30.5% of the aged and blind adult population (*Medicaid Managed Care Penetration Rates by Eligibility Group*, 2021).

The majority of MCOs are for-profit organizations, though research suggests that non-profit MCOs provide better access to care (Long, 2008). In 2019, 16 parent firms operated subsidiary MCOs throughout the country, which were altogether responsible for 63% of the Medicaid enrollment (Hinton et al., 2022). Six of the parent firms (UnitedHealth Group, Centene, Anthem, Molina, Aetna/CVS, and WellCare) collectively enroll 51% of the total Medicaid MCO enrollment, and all are publicly traded and ranked in the Fortune 500 (ibid.). While other private insurance companies are governed by a medical loss ratio (MLR), which is the percent of revenue that must be spent on medical care (as opposed to administrative and other

costs), Medicaid MCOs have only had to begin meeting an MLR since 2019 (*Medical Loss Ratios in Medicaid Managed Care, 2022*). Prior to 2019, there wasn't a minimum amount that the company was required to spend on healthcare, so they could retain unspent funds.

CHAPTER 3. Literature Review

One of the many promises of managed care is that through improved care coordination, beneficiaries will have a regular source of care, receive appropriate preventative care, and receive more timely care. Research consistently shows that MMC is associated with a higher likelihood that beneficiaries have a usual source of care and a lower probability of emergency room use (Burns, 2009; Verdier, 2009; Coughlin, 2009). This persistent finding reflects two sides of the same coin: MCOs connect a beneficiary with a primary care provider (PCP), and when a beneficiary has regular access to a PCP, they no longer need to use emergency services as their primary source of care. An older study of California's Medicaid initiative showed an 18% to 29% reduction in the utilization of emergency care for beneficiaries enrolled in a mandatory managed care program compared to their fee-for-service counterparts, which, the authors postulate, could be a product of the health benefits gained by accessing services through managed care (Bindman, 2005). Another study looking at utilization and access to care for the nonelderly Medicaid population found a statistically significant relationship between the MMC penetration rate (i.e., the share of a state's Medicaid population that is enrolled in managed care) and an increase in the number of visits with a medical practitioner, a decrease in the number of inpatient stays, and a decrease in the number of inpatient surgeries (Herring, 2010). While these are promising results from MMC, a decrease in utilization of services does not necessarily indicate an improvement in health status, as MCOs' utilization management practices permit the denial of medically necessary care.

Most empirical research on this topic yields mixed results. A recent literature review of thirty-two peer-reviewed articles found that MMC can be effective at generating cost savings through various methods, such as reducing hospital readmissions and preventable visits to the

emergency department (Franco Montoya et al., 2020). Concerning access to healthcare, several studies found that managed care improved access to primary and preventative care while others found a reduction or no change in primary care visits (ibid.).

When looking at the impact of MMC on access and utilization, Caswell and Long found that higher county-level rates of managed care penetration were associated with an increase in the likelihood of non-elderly adult beneficiaries visiting the emergency room, experiencing difficulty accessing a specialist, and having an unmet need for prescription drugs (Caswell et al., 2015). These researchers note that these findings “contradict the conventional theories on the ... benefits of managed care.” Using a difference-in-difference approach, Garrett et al. considered differences in utilization of services for non-elderly adults enrolled in mandatory managed care and found that the probability of visiting the emergency room declined by 18% for managed care beneficiaries, but the probability that a beneficiary would receive preventive services also decreased (Garrett et al., 2005).

An early meta-analysis of research on managed care that asked a similar question as this thesis found that, among all types of managed care (i.e., inclusive of managed care plans in the private market), 37% of the articles indicated that managed care beneficiaries received more preventative services than their non-managed care counterparts, though 60% of the articles found no difference in utilization between managed care and non-managed care (Phillips et al., 2000). For Medicaid beneficiaries, being enrolled in managed care was found to be less likely (at a p-value of 0.009) to result in beneficiaries receiving preventative services, though the authors note that these estimates are potentially impacted by a small sample size (ibid.).

For female beneficiaries, the probability of receiving sex- and age-appropriate examinations, such as a Papanicolaou test (i.e., pap smear) or a breast examination, decreased by

13% (Garrett et al., 2005). This study also found that beneficiaries enrolled in PCCM had 35% fewer doctor visits than their FFS counterparts, which is similar to the effect of mandatory managed care. Concerning Medicaid-enrolled children, this study found that MMC did not have a significant effect on the likelihood that beneficiaries had a usual source of care, received well-child care, reported unmet healthcare needs, or visited a doctor or healthcare professional more or less when compared to the utilization of services for children enrolled in an FFS county (ibid.).

Hu et al. employ a difference-in-difference approach to study the impacts of the staggered adoption of mandatory managed care enrollment in Pennsylvania that took place from 1995 to 2004 (Hu et al., 2015). Such an approach eliminates the bias that may come from beneficiaries self-selecting into a managed care plan and allows the researchers to exploit the staggered implementation to “difference out” other effects. The researchers found that pregnant women enrolled in MMC experienced fewer preventable complications during their pregnancy, though there wasn’t a reduction in charges or costs. Looking specifically at high-risk pregnancies (defined as having a pre-existing condition or a nonpreventable complication), preventable complications were found to be significantly lower in counties that had implemented MMC, indicating that managed care may have resulted in more effective treatment and better coordinated care.

It’s not unexpected that the impact of MMC on clinical outcomes varies by population, as populations that are high risk and high cost may also have more complex health conditions. Non-elderly disabled adults typically have more complex medical needs and a higher demand for healthcare compared to the non-elderly, non-disabled population. One study found that non-elderly disabled beneficiaries enrolled in mandatory MMC were 22.9% more likely to have

difficulty accessing a specialist compared to their counterparts in counties with FFS and were also 21.7% more likely to wait more than thirty minutes to meet with their primary provider (Burns, 2009). This study also looked to see if disabled beneficiaries were more likely to have, in the past twelve months, received a physical and a pap smear and, in the past two years, to have received a mammogram and a cholesterol check. The results showed a negative relationship that lacked statistical significance, indicating that access to those services under MMC is not meaningfully distinct from access under FFS (ibid.). A finding that did have statistical significance concerned receiving a flu shot in the past twelve months, which beneficiaries in MMC were 10.3% less likely to receive compared to their counterparts in FFS (ibid.).

Rare qualitative research on non-elderly disabled beneficiaries' access to care provides a glimpse into this population's lived experience of MMC and its perceived effects on access to care. Eighty percent of interviewees shared that the shift to MMC disrupted their relationship with their primary care physician because they didn't belong in the MCO's provider network, which, for one individual, led to misdiagnoses, dismissal of concerns, and an inability to access a specialist due to a narrow provider network (Hiranandani, 2011). Respondents also reported difficulty getting a new wheelchair (for one individual, this led to the development of potentially fatal pressure sores); delays in servicing existing wheelchairs; delays and denials for adjustable beds, commode chairs, grab bars, and toilet seats; restrictive formularies; limited medical supplies; time-limited hospital stays; and limited access to preventative care (ibid.). The medical needs of this high-cost population may be incompatible with the cost-containment goals of MMC, and resource-poor individuals have few alternatives to access the healthcare that they need when their MCO isn't willing to provide it.

A report from the federal Department of Health and Human Services Office of Inspector General found that 51% of the providers in MCOs' networks could not offer appointments to beneficiaries, which could indicate that provider networks are narrower than what the MCOs publicize (Levinson, 2014). Notably, 8% of the providers were not participating in the plan, 35% could not be found at their purported locations, and another 8% were not accepting new patients (ibid.). Concerning wait times for appointments, only 51% of the providers that were available could meet with a patient in two weeks or less, and the remaining 49% were only able to offer appointments for two weeks to more than three months away.

CHAPTER 4. Conceptual Framework

As the literature demonstrates, the adoption of MMC can have a dramatic impact, positive or negative, on beneficiary access to, and utilization of, healthcare. Narrow networks, provider incentives, and care management practices intertwine differently for each individual and further vary by MCO and by state. This thesis evaluates the effect of different Medicaid delivery systems on several dependent variables that reflect access to, and utilization of, healthcare and preventative services. Figure 1 shows the conceptual framework, which demonstrates this proposed relationship. Figure 1 also demonstrates the potential effect of the MCOs' cost containment strategies and methods for utilization management upon variables gauging access and utilization, which do not necessarily result in beneficiaries having adequate access to care or receiving appropriate preventative care.

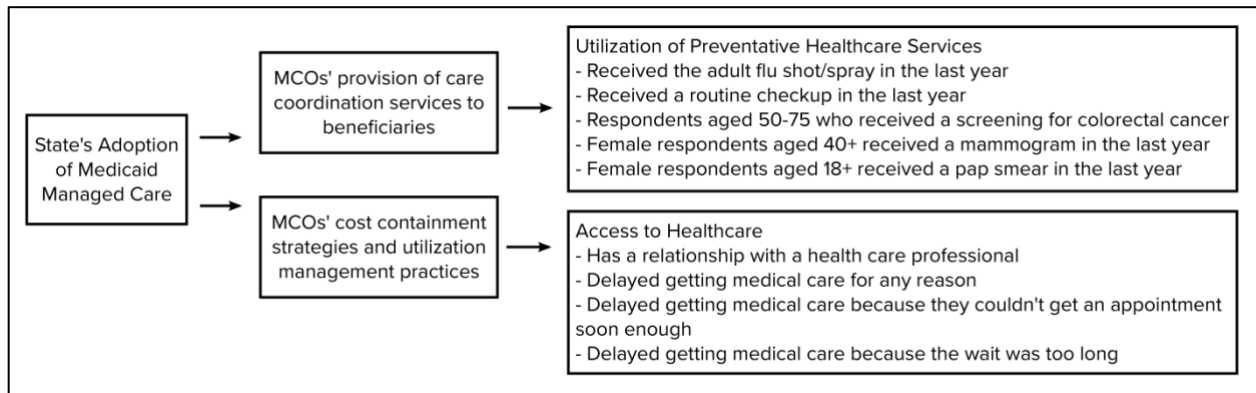


Figure 1. Proposed Conceptual Framework

4.1 Operationalizing Preventative Healthcare Services

To operationalize preventative healthcare, this thesis considers the recommendations made by the United States Preventive Services Task Force (USPSTF), which is a group of national, volunteer experts convened by the Agency for Healthcare Research and Quality (AHRQ) (*The Guide to Clinical Preventative Services 2014*). The clinical recommendations made by the USPSTF are intended to help individuals and PCPs determine if a given

preventative service is appropriate for the individual. This thesis incorporates the following USPSTF recommendations: 1) one of three screenings for colorectal cancer for respondents between the ages of 50 and 75 (i.e., blood stool test within the past three years, a sigmoidoscopy within the past five years, or a colonoscopy in the past ten years); 2) mammography for women aged 40 and over; and 3) pap smear for women between the ages of 21 and 65.

4.2 Proposed Hypotheses

This thesis hypothesizes that the states that have adopted MMC will have a statistically significant difference on all metrics, relative to the states that operate Medicaid with FFS. Under the variables that concern access to healthcare, this thesis anticipates that beneficiaries in MMC states will be more likely to have an established relationship with a healthcare provider than beneficiaries in FFS states, as this dependent variable is directly related to MCOs' coordination of medical care for the beneficiary. This thesis will test whether beneficiaries in MMC states have delayed getting medical care. Given the literature, it is anticipated that beneficiaries in MMC states will have experienced more delays than non-MMC states. Concerning the utilization of preventive healthcare, this thesis anticipates that MMC beneficiaries will be more likely to receive a routine checkup in the previous year, that they will be more likely to have received the flu shot or spray in the previous year, that respondents between 50 and 75 years old will be more likely to have received screenings for colorectal cancer, that female respondents aged 40 and over will be more likely to have received a mammogram in the last year, and that female respondents aged 18 and older will be more likely to have received a pap smear in the last year. This anticipated relationship assumes that MCOs are providing and coordinating the services, exams, and preventative care appropriate for a given beneficiary.

CHAPTER 5. Data and Methods

5.1 Source of Data

This thesis uses the Behavioral Risk Factor Surveillance System (BRFSS), which is an annual survey conducted by states and supported by the Centers for Disease Control and Prevention's (CDC) Population Health Surveillance Branch. The BRFSS surveys noninstitutionalized adults, aged 18 years and older, that reside in the U.S. and collects individual-level data on "preventive health practices and risk behaviors that are linked to chronic diseases, injuries, and preventable infectious diseases that affect the adult population" (2014 *BRFSS Data Overview*). Since 2011, the survey has been conducted on both landline and mobile phone. States have some discretion in the modules that they add to their questionnaire, resulting in heterogeneity in the responses to certain questions.

This thesis uses the 2014 survey results, largely because the survey did not ask about the interviewee's source of health insurance in the previous years. Further, thirty-seven states asked this question in 2014, which is the largest uptake of the question in the recent past. The question was not asked by any state in 2015 though it was asked by eight states in 2016, five in 2017, eight in 2018, eleven in 2019, and five in 2020 (see Table 13). This low uptake makes cross-temporal and intrastate comparisons infeasible.

5.2 Independent Variables

The key independent variable for this thesis is a binary variable indicating the state's adoption of MMC. This was derived from the 2014 Medicaid Managed Care Enrollment and Program Characteristics report, which is published annually by CMS. This report is developed with enrollment data collected directly from states, the District of Columbia, and U.S. territories. In addition to enrollment for MMC, this report also includes state-specific plan-level enrollment

and identifies the types of delivery systems (i.e., comprehensive MCO, PCCM, etc.) used in each state (excluding FFS states).

Given the complex social characteristics that can influence access to healthcare, this thesis controls for several demographic variables: sex, coded as a binary male/female variable; race and ethnicity, coded as White non-Hispanic, Black non-Hispanic, and Hispanic; age delineated by various increments, beginning with 18 to 24, 25 to 34, 35 to 44, and so on with the final variable capturing age 65 and above; self-reported general health status defined as good (inclusive of “excellent,” “very good,” and “good” responses) and poor (inclusive of “fair” and “poor” responses); marital status; the highest grade or year of school completed, beginning with some high school, high school graduate or GED recipient, and one year to three years of college or technical school. This thesis also controls for the presence of a chronic illness, as self-reported by the interviewee, which includes the following conditions: heart attack, angina, coronary heart disease, stroke, asthma, skin cancer, other types of cancer, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, arthritis, depressive disorder, kidney disease, or diabetes.

5.3 Dependent Variables

This thesis’ outcome variables align with the federal access requirements for Medicaid MCOs and other measures that are used in evaluating Medicaid MCOs. They primarily concern a beneficiary’s access to healthcare and utilization of preventative services, described further below.

Access to Healthcare

There are two variables that are considered for their partial role in operationalizing access to healthcare. The first variable tested is whether or not the respondent has a relationship with a

healthcare provider or personal doctor, to which a respondent can differentiate between having only one provider, multiple, or none. The second variable indicates if a beneficiary experienced a delay in accessing medical care due to any of the following reasons: they couldn't get through on the telephone, couldn't get an appointment soon enough, had to wait too long to see the doctor, found that the clinic or doctor's office wasn't open when they arrived, and/or they didn't have transportation to the appointment. There is an additional binary variable that indicates if a beneficiary experienced a delay in getting medical care because they had to wait too long to see the doctor, and another that indicates they couldn't get an appointment soon enough.

Utilization of Preventative Healthcare

As previous literature has illustrated, Medicaid MCOs have been found to be associated with the provision of preventive health care (Burns 2009). This thesis considers five variables as metrics of Medicaid beneficiaries' utilization of preventative healthcare. The first variable concerns whether or not a beneficiary received a routine checkup in the last year. The second variable is if an individual received the adult flu shot or spray in the previous twelve months. The third variable concerns the completion of a screening for colorectal cancer for those between the ages of 50 and 75. The fourth variable indicates if an individual received a mammogram in the previous year, and the last variable indicates if an individual received a pap smear in the previous year. All of these are binary variables that were created from the BRFSS data file.

5.4 Empirical Approach

Given the focus of this thesis, the BRFSS sample was restricted to only the individuals that indicated Medicaid was their source of health insurance. Given the infrequency with which this information is available (see Table 13), and that the question wasn't asked prior to 2014, we were not able to analyze responses for the identified dependent variables in the period before and

after a state’s adoption of MMC. Instead, one MMC state is paired with one non-MMC state based on observable factors, such as median income, population density, demographics, and Medicaid expansion status, resulting in the four pairs in the table below. Two states (Delaware and Connecticut) expanded Medicaid on January 1, 2014, and the other states expanded in a later year or have yet to expand. Once this data was restricted and the paired states were identified, we created five analytical files; the first included all eight states and the remaining four files each include a single pair of states.

	MMC State	Non-MMC State
State Pair #1	Delaware	Connecticut
State Pair #2	Georgia	Alabama
State Pair #3	South Carolina	North Carolina
State Pair #4	Utah	Montana

Empirical Model

This thesis estimates the below reduced form model of the access and utilization outcome variables, described previously, and the association with states’ use of MMC, controlling for characteristics of the beneficiary. The specification takes the following form:

$$Y_i = \alpha + \beta MMC_s + \gamma X_i + e_i$$

where Y is the binary outcome variable of interest (i.e., delayed care for any reason, delayed care because they could get an appointment soon enough, delayed care because the wait time at the clinic was too long, has at least one personal doctor, received an annual checkup, received the flu vaccine in the last year, received a screening for colorectal cancer, received a mammogram, received a pap smear), MMC_s is the presence of Medicaid managed care in a given state, s , X_i includes the various individual-level control variables, and e is the remaining error term. The model is estimated for each outcome variable, Y_i , separately. Additionally, this model is estimated for the aggregate set of states and then separately for the selected state pairings.

CHAPTER 6. Results

6.1 Descriptive Statistics

Tables 1 and 2 reflect responses to the 2014 BRFSS survey. They are isolated to individuals that indicated they have Medicaid as their source of insurance and are only shown for the states considered in this thesis. Table 1 shows the self-reported health status and other health characteristics of the respondents included in this sample. There's variation between the states, though some similarities emerge. Across the states, few respondents indicated that they are in “excellent” or “poor” health, with most indicating that their health is “good.” A large share of respondents indicated that they’ve been diagnosed with a chronic illness. All states show that at least a third of respondents have an activity limitation due to a health problem, with one state showing that over half of respondents have such a limitation. These results also show that large portions of the respondents indicated that they have difficulty walking or climbing stairs or have difficulty concentrating or remembering.

Table 1. Health Profile of Medicaid Beneficiaries in Selected States

U.S. State	AL	CT	DL	GA	MT	NC	SC	UT	Average
General Health (%)									
Excellent	7.0	13.7	11.7	20.5	10.8	12.4	14.6	10.8	13.4
Very Good	13.9	25.8	27.1	14.1	18.4	21.6	20.9	24.4	20.1
Good	33.8	32.8	35.0	25.7	32.4	29.8	30.4	33.5	30.7
Fair	29.6	21.5	16.0	21.9	25.9	18.4	21.2	20.2	21.8
Poor	15.7	5.8	10.2	17.6	11.5	16.6	12.4	11.0	13.5
Has been diagnosed with a chronic illness (%) ^a	76.7	65.6	65.9	61.2	72.0	65.4	67.6	69.7	67.1
Has an activity limitation due to health problem (%)	51.3	34.2	37.0	46.6	43.6	39.6	33.8	41.3	40.7
Has a health problem that requires equipment (%)	22.3	14.2	17.3	14.3	14.5	21.3	15.9	15.3	17.7
Is blind or has difficulty seeing (%)	16.1	5.1	9.1	9.5	12.2	7.6	14.2	12.5	10.2
Has difficulty concentrating or remembering (%)	38.9	23.2	24.9	18.7	24.5	23.4	26.4	35.1	26.0
Has difficulty walking or climbing stairs (%)	41.2	19.0	21.0	33.1	33.5	34.4	27.9	27.3	30.8
Has difficulty dressing or	11.1	6.3	8.9	6.7	13.1	14.1	10.6	12.7	10.3

bathing (%)									
Has difficulty doing errands alone (%)	25.6	16.6	11.3	19.5	18.7	19.7	15.2	19.0	18.8

Data source: 2014 Behavioral Risk Factor Surveillance System survey

AL: Alabama; CT: Connecticut; DL: Delaware; GA: Georgia; MT: Montana; NC: North Carolina; SC: South Carolina; UT: Utah

The frequencies in this table may not sum to 100% due to rounding.

^a This indicates that a respondent affirmed that they have been diagnosed with at least one of the following conditions: heart attack, angina, coronary heart disease, stroke, asthma, skin cancer, other types of cancer, chronic obstructive pulmonary disease, emphysema, chronic bronchitis, arthritis, depressive disorder, kidney disease, or diabetes.

Table 2 shows the demographic and socioeconomic characteristics of the BRFSS sample used in this thesis. Across states, the majority of respondents tend to identify as female. There is notable variation between states regarding the race and ethnicity of respondents. Montana and Utah are both predominantly White Non-Hispanic, though the other states have much more racial and ethnic diversity. Regarding income, most respondents shared that they have an income of less than \$10,000, with about 30% of respondents sharing that their income is between \$10,000 and \$19,999. A large share of respondents (17%) shared that they didn't know their income or were not sure of their income.

Table 2. Demographic and Socioeconomic Profile of Beneficiaries in Selected States

U.S. State	AL	CT	DL	GA	MT	NC	SC	UT	Average
Sex (%)									
Male	28.6	40.3	35.8	22.0	29.9	32.7	22.3	31.4	29.9
Female	71.4	59.7	64.2	78.0	70.1	67.3	77.7	68.6	70.1
Race and Ethnicity (%)									
White Non-Hispanic	46.5	51.4	52.4	37.2	82.5	44.0	45.1	70.5	47.0
Black Non-Hispanic	46.1	15.2	31.4	53.6	0	44.9	48.3	2.9	38.8
Asian Non-Hispanic	0.4	2.9	1.1	0	0	0	0.3	1.5	0.7
AI/AN Non-Hispanic	1.5	0.5	3.8	3.3	9.8	2.3	1.6	3.5	2.2
Hispanic	3.7	25.1	9.6	4.9	3.7	4.7	3.1	16.8	8.5
Other Race, Non-Hispanic	1.7	4.9	1.7	4.0	4.0	4.1	1.6	4.8	3.0
Level of Education (%)									
Did not graduate high school	38.5	20.4	24.1	39.8	28.1	29.9	33.6	25.0	31.3
Graduated high school	35.9	38.0	39.0	31.0	31.9	36.4	32.5	33.2	35.0
Attended college or technical school	20.6	29.1	29.1	22.1	26.5	26.7	26.7	30.7	25.7

Graduated college or technical school	4.6	10.7	7.7	6.8	12.4	5.9	6.5	11.0	7.2
Marital Status (%)									
Married	21.2	23.3	19.1	15.2	25.9	22.8	22.7	33.8	21.8
Divorced	18.0	17.0	15.6	19.3	20.4	13.8	13.5	25.3	16.5
Widowed	9.3	3.1	3.6	6.8	5.7	5.9	4.2	4.5	5.6
Separated	10.1	4.6	5.0	6.5	4.1	6.2	6.7	5.4	6.5
Never Married	37.8	43.2	50.3	49.1	34.7	43.6	48.5	25.2	43.7
Member of an Unmarried Couple	3.5	8.9	6.3	3.1	9.3	7.7	4.5	5.7	5.9
Income Level (%)									
Less than \$10,000	24.5	16.7	16.4	24.0	22.4	21.7	27.8	25.0	22.6
\$10,000 to \$14,999	14.0	8.9	8.8	12.6	13.3	18.6	12.5	12.2	13.5
\$15,000 to \$19,999	16.8	14.8	20.5	12.2	19.7	14.9	18.9	15.2	15.7
\$20,000 to \$24,999	9.0	12.1	19.9	15.5	13.2	10.0	12.0	12.4	12.0
\$25,000 to \$34,999	5.3	13.6	9.2	9.6	7.5	5.2	7.2	6.6	7.9
\$35,000 to \$49,999	3.0	9.5	3.2	6.0	4.7	6.3	1.3	3.9	5.2
\$50,000 to \$74,999	1.7	4.8	0.2	2.3	2.3	0.4	1.5	3.1	2.1
\$75,000 or more	0.6	4.4	2.7	0.5	1.85	0.9	1.7	2.3	1.6
Don't know/Not sure	22.1	10.9	17.6	16.8	10.9	20.4	15.2	16.1	17.2
Age (%)									
18 to 24	15.4	14.3	20.8	21.9	21.5	26.6	24.8	17.0	21.1
25 to 29	14.4	14.2	12.9	12.5	15.8	12.4	13.9	15.7	13.5
30 to 34	12.0	13.8	17.2	14.0	12.9	8.1	15.8	13.2	12.6
35 to 39	9.6	9.0	6.7	11.2	8.3	6.7	9.2	10.4	8.9
40 to 44	8.5	10.1	6.8	5.7	7.7	8.5	8.3	7.4	8.2
45 to 49	5.6	9.5	8.3	4.5	7.1	8.7	4.9	7.5	6.9
50 to 54	7.6	9.4	12.2	12.5	6.9	8.3	6.3	8.5	8.9
55 to 59	7.5	6.3	6.3	7.3	6.5	7.0	6.0	7.7	6.8
60 to 64	7.1	5.5	4.4	3.7	7.2	3.5	4.4	5.1	4.7
65 to 69	4.4	2.7	1.5	2.6	2.4	3.5	3.2	3.0	3.2
70 to 74	2.1	1.7	0.5	2.9	2.2	1.8	1.1	2.1	1.9
75 to 79	1.8	0.5	0.7	0.5	0.6	1.8	1.2	1.3	1.2
80 and older	3.8	2.2	0.9	0.8	0.8	2.2	0.8	1.2	1.8

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

AL: Alabama; CT: Connecticut; DL: Delaware; GA: Georgia; MT: Montana; NC: North Carolina; SC: South Carolina; UT: Utah

The frequencies in this table may not sum to 100% due to rounding.

6.2 Findings

Logistic regressions of the dependent variables on the set of independent variables largely fail to demonstrate a link between MMC and improved access to care and appropriate utilization of preventative healthcare when compared to non-managed care states. Logistic regressions yield

largely statistically insignificant results, indicating that the type of delivery system doesn't have a strong relationship with Medicaid beneficiaries' access and utilization of healthcare. The statistical significance of the key independent variable (i.e., whether or not a state adopted MMC), and the direction of the effect, varies dramatically between the four pairs. This variation may be a partial cause of the statistically insignificant estimates seen in the aggregate results.

Regarding the key independent variable, the aggregate estimates do not indicate that states' adoption of MMC has a statistically significant impact, in either direction, on beneficiaries experiencing delays in accessing care, having a relationship with a healthcare provider, receiving an annual checkup or flu shot, or receiving preventative screenings per the USPSTF recommendations. One might expect that the implementation of MMC would result in greater access to care and increased utilization of preventative healthcare, but the above results do not demonstrate such a finding. We approach these results with caution and recognize that state-specific differences can meaningfully impact aggregate estimates.

Concerning delays in access to care for any reason (i.e., that they couldn't get through on the telephone, couldn't get an appointment soon enough, had to wait too long to see the doctor once at the office or clinic, the clinic or office was closed when the beneficiary arrived, or because they didn't have transportation), Table 4 shows mixed results in both the direction of the effect and whether there was a statistically significant impact. At the aggregate level and in one state pair there wasn't a significant impact. Two state pairs show that the beneficiaries in the MMC states were less likely to experience a delay than their non-MMC counterparts, though one state pair shows that they were much more likely to experience a delay.

The estimates in Table 5 demonstrate that there was little difference between the MMC states and their non-MMC counterparts in delaying care because they couldn't get an

appointment soon enough. In one state pair, beneficiaries in the MMC state were much less likely to delay accessing healthcare because they couldn't get an appointment soon enough. The other estimates lack significance and are both above and below 1.

Concerning delays because of the wait at the clinic, the results in Table 6 are mixed, as direction and magnitude of the difference varies dramatically between the estimates, three of which lack statistical significance. Concerning the pairs that have significance, one pair shows that beneficiaries in the MMC state were much more likely to experience a delay in accessing care, with a significant odds ratio of 2.38. That said, another pair shows that beneficiaries in the MMC state were much less likely to experience a delay in accessing care, with an odds ratio of only 0.176.

In Table 7, we see that MMC is strongly related with beneficiaries having a relationship with a healthcare provider for one state pair, with an odds ratio of 2.66. This result aligns with established literature, cited previously. In another state pair, we see that the opposite is true, as being under the MMC delivery system results in people being much less likely to have a relationship with a provider. The aggregate results and the other two state pairings have inconclusive results, indicating that there wasn't enough variation between the two states to indicate that MMC had a causal impact on improving the likelihood that a beneficiary has a relationship with a health provider.

Table 8 shows largely inconclusive results concerning receipt of an annual checkup, though in one state pair we see that beneficiaries in the MMC state were less likely than their non-MMC counterparts to have an annual checkup. In Table 7, this state pair did not indicate that beneficiaries in the MMC state were more likely to have a relationship with a healthcare provider than their non-MMC counterparts, and the lack of this relationship may have led fewer

beneficiaries to access routine annual care. The aggregate results and the other state pairs do not show a significant difference between the MMC and non-MMC states.

None of the state pairs, nor the aggregate regression, show that there was a significant difference between the MMC states and non-MMC states in beneficiaries' receipt of the flu vaccine, seen in Table 9. Given the results in Table 8, it's possible that beneficiaries were not receiving regular, routine preventative care and were therefore not reminded to get the flu vaccine by their provider.

None of the state pairs, nor the aggregate regression, show a significant difference between the MMC state and non-MMC state for beneficiaries receiving a screening for colorectal cancer (as age appropriate).

Table 11, which reports the results for the receipt of an annual mammogram, shows that there were only significant results in one state pair. With an odds ratio of 2.028, the MMC state was much more likely to ensure that beneficiaries received a mammogram than the non-MMC state.

Similarly, Table 12 shows that only one state pair had significant results. Beneficiaries in the MMC state were much more likely to receive an annual pap smear than their non-MMC counterparts. The other results are at or beneath 1, indicating that MMC was associated with a less than 100% likelihood that beneficiaries would receive a pap smear, though all lack statistical significance.

CHAPTER 7. Discussion

It has been suggested that states' adoption of managed care will increase access to services for Medicaid beneficiaries and improve patient care compared to other service delivery models. It is thought to provide more timely care as well as manage the utilization of services, while ensuring that beneficiaries receive needed care. At the aggregate level, this thesis contradicts this suggestion as the use of MMC did not result in improvements in access to healthcare or improved utilization of preventative services for Medicaid beneficiaries. As indicated in the previous section, the coefficients of the dependent variables, regardless of the direction, are not statistically significant at the 10%, 5% or 1% level of significance for the aggregate set of states. For example, receiving an annual checkup with a healthcare provider is a standard point of contact between a beneficiary and their PCP, though beneficiaries in MMC states were not found to be more likely to have visited a PCP than beneficiaries in non-MMC states. Other anticipated relationships, detailed in the Methods chapter, between MMC and the dependent variables were not present at a statistically significant level in the aggregate analysis.

As the paired-state logistic regressions demonstrate, some MMC states have the anticipated relationship with the dependent variables when compared to their non-managed care counterpart. However, some state pairs show an unanticipated negative relationship with statistical significance, such as the pair that showed respondents in the MMC state were much more likely to experience a delay of care for any reason. Additionally, many of the pairs fail to demonstrate a statistically significant difference between the managed care and non-managed care states, as was seen for receipt of the flu vaccine. The lack of statistically significant relationships between the key independent variable and the dependent variables contradicts the conventional theory about the impact of managed care on beneficiary outcomes. One of the

primary strategies behind MMC's cost containment is to shift the "locus of care" away from high-cost settings and ensure timely access to preventative care (Casewell et al. 2015). This is not borne out by the findings in this thesis, as many of the MMC states were not found to purvey the appropriate preventative services and screenings significantly different from the non-managed care states.

The statistical non-significance should only be considered at the significance levels described above and is restricted to the data analyzed in this thesis. Further, these results are subject to the limitations described below.

These findings conform with the consensus in this field that there is significant variation between state Medicaid programs and, consequently, in outcomes for Medicaid beneficiaries. One potential explanation for the aggregate-level findings is that there were state-level interventions (e.g., incentive payments for providers) that contributed to heterogeneous outcomes for beneficiaries in different states, and not necessarily the same outcomes for the beneficiaries residing in states that employ managed care. This thesis did not control for these interventions, which could have led to confounded results.

Limitations

There are several limitations to this thesis' results. These estimates are impacted by a lack of control of the factors that affect implementation as, under Medicaid managed care, a state can employ various tools to incentivize specific behaviors from providers, which inherently makes comparison between MMC states difficult. Additionally, the BRFSS dataset provides income as a categorical variable with various groupings rather than a continuous variable of a participant's actual income. Further, the groupings that are available do not precisely match to Medicaid

eligibility limits. Therefore, this thesis is unable to control for beneficiary income, which is a critical determinant of an individual's ability to access healthcare.

Additionally, 2014 was the first year that BRFSS surveyors asked interviewees about the source of their health insurance. This may have had a direct effect on the surveyor and their ability to provide assistance to the interviewee in responding to the question. Additionally, this question was in an optional module of the BRFSS questionnaire. States were able to add the module with the question about the source of health insurance to their questionnaire and, as with all optional modules, were required to ask the question without modification.

Though six of the states included in this analysis did not expand Medicaid in 2014, two states did — Connecticut and Delaware. Beneficiaries in these states may have indicated that Medicaid was their insurer, though their responses reflect their access to, and utilization of, healthcare at a time when they may not have had Medicaid insurance, let alone any insurance. Given that both states expanded January 1, 2014, it is possible that there are similar differences in beneficiary enrollment and that responses regarding access and utilization of services for beneficiaries enrolled under Medicaid expansion are similar between the two states.

CHAPTER 8. Conclusion

This thesis built off existing literature to explore several metrics on access and utilization in a comparison of managed care and non-managed care states. Using the 2014 BRFSS survey, this thesis failed to find a consistent statistically significant difference. There were pockets of significance in the states that have adopted MMC, but at the aggregate level and in many of the state pairings, this research failed to find a positive statistically significant relationship between the use of managed care and access to healthcare and utilization of preventative services. The marked lack of statistical significance in these findings is notable, as conventional theory suggests that the adoption of managed care would result in fewer delays in accessing care, establishment of a relationship with a PCP, receiving routine annual care, and receiving appropriate preventative services and screenings. The absence of a consistent and meaningful difference resonates with much of the literature, which finds largely mixed results, and affirms that more research is needed on this topic. To support future research, institutions could work to make anonymized, administrative claims data publicly and freely available.

APPENDIX

Table 3. U.S. Managed Care Population by State (2019)

State	Expanded Medicaid	Number of Enrollees in Risk-Based Managed Care*	Percent of State Medicaid Enrollment*
United States	N/A	53,657,764	69%
Arizona	Yes	1,580,628	84%
Arkansas	Yes	45,236	5%
California	Yes	10,384,817	81%
Colorado	Yes	112,938	9%
Delaware	Yes	199,724	84%
District of Columbia	Yes	194,136	73%
Florida	No	2,967,589	78%
Georgia	No	1,418,039	74%
Hawaii	Yes	327,762	100%
Illinois	Yes	2,122,611	71%
Indiana	Yes	1,074,346	73%
Iowa	Yes	602,684	94%
Kansas	Yes	341,297	86%
Kentucky	Yes	1,224,145	90%
Louisiana	Yes	1,356,398	84%
Maryland	Yes	1,190,456	82%
Massachusetts	Yes	726,804	40%
Michigan	Yes	2,443,239	52%
Minnesota	Yes	849,507	78%
Mississippi	No	436,028	65%
Missouri	Yes	596,646	70%

Nebraska	Yes	247,285	100%
Nevada	Yes	498,872	76%
New Hampshire	Yes	173,073	90%
New Jersey	Yes	1,498,187	93%
New Mexico	Yes	667,641	80%
New York	Yes	4,460,781	73%
North Dakota	Yes	19,692	22%
Ohio	Yes	2,371,042	84%
Oregon	Yes	868,229	80%
Pennsylvania	Yes	2,434,956	86%
Rhode Island	Yes	258,954	83%
South Carolina	No	801,150	64%
Tennessee	No	1,437,402	100%
Texas	No	3,577,456	92%
Utah	Yes	215,764	74%
Virginia	Yes	1,274,510	87%
Washington	Yes	1,512,472	87%
West Virginia	Yes	387,376	76%
Wisconsin	No	757,892	63%

Data Source: “Total Medicaid MCO Enrollment.” Kaiser Family Foundation. 2019.

Note: States that have not adopted a managed care delivery model are excluded from this table.

Table 4. Delayed Care for Any Reason

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.107	0.549***	0.607**	1.753***	1.127
Female	1.240	1.951***	1.109	1.114	1.016
White	0.617**	0.860	1.490	0.322**	0.698
Black	0.714	1.627	1.347	0.304**	0.836
Hispanic	0.561*	1.136	1.757	0.225**	0.049**
In good health	1.797***	1.400	2.098***	2.135***	1.557
Married	0.858	0.913	0.556**	1.164	0.558**
Has a chronic illness	1.622***	1.593*	1.730*	1.315	2.311**
Did not graduate high school	0.972	1.141	1.069	1.011	0.562
Graduated high school	0.905	1.149	0.889	0.672	0.748
Has some college education	0.954	1.363	0.827	0.974	0.466**
Aged 18-24	2.699***	4.440***	4.209***	2.510**	2.118
Aged 25-34	3.961***	6.415***	4.430***	2.242**	6.597***
Aged 35-44	3.208***	3.878***	3.489**	2.740**	3.695***
Aged 45-54	3.219***	3.965***	2.660**	2.788**	3.530***
Aged 55-64	2.194***	2.446**	3.286**	1.812	2.244**
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.145***	0.049***	0.080***	0.370*	0.175**
F-value	5.00	1.40	2.28	2.52	3.23
Observations	2,999	820	658	868	653

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

Note: This dependent variable indicates that an individual experienced a delay in accessing care because they couldn't get through on the telephone, couldn't get an appointment soon enough, had to wait too long to see the doctor once at the office or clinic, the clinic or office was closed when the beneficiary arrived, or because they didn't have transportation.

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 5. Delayed Care Because They Couldn't Get an Appointment Soon Enough

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	0.893	0.277***	0.687	1.284	2.047
Female	1.542	1.656	1.245	3.449***	0.827
White	0.661	1.636	2.029	0.262*	0.280
Black	0.686	2.383	4.301	0.248*	0.330
Hispanic	0.907	2.790	3.968	omitted	omitted
In good health	1.090	0.774	2.303*	1.525	0.783
Married	1.149	1.135	0.937	1.611	1.441
Has a chronic illness	1.959**	1.669	2.654	1.167	9.404**
Did not graduate high school	0.635	0.635	0.624	0.471	13.263**
Graduated high school	0.724	0.777	0.435	0.279**	23.847***
Has some college education	0.920	1.254	0.872	0.584	12.102**
Aged 18-24	3.631**	5.196	4.177	3.740	3.172
Aged 25-34	3.858***	13.608***	6.508*	2.068	4.076**
Aged 35-44	2.420**	7.461**	3.663	2.404	0.413
Aged 45-54	2.696**	6.993**	1.503	2.449	1.221
Aged 55-64	2.217*	2.849	3.802	2.306	1.455
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.039***	0.009***	0.009***	0.095*	0.002***
F-value	1.84	2.63	1.27	2.25	1.76
Observations	2,210	639	497	607	444

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 6. Delayed Care Because the Wait to See the Doctor Was Too Long

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.340	0.477	0.176**	2.380**	2.108
Female	1.071	1.108	0.241**	1.437	0.963
White	0.407**	0.642	0.874	0.329	0.249
Black	0.764	2.368	omitted	0.477	0.370
Hispanic	0.366*	0.912	0.516	0.232	omitted
In good health	1.556	0.431	2.489	1.700	3.252
Married	0.640	1.224	0.069*	0.438	0.699
Has a chronic illness	1.117	1.430	4.301*	0.938	1.234
Did not graduate high school	0.517**	2.495	0.783	0.936	0.072***
Graduated high school	0.471**	3.184	1.665	0.488	0.148*
Has some college education	0.592*	8.580**	0.488	0.909	0.042***
Aged 18-24	2.946**	4.201	8.975*	2.387	0.252
Aged 25-34	3.784***	4.362*	3.161	1.082	26.446***
Aged 35-44	2.045	2.754	0.675	0.992	6.529*
Aged 45-54	2.278*	1.950	2.845	2.143	1.654
Aged 55-64	1.532	0.350	0.398	1.527	2.230
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.065***	0.005***	0.047	0.081	0.096
F-value	2.56	1.50	2.57	1.91	5.67
Observations	2,110	589	462	611	434

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 7. Has At Least One Person They Consider to Be a Personal Doctor or Healthcare Provider

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.039	2.658***	0.591*	0.826	1.329
Female	1.616***	1.581*	2.540***	2.424***	0.810
White	0.974	0.428	1.594	0.965	2.464
Black	0.804	0.169***	3.567	0.914	2.069
Hispanic	0.648	0.227**	1.032	0.986	2.908
In good health	1.107	0.778	1.820**	1.414	0.835
Married	1.225	1.049	1.754**	1.741*	0.933
Has a chronic illness	1.652***	1.806**	1.654*	1.680*	2.002*
Did not graduate high school	1.074	0.509	0.693	1.372	1.273
Graduated high school	1.062	0.865	0.676	1.555	0.875
Has some college education	1.019	1.554	0.515*	0.944	1.092
Aged 18-24	0.146***	0.148***	0.455	0.169***	0.047***
Aged 25-34	0.234***	0.258*	0.452*	0.252**	0.107***
Aged 35-44	0.306***	0.361	0.538	0.464	0.110***
Aged 45-54	0.543**	0.884	0.851	0.419	0.421
Aged 55-64	0.875	1.588	1.573	0.816	0.456
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	5.953***	14.612***	1.622	3.090	8.828**
F-value	7.53	3.58	3.00	2.83	3.40
Observations	3,017	823	663	877	654

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 8. Visited a Doctor for a Routine Checkup in the Last Year

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	0.804	1.211	0.653	0.560**	1.191
Female	1.155	1.414	0.796	1.056	0.956
White	1.084	0.637	0.861	1.360	2.188
Black	2.419	1.379	0.463	2.821**	4.059**
Hispanic	1.036	0.848	1.238	1.120	1.217
In good health	0.786	1.141	1.342	0.580*	0.621
Married	0.879	0.884	1.148	1.179	0.536
Has a chronic illness	1.568	1.272	1.946***	1.581	1.943
Did not graduate high school	1.021	0.754	1.212	1.076	0.862
Graduated high school	0.786	0.537*	1.135	0.968	0.583
Has some college education	0.882	0.923	0.664	0.942	0.628
Aged 18-24	0.413	0.141***	0.573	0.834	0.202**
Aged 25-34	0.278	0.127***	0.503*	0.462*	0.171***
Aged 35-44	0.292	0.164***	0.432*	0.340**	0.294**
Aged 45-54	0.465	0.174***	0.570	0.740	0.421
Aged 55-64	0.649	0.348**	1.007	1.079	0.375*
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	5.507***	17.766***	2.824*	1.670*	6.436*
F-value	5.30	2.20	2.26	2.82	2.01
Observations	2,956	814	641	862	639

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 9. Received the Flu Vaccine in the Last Year

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	0.877	0.836	0.930	0.886	0.979
Female	1.135	1.439	0.961	1.070	1.001
White	1.490*	1.571	0.630	1.240	3.061**
Black	1.221	1.539	0.801	0.989	2.169
Hispanic	1.402	1.434	0.570	0.847	4.593**
In good health	0.888	1.168	1.039	0.889	0.727
Married	0.876	0.992	0.940	1.141	0.449***
Has a chronic illness	1.743***	1.774**	1.630*	1.208	3.049***
Did not graduate high school	1.080	1.829	1.040	1.610	0.549
Graduated high school	1.231	1.336	0.667	1.495	1.070
Has some college education	1.153	1.903**	0.579	1.490	0.682
Aged 18-24	0.336***	0.188***	0.844	0.230***	0.550
Aged 25-34	0.259***	0.233***	0.862	0.181***	0.360**
Aged 35-44	0.240***	0.283***	1.217	0.176***	0.252***
Aged 45-54	0.328***	0.275***	0.636	0.279***	0.399**
Aged 55-64	0.418***	0.483*	1.590	0.319***	0.402**
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.755	0.417	0.859	1.336	0.351
F-value	5.69	2.35	1.38	2.86	3.38
Observations	2,858	767	638	833	620

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

Note: Respondents were informed that this includes the various methods of vaccine administration, such as the shot in the arm or a nasal spray, mist, or drop.

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 10. Received Screening for Colorectal Cancer

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.278	1.601	1.140	1.288	1.022
Female	0.595***	0.811	0.971	0.700	0.343***
White	0.671	1.246	0.141***	2.312	0.115***
Black	0.493	1.301	omitted	1.277	0.092***
Hispanic	0.300	0.434	0.202*	2.477	0.025**
In good health	0.817	1.042	1.220	0.448**	1.206
Married	0.419***	0.570	0.862	0.273***	0.691
Has a chronic illness	0.531***	0.317	0.559	0.582	0.606
Did not graduate high school	2.141**	1.843	0.703	3.802**	2.192
Graduated high school	1.744*	1.702	0.473	3.119*	2.218
Has some college education	1.114	0.665	0.334*	3.347*	0.997
Aged 18-24	omitted	omitted	omitted	omitted	omitted
Aged 25-34	omitted	omitted	omitted	omitted	omitted
Aged 35-44	omitted	omitted	omitted	omitted	omitted
Aged 45-54	1.863	1.214	1.574	3.398**	2.047
Aged 55-64	0.709	0.621	0.735	0.606	0.869
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	1.636*	1.864	15.980***	0.583	12.209***
F-value	5.38	1.61	1.90	2.95	4.66
Observations	1,110	290	228	299	290

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

Note: This reflects that a respondent was between the ages of 50 and 75 and have had a blood stool test within the past three years, a sigmoidoscopy within the past five years, or have had a colonoscopy in the past ten years.

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 11. Received a Mammogram in the Last Year

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.030	0.824	0.827	0.631	2.028*
Female	omitted	omitted	omitted	omitted	omitted
White	1.078	1.241	2.011	6.725**	0.275***
Black	1.986**	2.340	1.691	6.145**	1.003
Hispanic	2.070*	1.673	2.307	21.307**	1.054
In good health	0.821	1.106	0.614	0.609	0.973
Married	0.894	1.811	1.002	0.519*	0.951
Has a chronic illness	1.034***	2.234**	1.776	2.158	1.751
Did not graduate high school	0.540*	1.094	0.534	0.425	0.327**
Graduated high school	0.656	0.923	0.399*	0.533	0.653
Has some college education	0.564*	0.878	0.380*	0.432	0.392
Aged 18-24	omitted	omitted	omitted	omitted	omitted
Aged 25-34	omitted	omitted	omitted	omitted	omitted
Aged 35-44	0.263***	0.435	0.486	0.303**	0.111***
Aged 45-54	1.552*	1.829	0.817	2.051*	1.488
Aged 55-64	1.040	0.935	2.128	1.334	1.043
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.620	0.253	0.359	0.218	2.052
F-value	5.51	1.77	1.83	2.50	4.50
Observations	1,480	394	301	397	388

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

Note: The responses to this question were restricted to respondents that were female and over the age of 40.

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 12. Received a Pap Smear in the Last Year

	All States	CT and DL	MT and UT	NC and SC	AL and GA
MMC	1.043	1.658*	0.861	0.973	1.077
Female	omitted	omitted	omitted	omitted	omitted
White	1.478	0.614	2.977***	3.431**	0.764
Black	2.366***	1.285	10.466*	3.406**	1.769
Hispanic	1.351	0.830	2.469*	2.374	0.584
In good health	0.976	0.646	1.018	1.129	1.244
Married	0.977	1.587	1.004	0.704	1.073
Has a chronic illness	0.735	1.100	1.361	0.685	0.664
Did not graduate high school	1.163	2.574*	0.606	0.602	1.205
Graduated high school	1.277	2.894***	0.661	1.135	0.799
Has some college education	1.602*	2.504**	0.544	1.558	1.129
Aged 18-24	23.782***	16.619***	143.368***	27.112***	27.625***
Aged 25-34	70.401***	39.038***	302.067***	75.924***	112.752***
Aged 35-44	36.781***	40.924***	192.942***	32.926***	36.130***
Aged 45-54	28.918***	39.685***	97.377***	34.752***	19.861***
Aged 55-64	20.142***	13.613***	60.358***	30.812***	18.156***
Aged 65+	omitted	omitted	omitted	omitted	omitted
Constant	0.014***	0.013***	0.002***	0.010***	0.023***
F-value	9.14	3.91	3.13	3.33	4.52
Observations	2,175	545	468	650	512

Data Source: 2014 Behavioral Risk Factor Surveillance System survey

Note: The responses to this question were restricted to respondents that were female and were between the ages of 21 and 65, per the USPSTF recommendation.

* Indicates a p-value at or below 0.10; ** Indicates a p-value at or below 0.05; *** Indicates a p-value at or below 0.01

Results have been rounded to the nearest thousandths.

Table 13. Availability of Health Insurance Question in the BRFSS Survey

State	2014	2016	2017	2018	2019	2020
Alabama	x					
Alaska	x					
Arizona	x					
Arkansas						
California					x	x
Colorado					x	
Connecticut	x				x	
Delaware	x	x	x			
District of Columbia	x	x	x			
Florida			x		x	
Georgia	x	x		x		x
Hawaii						
Idaho	x					
Illinois						
Indiana					x	
Iowa	x					
Kansas					x	
Kentucky	x	x				
Louisiana	x	x		x		
Maine					x	
Maryland	x					
Massachusetts	x					
Michigan	x					
Minnesota	x	x				
Mississippi	x			x	x	
Missouri						
Montana	x					
Nebraska	x			x		
Nevada	x					

New Hampshire	x			x		
New Jersey	x		x			
New Mexico	x	x		x		
New York	x					
North Carolina	x					
North Dakota	x					
Ohio	x				x	x
Oklahoma						
Oregon	x			x		
Pennsylvania	x	x			x	
Rhode Island	x					
South Carolina	x					
South Dakota						
Tennessee	x				x	
Texas						x
Utah	x					
Vermont	x			x		
Virginia	x					x
Washington	x					
West Virginia	x					
Wisconsin	x		x			
Wyoming						
Number of states that asked about source of health insurance:	37	8	5	8	11	5

Data Source: 2014, 2016, 2017, 2018, 2019, and 2020 Behavioral Risk Factor Surveillance System surveys

Note: If blank, the state did not ask BRFSS interviewees about their source of health insurance. Not a single state asked about interviewees' source of health insurance in 2015.

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