Medicaid and HIV/AIDS in the United States:
A State-Level Analysis of Beneficiaries and Spending

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Abstract

Medicaid and HIV/AIDS in the United States:
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People with HIV/AIDS rely disproportionately on the public sector for their health care, particularly Medicaid, estimated to be their single largest source of coverage in the United States. Despite the importance of Medicaid for people with HIV disease, however, few analyses have assessed the extent of its role for this population, either nationally or across the states. Prior studies have been quite limited, hampering the ability of policymakers and others to understand Medicaid's role for this population or to prepare for future changes, such as those expected as the result of the implementation of the Affordable Care Act in 2014. This dissertation helps to fill this gap by conducting the first-ever national analysis of Medicaid beneficiaries with HIV/AIDS, based on data from all states, for the 2003 to 2007 period. It not only provides a detailed description of Medicaid beneficiaries with HIV/AIDS, spending, and services, it documents significant variation by state across these areas. The analysis goes further to analyze the key correlates of variation, pooling data across states and using a state and time fixed effects model, in an effort to identify policy and programmatic levers that could be used to enhance Medicaid access and equity for people with HIV/AIDS. Overall, this study finds that there are two such levers – the federal matching percentage for the Medicaid program (FMAP) and physician supply, although the findings related to the FMAP suggest limits in its ability to promote equity across the states. In addition, those states that already opt to provide more generous Medicaid eligibility have greater Medicaid access for people with HIV/AIDS.

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Chapter One: Policy Problem

Introduction

The HIV/AIDS[1] epidemic remains a serious problem in the United States today (Centers for Disease Control and Prevention [CDC] 2011a). While preventable and treatable, there is still no cure for HIV disease, which continues to be a disabling condition for many, requiring complex and expensive medications, and multiple other health services (CDC, 2011b). People with HIV/AIDS may be forced to leave (or unable to enter) the workforce, thereby losing income and access to employer-sponsored health insurance; in addition, a significant share of those newly diagnosed are already uninsured (Kates, Levi, Neal, & Gallagher, 2002), and those who are HIV positive are more likely to be impoverished (CDC, 2010a, 2011f). As such, people with HIV/AIDS rely disproportionately on the public sector for their health care, particularly Medicaid, the nation's principal safety net health insurance program for low-income Americans.

Medicaid is estimated to be the single largest source of health insurance coverage for people with HIV/AIDS in the United States (Kates, 2004; Kates & Levi, 2007; Bozzette et al., 1998; Institute of Medicine [IOM], 2010, 2011; Kaiser Family Foundation [KFF], 2009a; Kates, 2011). The program is jointly financed by the federal government and the states, but designed and administered by the states within broad federal guidelines. As a result, Medicaid varies significantly by state in terms of eligibility criteria, benefits packages, provider payments, and other key aspects of the program (KFF, 2010a), and

[1] Throughout this dissertation, the terms "HIV/AIDS", "HIV" and "HIV disease" are used interchangeably.

such variation has raised concerns about access and equity among policymakers, researchers, and others (Holahan, 2002, 2007; Adams, 1995; Grannemann & Pauly, 2010).

Despite the importance of Medicaid for people with HIV disease, however, few analyses have assessed the extent of its role for this population, either nationally or across the states, and most prior studies have been quite limited. The lack of data on Medicaid beneficiaries with HIV/AIDS has significantly hampered the ability of policymakers and others to understand Medicaid's role for people with HIV/AIDS in the United States, including how access may vary across the country, or to prepare for future changes, such as those expected as the result of the implementation of the Patient Protection and Affordable Care Act (ACA) in 2014 (Public Law 111–148). The dissertation aims to fill this gap by providing new information on Medicaid's role for people with HIV/AIDS, including the identification of potential policy levers that may be available to reduce variation across states and enhance access to and equity in the Medicaid program.

The remainder of this Chapter sets the stage and context for understanding the motivation of my dissertation research, and describes my research approach and expected contributions. Because the dissertation focuses on the intersection of two complex areas – HIV disease and Medicaid – I first provide an overview of each. The overview of HIV disease describes the current status of the HIV/AIDS epidemic in the United States, including key demographic trends, and the importance of insurance coverage, care and treatment for the population. The overview of Medicaid describes the respective roles of

the federal and state government in designing and operating Medicaid, the main components of Medicaid, and how variation by state is a key feature of the Medicaid program. It also discusses the expected changes in Medicaid due to the implementation of the Affordable Care Act. Finally, this Chapter describes my research design and expected contributions, and discusses the overall organization of the dissertation.

HIV/AIDS

The human immunodeficiency virus (HIV) is a virus that destroys certain types of white blood cells, causing deterioration of the immune system and affecting the body's ability to stave off infections that most healthy individuals can easily fight (National Institute of Allergy and Infectious Diseases [NIAID], 2008; CDC, 2006). It is these infections, called opportunistic infections, which result in HIV-related morbidity and mortality. Acquired immunodeficiency syndrome (AIDS) is the most advanced stage of HIV disease.

The first cases of HIV/AIDS were reported in the United States in 1981 (CDC, 1981). Since that time, more than 1.7 million people are estimated to have been infected with HIV in the U.S., including more than 600,000 who have already died, and although the annual number of new HIV infections has declined from its peak in the earlier years of the epidemic, new infections continue at a steady rate today (CDC, 2011a, 2011c). The most recent estimates from the Centers for Disease Control and Prevention (CDC) indicate that approximately 50,000 people are newly infected with HIV each year in the

U.S, a number higher than previously thought and what the CDC characterized as "plateau[ing] at an unacceptably high level"(Prejean et al., 2011; CDC, 2011d, 2011e).

HIV/AIDS cases have been reported in all states in the country, although most are concentrated in a subset of states – ten states account for 70% of all people living with HIV/AIDS in the United States. The HIV/AIDS prevalence rate (the number of people living with HIV/AIDS as a share of the population) is approximately .3% nationally.[2] It varies by state ranging from .03% in Montana and North Dakota to 2.6% in the District of Columbia (author calculations based on CDC, 2010b).

One of the defining characteristics of HIV disease has been its disproportionate impact on certain population groups, particularly racial and ethnic minorities, and gay and bisexual men of all races. In 2009, the majority of new infections (68%) occurred among minority Americans, with blacks representing the largest share of any race/ethnicity (Prejean et al., 2011; CDC, 2011e). Gay and bisexual men also continue to be at high risk, accounting for 61% of new infections in 2009, and young gay and bisexual men are the only group for whom rates of new infections are on the rise (Prejean et al., 2011; CDC, 2011e).

Most new HIV infections occur among men (77% in 2009), and the rate of new infections among black men in 2009 was six times that of white men (CDC, 2011e). Women have represented a fairly stable share of new infections for much of the past decade, accounting for 23% of new infections in 2009. However, among women, black women have been particularly hard hit, accounting for 57% percent of new infections among

[2] Among those estimated to have been diagnosed with HIV infection and/or AIDS.

women in 2009, a rate 15 times higher than that of white women, and more than twice the rate among white men (CDC, 2011e).

Studies have also found a link between HIV and poverty. Early research by the CDC found an inverse correlation between AIDS prevalence and income over a ten-year period (Karon, Fleming, Steketee, & De Cock, 2001). Similarly, Holtgrave and Crosby (2003) found that income inequality and social capital were inversely and significantly correlated with AIDS case rates. More recent research has corroborated these findings, finding higher HIV prevalence among those with lower socioeconomic status (CDC, 2010a, 2011f).

While HIV continues to be a serious illness, without a cure, major advances have been made in the care and treatment of HIV disease, most notably due to the introduction of effective antiretroviral treatments (ARVs) in 1996. ARVs, when used in combination, can slow the rate of progression of HIV disease, and have resulted in significant reductions in HIV-illness and death (NIAID, 2008; Department of Health and Human Services [DHHS], 2011). Combination antiretroviral therapy is the recommended standard of care by the U.S Department of Health and Human Services (DHHS) and the World Health Organization (WHO) (DHHS, 2011; WHO, 2010). It is also recommended that people with HIV/AIDS receive care as early in their illness as possible, including antiretrovirals as well as a range of primary and specialty care services (DHHS, 2011; WHO, 2010). Moreover, a recent study sponsored by the National Institutes of Health (NIH) found that taking antiretrovirals earlier in the course of HIV disease not only had

positive clinical benefits for the HIV positive individual, but led to significant reductions in the risk of HIV transmission to their HIV-negative partners (NIAID, 2011), underscoring the importance of ARVs.

In large part due to ARVs, HIV death and hospitalization rates (which had reached their peak in 1995) began to decline in the mid-1990s. For example, between 1995 and 2007, HIV death rates fell by 77% percent; hospital discharge rates dropped by 33% between 1995 and 2006 (NCHS, 2010a, 2010b)). In addition to antiretroviral treatment, successful HIV prevention efforts also contributed to these declines by helping to reduce the number of new infections from their peak in the late 1980s (CDC, 2011a). Because of these developments, HIV is increasingly considered a chronic illness for those who have consistent and adequate access to regular care and treatment (Health Resources and Services Administration, 2006; Horberg et. al., 2010).

Still, while preventable and treatable, there is no cure for HIV, and access to care and treatment remains a barrier for significant shares of those living with the disease (Teshale et al., 2005; Kates & Levi, 2007; CDC, 2011b). ARV treatments, despite their success, must generally be taken for life, and are not easily tolerated by all patients. Moreover, they are expensive. A typical ARV treatment regimen costs between $11,000 and $15,000 per patient per year, depending on the specific treatment regimen and payer (Kates, 2004; KFF, 2006a; Kates & Levi, 2007; National Alliance of State and Territorial Directors, 2011). When additional medical expenses for doctor's visits, laboratory tests, and drugs to prevent and treat HIV-related opportunistic infections are taken into

account, average annual costs can rise to more than $20,000 per person per year (Kates, 2004; IOM, 2005). The high costs of treatment have created barriers to access for many people with HIV/AIDS. The CDC estimates that in 2010, less than half of all people with HIV/AIDS in the U.S. were in regular care and only 36% were on antiretrovirals (CDC, 2011b). Given the expense of HIV care and treatment, insurance coverage is critical to accessing care. Yet because HIV is still a disabling condition for many, people with HIV/AIDS may be forced to leave (or unable to enter) the workforce, thereby losing income and access to employer-sponsored health insurance; in addition, a significant share of those newly diagnosed with HIV are already uninsured, and HIV prevalence is higher among those with lower incomes (Kates et al., 2002; Kates & Levi, 2007; CDC, 2010a, 2011f).

Studies show that the public sector, particularly Medicaid, has been a critical source of care and coverage for unemployed and/or low income people with HIV/AIDS, with Medicaid estimated to be the single largest source of coverage for people with HIV/AIDS in the United States (Kates, 2004; Kates & Levi, 2007; Bozzette et al., 1998; IOM, 2010, 2011; Kates, 2011). The next largest source of coverage for people with HIV/AIDS is private insurance, followed by Medicare, although many low income Medicare beneficiaries with HIV/AIDS also rely on Medicaid to help cover their expenses. Those who are uninsured (generally because they are not eligible for Medicaid and cannot afford coverage or have been considered uninsurable in the individual insurance marketplace due to their HIV infection[3]) rely heavily on the federal Ryan White Program

[3] Under the ACA, individual and group health plans will be prohibited from using pre-existing medical conditions exclusions as of January 2014; until that time, a temporary national high-risk

which provides care and support services to uninsured and underinsured people with HIV/AIDS in the U.S., functioning as the "payer of last resort" and "wrapping around", or supplementing, Medicaid (IOM, 2004; Kates, 2004; Kates & Levi, 2007; KFF, 2011a).

This Chapter now turns to a description of the Medicaid program, highlighting the respective roles of the federal and state governments in designing the program and the ways in which it varies across the country.

Medicaid

Created in 1965, Medicaid has become the nation's principal safety net health insurance program for low-income Americans, providing health and long-term care services to almost 60 million today (KFF, 2010a). Medicaid is jointly financed by the federal government and the states. It is voluntary and states that choose to participate in Medicaid, as all do, receive federal matching payments based on a set-formula if they operate their Medicaid programs according to federal guidelines (Congressional Research Services [CRS], 2010; KFF, 2010a).

Federal guidelines governing Medicaid are broad, and provide states with considerable flexibility to determine eligibility criteria, benefits, provider payment rates, and other components of the program. As a result, Medicaid varies significantly across the country, operating as more than 50 distinct programs, one in each state, the District of Columbia, and the U.S. territories. As such, there is differential access to the program based on

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pool was established in 2010 to provide health coverage to those with pre-existing medical conditions (Kaiser Family Foundation, http://healthreform.kff.org/timeline.aspx).

where one lives, with numerous studies documenting wide variations in spending, eligibility, and other factors by state; for example, the proportion of the population covered by Medicaid ranges from a low of 8% in New Hampshire and Nevada to a high of 22% in the District of Columbia (KFF, 2010a; Holahan, 2002, 2007). Variation in Medicaid is indeed a key feature of the program, recognized as the "rule rather than the exception" (CRS, 2010). Therefore, it is important to understand the relative roles of the federal government and the states in determining the program's structure, including eligibility criteria, benefits, and payment rates, as well as how these vary across the country. Federal Medicaid requirements and state Medicaid policy and programmatic choices are summarized in Table 1.1, followed by a more detailed description of each of these components.

Table 1.1: Overview of Federal Medicaid Requirements and Key State Medicaid Policy & Programmatic Choices		
Category	**Federal Requirements**	**State Policy & Programmatic Choices**
Financing: Federal Medical Assistance Percentage (FMAP)	➢ Federal government provides match based on legislatively mandated formula, which assesses state per capita income relative to the national average ➢ Minimum match is 50%	➢ Medicaid is voluntary. States decide whether to participate and if they do, must provide matching funds depending on match rate. ➢ All states participate ➢ FMAP ranges from 50% to approximately 75%; state match ranges from 25% to 50%
Eligibility Criteria	➢ Mandatory eligibles must be covered by states if they choose to participate in Medicaid ➢ Optional eligibles can be covered and federal government will provide matching payments	➢ States decide if they will cover optional eligibles, including those at higher income levels or categories that are not mandated ➢ States decide if asset test will be used as part of their financial eligibility criteria ➢ There is wide variation in eligibility criteria by state
Benefits Package	➢ Mandatory benefits must be covered by states if they choose to participate in Medicaid ➢ Optional benefits can be covered and federal government will provide matching payments ➢ States must provide same* benefit package to all categorical eligibles (mandatory and optional). ➢ States have some ability to determine the amount, duration, and scope of services (e.g. a per month limit) ➢ States can require premiums and cost-sharing in some cases.	➢ States decide if they will cover optional benefits ➢ States define amount, duration and scope differently ➢ Some states impose premiums and cost-sharing ➢ There is wide variation in benefits package by state
Provider Payments	➢ Federal law requires payments be "…consistent with efficiency, economy and quality of care and are sufficient to enlist enough providers so that care and services are available…"	➢ States set payment rates ➢ There is wide variation in rates by state

Sources: DHHS Office of the Assistant Secretary for Planning and Evaluation (ASPE), 2011; KFF, 2010a; Social Security Act, 42 U.S.C, Chapter 7; CMS, 2011.

Federal Medical Assistance Percentage (FMAP)

The Federal Medical Assistance Percentage (FMAP) is used to determine the amount of federal matching funds that each state will receive for Medicaid. It is annually determined by the federal government based on a legislatively mandated formula that assesses state per capita income relative to the national average. In other words, there is an inverse relationship between a state's income and the amount of federal Medicaid resources it receives, with richer states receiving less funding and poorer states receiving more. In FY 2011, the FMAP ranged from 50% in 15 states (the minimum level as set by law) to 75% in Mississippi, the state with the lowest income per capita (ASPE, 2011). The goal of the FMAP, established when the Medicaid program itself was created, is to reduce variation among states in the coverage of low income populations by more evenly distributing the financing burden (Government Accountability Office [GAO], 1983, 2003).

Eligibility

Medicaid eligibility is complex. To qualify for Medicaid, individuals must meet certain financial criteria, based on income (as measured by federal poverty level) and, in some cases, assets. Under current federal law, poverty alone is insufficient to be eligible for Medicaid; low-income individuals must also be part of a group that is considered "categorically" eligible for the program. There are both mandatory eligibility groups, which are groups all states must cover if they participate in Medicaid, and optional eligibility groups, which are groups states can choose to cover in their Medicaid

programs and receive federal matching funds for the costs of their care and services (KFF, 2010a; CMS, 2011).

Mandatory eligibility groups include: children under age 6 with family incomes below 133% of the federal poverty level (FPL); children between the ages of 6 and 18 with incomes below 100% FPL; pregnant women with incomes below 133% FPL; some other categories of low income parents (usually those below 50% FPL); certain low income Medicare beneficiaries; and the elderly and persons with disabilities receiving Supplemental Security Income (SSI). This last category constitutes an important one for people with HIV/AIDS.

Optional eligibility groups include: pregnant women, children, and parents with incomes that exceed the mandatory thresholds identified above; elderly and disabled individuals with incomes up to 100% FPL; the working disabled with incomes up to 250% FPL; the "medically needy," individuals with high medical expenses who meet Medicaid's categorical eligibility criteria (e.g., the disabled) but do yet meet Medicaid's income criteria, unless their medical expenses are taken into account (e.g., they "spend down" to Medicaid's income eligibility criteria by virtue of their high medical expenses); and the disabled with incomes too high to qualify for SSI cash assistance, but who receive a state supplementary payment (SSP) in their state, an optional payment some states make to this group. States also have the option to use an asset test as part of their financial eligibility criteria; almost all do for the disabled and elderly, and approximately half do in the case of parents (KFF, 2010a).

Because of state flexibility, Medicaid eligibility criteria range across the country. For example, 17 states do not have medically needy programs; more than half do not provide any coverage to childless adults, regardless of income, and among those that do, it is fairly limited; and 34 states limit Medicaid eligibility for low income parents to less than 100% of FPL, including 17 at less than 50% FPL (KFF, 2010a, 2010b). In addition, 24 states set their Medicaid income eligibility criteria for the elderly and disabled at or below the SSI income level (75% FPL) (KFF, 2010b).

Benefits

Medicaid provides a comprehensive range of services, and its benefits package extends beyond what many private insurance plans offer to include services that are critical to those with disabilities and other complex medical conditions. As with eligibility, there are both mandatory services that states must cover to participate in Medicaid, and optional services that states can choose to cover as part of their Medicaid program for which they receive federal matching payments. Mandatory services include the following: physician services; inpatient and outpatient hospital services; laboratory and x-ray services; long-term care services; family planning services; and transportation services. Optional services include: prescription drugs; clinic services[4]; dental services; rehabilitation and other therapies; and case management.

[4] "Clinic services" under the Medicaid program are preventive, diagnostic, therapeutic, rehabilitative or palliative services furnished by a facility that is not part of a hospital but is organized and operated to provide medical care to outpatients. See, KFF, 2011b.

Federal law requires states to provide the same benefit package to all categorical eligibles, whether mandatory or optional eligibles, including any optional benefit that the state has chosen to cover. States have some ability to determine the amount, duration, and scope of services, e.g. a per month limit, and states can require premiums and cost-sharing in some cases. As with eligibility, therefore, this flexibility has led to variation in the benefits package across the states. For example, while all states cover prescription drugs, an optional benefit that is particularly critical for people with HIV/AIDS, 19 states limit the number of prescriptions per month or per year and most (44) require co-payments for medications. Dental services are also optional, and three states do not cover them; of those that do, 22 have co-payment requirements. Physician services are mandatory benefits, and therefore covered by all states, but 31 have co-payment requirements, and many limit physician visits in some way (KFF, 2011b).

Provider Payment Rates

Medicaid payments for services are made directly by states to providers who furnish services to beneficiaries. Payments are provided either to providers on a fee for service basis and/or by contracting with managed care plans for a capitated (per person) rate paid to providers. Federal law requires that Medicaid payments be "…consistent with efficiency, economy and quality of care and are sufficient to enlist enough providers so that care and services are available under the plan at least to the extent that such care and services are available to the general population in the geographic area…" (Social Security Act, 1965, §1902(a)(30)(A); CMS, 2011). In the case of capitated payments, CMS rules require them to be "actuarially sound", defined in part as "appropriate for the populations

to be covered, and the services to be furnished" (42 CFR §438.6(c)(2)). Beyond these requirements, states are otherwise able to set rates for most Medicaid services, which vary by state. For example, in 2008, the Medicaid fee index (a measurement of a state's Medicaid physician payments relative to the national average) ranged from .58 in New Jersey to 2.05 in Alaska, with 15 payment fees below the national average (Zuckerman, Williams & Stockley, 2009). Another way Medicaid fees are measured is relative to Medicare fees, which are on average higher than Medicaid fees, and set according to a national standard (with much less geographic variation). In 2008, the Medicaid-to-Medicare fee ratio ranged from a low of 0.37 in New Jersey to a high of 1.43 in Wyoming, and averaged 0.72; 11 states are below this average (Zuckerman et al., 2009).

All of these key aspects of the Medicaid program are expected to change with the implementation of the Affordable Care Act in 2014. These expected changes are reviewed in the following section.

The Affordable Care Act

On March 23, 2010, President Obama signed the Affordable Care Act into law. The Affordable Care Act is expected to make significant changes to the Medicaid program, many designed to expand access and create a more uniform program across the country. Thus, the proposed study will provide an important baseline from which to assess the implications of these changes for people with HIV/AIDS. While these changes are not mandated until 2014, they are highlighted here (KFF, 2010c; ACA, 2010):

- FMAP: The Affordable Care Act will significantly increase the FMAP to states for those newly eligible for Medicaid. This includes full federal funding (100% FMAP) for individuals newly eligible for Medicaid, phased-down to a 90% FMAP for 2020 and beyond, and a phased-in increase in the FMAP to states that already had expanded coverage to reach the same 90% in 2020.
- Eligibility: Medicaid eligibility will be significantly expanded by the Affordable Care Act. The new law expands Medicaid income eligibility to a national "floor" of 133% of poverty, designed to help reduce state-by-state variation. Eligibility is to be determined without an assets or resource test. For the first time, it will no longer be necessary for beneficiaries to be part of a categorical eligibility group (e.g., "disabled"), and poverty alone will be sufficient for qualifying for Medicaid.
- Benefits: All adults newly eligible for Medicaid will receive a "benchmark benefit package," or benchmark-equivalent, that meets a minimum standard (that of the essential health benefits available in new state-based Health Benefit Exchanges, also created by the law, through which individuals can purchase insurance coverage). States will also have the option to define a benchmark plan that would cover a more comprehensive benefits package, similar to what is currently offered through Medicaid.
- Provider Payment Rates: Medicaid payments to providers will be increased to 100% of the Medicare payment rates for 2013 and 2014; this increase will be financed entirely by the federal government.

The next section of this Chapter briefly describes what is known Medicaid and HIV/AIDS, highlighting the current gap in knowledge which this dissertation aims to help fill.

Medicaid & HIV/AIDS: The Current State of Knowledge

While Medicaid's importance for people with HIV/AIDS has long been recognized by policymakers, providers, program managers and researchers, who have sought to describe and assess its role for the population since early on in the epidemic (see, for example, Scitovsky, Cline, & Lee, 1986; Andrulis, Beers, Weslowski, Bentley, & Gage, 1987a, 1987b; Roper, 1987; Green & Arno, 1990; CRS, 1993; Graydon, 2000; Kates, 2004; IOM, 2005, 2010, 2011; Kates, 2011), there is limited information available on the extent of its role for people with HIV/AIDS nationally, or across the country. Most prior studies have been based on analyses of data from only a limited number of states, medical sites and settings, and/or patient populations, and are therefore not necessarily representative of the experiences of all Medicaid beneficiaries with HIV/AIDS in the United States, nor do they capture variation by state. In addition, few of these studies analyzed Medicaid specifically, instead focusing more generally on people with HIV in care, and therefore have been unable to provide detailed information on Medicaid's role for people with HIV/AIDS. To date, for example, there has been no in depth, comprehensive analysis of Medicaid beneficiaries with HIV/AIDS broken down by state. As mentioned above, this has hampered the ability of policymakers and others to understand Medicaid's role for people with HIV/AIDS either at the national or state-levels, including any assessment of variation across the country. Given that Medicaid is a federal-state partnership, where

variation is the "rule rather than the exception" (CRS, 2010), the picture of Medicaid's role for beneficiaries with HIV/AIDS remains incomplete.

Intended Contribution of This Study

This dissertation provides an in depth assessment of Medicaid's role for people with HIV/AIDS at the national and state-levels. It builds on prior research in this area, including a recent study conducted by this author which provided the first national snapshot of Medicaid beneficiaries with HIV/AIDS ever conducted (Kates, 2011). First, the dissertation provides a detailed descriptive analysis of Medicaid beneficiaries with HIV/AIDS, nationally and at the state-level, including their demographic characteristics, eligibility pathways, costs, and services. Second, it documents variation across states in enrollment, spending, and service use among beneficiaries with HIV/AIDS. Finally, in an effort to identify potential policy and programmatic levers that may help to reduce variation, enhance access, and provide a more equitable system, it analyzes the correlates of variation across states. My dissertation research is designed to answer five research questions:

1. What is the size of the Medicaid beneficiary population with HIV/AIDS at the national and state-levels?
    a. What share of Medicaid beneficiaries, nationally and by state, do they represent? How does this vary by state?
    b. What share of the people with HIV/AIDS, nationally and by state, do they represent? How does this vary by state?

2. What are the demographic characteristics and eligibility pathways of Medicaid beneficiaries with HIV/AIDS in the United States?
    a. How do these factors (demographic and eligibility pathways for beneficiaries with HIV/AIDS) vary by state?

3. How much does Medicaid spend on beneficiaries with HIV/AIDS in the United States?
    a. How does spending on beneficiaries with HIV/AIDS vary by state?

4. What services do Medicaid beneficiaries with HIV/AIDS in the United States use?
    a. How does service use among Medicaid beneficiaries with HIV/AIDS vary by state?

5. What explains variation in Medicaid HIV enrollment and spending by state? What socioeconomic and political factors are correlated with variation?

By providing new information and analyses of Medicaid's role for people with HIVAIDS in the United States, this dissertation not only contributes to the literature in the field and lays the groundwork for additional research questions to explore, it helps to inform current policy discussions, including those concerning equity and access, and to prepare

for future changes. This is particularly timely in light of expected changes due to the implementation of health care reform in 2014.

Organization of the Dissertation

The remainder of my dissertation is organized as follows. Chapter two provides my conceptual framework and literature review. It is followed by a discussion of methods in Chapter three. My findings are presented in chapter four, and implications for research and policy are discussed in chapter five.

Chapter Two: Literature Review & Conceptual Framework

Introduction

The purpose of this dissertation is to provide an in-depth assessment of Medicaid's role for people with HIV/AIDS at the national and state-levels, and to analyze key correlates of variation across states, to offer new and critical information about this population. In Chapter one, I provided an overview of the information gap this dissertation aims to fill, highlighting that, despite the importance of Medicaid for people with HIV/AIDS, there is a lack of comprehensive knowledge about its role at the national and state-levels, including the extent to which there is variation in enrollees and expenditures by state. I also identified my five primary research questions.

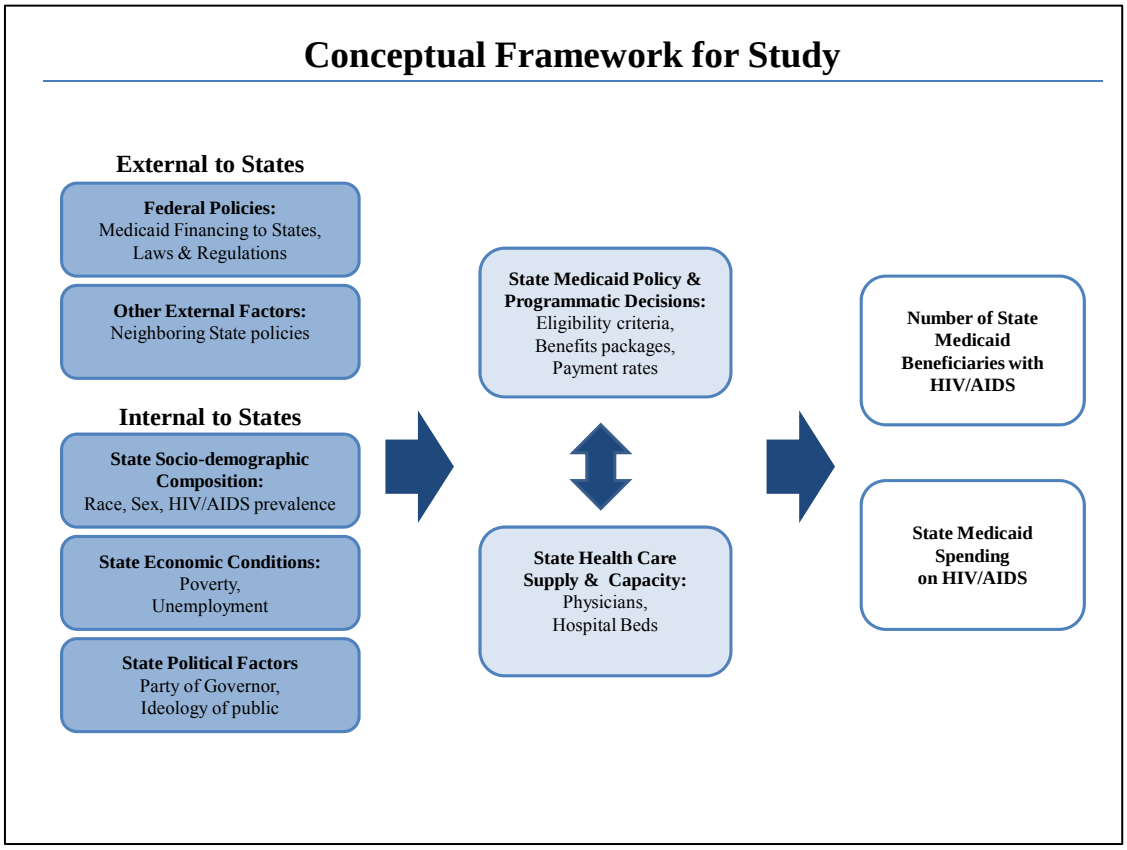
In this Chapter, I provide the conceptual framework used for my analysis. I then examine the literature upon which this dissertation builds. My literature review looks at two primary areas. First, because one key goal of this dissertation is to help fill the current information gap on Medicaid and HIV, I examine the literature on what is already known about Medicaid's role for this population, focusing on studies of Medicaid coverage and cost to date, and assessing the representativeness of past analyses. Second, because I am interested in understanding the correlates of variation in Medicaid HIV enrollment and spending by state to identify potential levers for promoting a more equitable program, I examine the literature exploring the determinants of state Medicaid variation. This literature serves as the theoretical and methodological foundation for my analytic approach.

Conceptual Framework

The conceptual framework used in this dissertation is drawn largely from the literature on state health policy determinants (see, E.A. Miller, 2004, 2005) and adapted to focus specifically on the Medicaid program and state-level variation in HIV enrollment and expenditures. As shown in Figure 2.1, the conceptual framework presents the outcomes of interest within a broader context of a complex federal-state Medicaid picture.

The framework includes factors both external and internal to states that may be associated with state-level Medicaid policies, programmatic decisions, and health care supply/capacity, which may in turn be associated with the outcomes of interest. Factors considered external to states include, for example, the federal matching rate for Medicaid as well as the policies of neighboring states. Internal factors include states' socio-demographic composition, economic conditions, and political dynamics. State-level Medicaid policy, programmatic, and supply/capacity factors include variables such as eligibility criteria, benefits, and payments to physicians. The outcomes of interest in this study are measures of state variation in Medicaid HIV enrollment and spending. This conceptual framework serves as the basis for the development of my analytic strategy, and informs the construction of the multivariate models used to analyze the correlates of variation. I now turn to a review of the literature on what is known about Medicaid and HIV/AIDS, followed by a review of literature on determinants of state variation in Medicaid spending and enrollment.

Figure 2.1 Conceptual Framework for Study



The Literature on Medicaid & HIV/AIDS

Medicaid's importance for people with HIV/AIDS was recognized early on in the epidemic, when researchers and policymakers began to document that the program was financing a growing and significant share of the care for people with HIV/AIDS. By 1986, the federal government was estimating that 40% of people with HIV/AIDS in the U.S. were covered by Medicaid (IOM, 1986; Roper, 1987; Office of Technology Assessment [OTA], 1987), and attention to Medicaid's importance for this population has

continued over time, remaining a top national policy and research priority today (IOM, 2010; DHHS, 2010; White House, 2010).

Studies of Medicaid's role for people with HIV/AIDS have been undertaken throughout the three decades of the epidemic although, as mentioned above, studies to date have been quite limited in scope, based on analyses of data from only a limited number of states, medical sites or settings, and/or patient populations, and therefore not necessarily representative of the experiences of all Medicaid beneficiaries with HIV/AIDS in the United States. Many of the studies conducted do not focus specifically on Medicaid itself, but may include Medicaid as a variable in the analyses. These limitations are in large part due to the lack of accessible and comparable Medicaid data from all states that could be analyzed. One exception is the recent analysis conducted by this author, which provided the first national snapshot of Medicaid and HIV/AIDS (Kates, 2011).

To help situate my research within the larger body of research on Medicaid and HIV/AIDS, I reviewed the literature from the year of the first reported AIDS cases in the U.S. (1981) to the present, focusing on studies that assessed some aspect of Medicaid's coverage and/or cost role for people with HIV/AIDS. Seventy-eight studies were identified for inclusion in this review and they are described in Appendix A. Of these, half (39) analyzed data from the first decade of the epidemic (1981-1990), 32 analyzed data from the second decade (1991-2000) and 17 analyzed data from the third decade (2001-2010). Eleven of the studies were literature reviews of prior estimates. Each of these research eras is described below.

The First Decade

Studies conducted during the epidemic's first decade primarily focused on hospital discharge data; this was the period before advent of effective treatments, when people infected with HIV became quite ill quickly, and hospitalization rates were high. Several of these early studies were analyses of hospitals in a subset of cities or communities; a few looked more broadly at hospitals across the nation. A seminal analysis was conducted by Green & Arno, who analyzed hospital discharge data from New York City, San Francisco, and Los Angeles between 1983 and 1988, and found that an increasing share of HIV/AIDS-related hospitalizations were financed by Medicaid in each city over the period, e.g., in New York City, it rose from 39.7% to 54.5%, prompting the authors to coin the phrase, the "Medicaidization of AIDS" which began to characterize the epidemic (Green & Arno, 1990).

Studies found that Medicaid financing of AIDS care was even higher in some hospital settings. A 1987 analysis of people with AIDS in New York City public hospitals found that 70% were covered by Medicaid (Boufford as cited in Scitovsky, 1988). A 1987 U.S. Office of Technology Assessment's review of several studies found that Medicaid had financed between 12% and 65% of AIDS care, depending on the hospital (OTA, 1987), and a 1989 Government Accountability Office (GAO) analysis of data for five communities - New Haven, Baltimore, Philadelphia, New York City, and Seattle – found that Medicaid paid for 30% to 50% of AIDS hospitalizations between 1986 and 1988 (GAO, 1989).

Studies of larger hospital samples yielded similar findings of an important role played by Medicaid for patients with HIV/AIDS. A 1987 survey of 276 acute care hospitals in the U.S. found that 44% of inpatient admissions were financed by Medicaid, as were 31% of outpatient hospital visits (Andrulis, Beers, Weslowski, & Gage, 1989). Moreover, an analysis of the National Hospital Discharge Survey, a nationally representative probability survey of discharges from non-Federal general and specialty hospitals, found that between 1984 and 1990, the share of HIV/AIDS-related discharges paid for by Medicaid rose from 27% to 40%, while private insurance fell from 50% to 33% (Kozak, McCarthy, & Moien, 1993).

Only a few studies analyzed Medicaid program data specifically but these studies also found Medicaid to be a main source of coverage for people with HIV/AIDS. For example, a review of California's Medicaid program, Medi-Cal, found that by 1988, approximately 50% of people with HIV/AIDS were covered by the program (California Department of Health Services, 1996). Bartnyska, Schactman, & Hidalgo (1995) found that approximately half of people with AIDS in Maryland were enrolled in Medicaid at some point over the first decade of the epidemic.

Studies undertaken in the first decade of the epidemic also provided the first cost estimates, though few were specific to Medicaid. These studies attempted to estimate the lifetime costs of treating patients with HIV/AIDS, almost all of whom were hospitalized at that time. For example, Hardy, Rauch, Echenberg, Morgan, & Curran (1986) produced

the first lifetime estimate of $147,000 per patient. Over the next few years, these estimates were generally revised down, with Sisk (1987) estimating a range with a lower bound of $25,147 and Bloom & Carliner (1988) estimating that lifetime costs would not exceed $80,000. Among the few studies that did provide Medicaid specific cost estimates were studies by Seage, et al. (1986) who found that annual per capita Medicaid costs in 1984 were $40,687 among hospital patients with AIDS in one New England hospital; Andrews, Keyes, & Pine (1988), who found that annual Medicaid costs per person with HIV/AIDS in California ranged from $14,856 to $20,364 between 1982-1984; and Elwood, Fanning, & Dodds (1991), who found that mean lifetime Medicaid expenditures ranged by eligibility group from $17,263 to $30,524 in California, and $25,102 to $47,849 in New York in the 1982-1987 period.

These studies, despite their limitations, formed the basis of estimates made by the federal Centers for Medicare and Medicaid Services or CMS (then called the Health Care Financing Administration, or HCFA), in large part because there were no accessible person-level data at the national level at that time, nor did states typically keep statistics on HIV/AIDS in their Medicaid programs (Howell & Pine, 1991; Pine, 1998). As early as 1986, HCFA was estimating that Medicaid served at least 40% of all people with AIDS nationally and covered nearly 25% of the total medical care cost of AIDS (IOM, 1986; Roper, 1987, 1988; OTA, 1987).

The Second Decade

By the 1990s, while hospital-based analyses continued, they became less relevant for understanding the epidemic, as more and more people with HIV/AIDS were able to be treated in outpatient settings, and HIV-related hospitalizations began to decline. These trends began even before the introduction of effective antiretroviral treatments in 1996, although they accelerated much more significantly after that point (NCHS, 2010a, 2010b). New studies in community and clinic-based settings were undertaken, providing additional levels of information. While none of these studies was designed to look specifically at Medicaid, they did include data about insurance coverage and related issues. For example, a CDC-sponsored survey of people with HIV/AIDS in 11 sites (7 states and 4 city jurisdictions) found that 50% of the sample was covered by Medicaid between 1990 and 1992 (Diaz et al., 1994).

The AIDS Cost and Service Utilization Survey (ACSUS), a major multi-site study funded by the federal Agency for Healthcare Research and Quality (AHRQ), was another important source of data on coverage. The ACSUS study sampled 1,200 patients with AIDS at 26 sites in 10 cities receiving care in 1991 and 1992. It also found a heavy reliance on the public sector (primarily Medicaid), which covered between 37% and 62% of people with AIDS, depending on their level of disease severity (Schur & Berk, 1994).

By the early 1990s, HCFA had begun estimating that approximately 50% of people with AIDS were covered by Medicaid nationally (Pine, 1998; Office of Inspector General, 1998). Medicaid cost estimates were provided by a few studies, including Rains, Do, &

Maxfield (1996) who found that annual per capita Medicaid costs for enrollees with AIDS in California were $18,900 over the 1982-1994 period; similarly, Moore & Chaisson (1997) found that annual Medicaid payments for patients with HIV/AIDS at a Maryland AIDS clinic were $18,096 in the 1992-1995 period.

One limitation of the ACSUS study was its focus only on patients who had already developed an AIDS diagnosis, and it did not capture the full spectrum of patients with HIV disease. This focus became increasingly limited from a research perspective, as people with HIV were beginning to live much longer, and AIDS diagnoses began to represent a smaller share of the population with HIV disease.

After the completion of the ACSUS study, the federal government funded the HIV Cost and Services Utilization Study (HCSUS), which, as the first national probability study of people with HIV/AIDS who were receiving care, was considered groundbreaking. First, HCSUS widened the sample to include people with HIV disease beyond those who had progressed to an AIDS diagnosis. HCSUS also used a complex design methodology to achieve a nationally representative sample of people with HIV/AIDS. HCSUS sampled 2,864 patients with HIV/AIDS from 28 metropolitan areas receiving care in 1996 and 1997, and followed them over a period of two years, providing the first national estimates on a range of health care access and coverage variables for the population (Bozzette et al., 1998). For example, HCSUS found that 44% of those receiving care were covered by Medicaid (Bozzette et.al, 1998; Kates & Levi, 2007); by contrast, approximately 14% of the U.S. population overall is covered by Medicaid (KFF, 2010c), as are an estimated

26% of the disabled population with complex activity limitations (NCHS, 2008). HCSUS also found that people with HIV/AIDS were more likely to be unemployed and low income than the U.S. population overall (Kates & Levi, 2007). Finally, HCSUS estimated annual per capita medical costs for people with HIV/AIDS in care at $22,200 (Bozzette et.al., 1998).

While HCSUS represents one of the most important and oft-cited studies on HIV/AIDS in the U.S., the study ended more than 12 years ago, and much has changed in the HIV treatment and epidemiological landscape since then. In addition, because HCSUS was not designed to study the population of Medicaid beneficiaries with HIV/AIDS, it was not able to answer many questions about the program. Finally, the HCSUS sample is not large enough to provide any state-level analysis.

The Third Decade

HCSUS has not been repeated since 2000, and no other nationally representative study of people with HIV/AIDS in care has been conducted, in part due to the complexity and expense of such an undertaking, particularly due to the fact that the overall national prevalence of HIV/AIDS is less than 1 percent of the U.S. population. Instead, the federal government launched two new data collection efforts to help develop more robust samples – the HIV Research Network (HIVRN) and the CDC's Medical Monitoring Project (MMP). HIVRN began in the early 2000s and is still ongoing today. It is a collaborative effort of 19 institutions in 13 cities from around the nation that collectively provide HIV/AIDS care to over 14,000 patients, who are followed over time (Hellinger,

2005; IOM, 2011). While not nationally representative, HIVRN is able to provide data on a large sample of patients on an ongoing basis, and to capture changes in the HIV treatment and epidemiological landscape. In 2002, approximately 38% of patients in the HIVRN study were found to be covered by Medicaid. HIVRN data from 2006 indicate that 41% were covered by Medicaid, and in 2010, 42% were found to be covered by Medicaid (Yehia et al, 2008; IOM, 2011). While HIVRN remains a promising source of ongoing data, it too will not be able to provide representative information on the population of people with HIV/AIDS, nor is it designed to take an in depth look at those with Medicaid specifically.

The Medical Monitoring Project (MMP), which began in 2005, is led by the CDC in collaboration with other federal agencies (CDC, 2005a). The MMP is a surveillance project that is intended to eventually be able to produce nationally representative data on people living with HIV/AIDS in care by implementing a probability proportional to size (PPS) sampling design, focusing in a subset of locations in the United States (26 sites in its most recent data collection period of 2007). In 2007, the MMP found that 38% of participants were covered by Medicaid[5] (CDC, 2011b, 2011g). However, the overall participation rate in the MMP was low in 2007, and the data were unweighted and not considered nationally representative. It is not clear when or if MMP will achieve a representative sample. In addition, MMP is not designed to measure specifically the experiences of Medicaid beneficiaries with HIV/AIDS.

[5] Author's calculation of data from CDC, 2011g.

One of the common challenges facing prior analyses seeking to assess Medicaid's role for people with HIV has been the lack of uniform and accessible data from all state Medicaid programs; rather, data were only available directly from states, on a state-by-state basis, and, until recently, no national analysis based on data from all states had been conducted. The relatively recent availability of data from the Medicaid Statistical Information System (MSIS), the main source of Medicaid eligibility and claims data reported by states to the federal government, has made new research possible.

While publicly available data from MSIS are still limited – in particular, data are not publicly available for specific diagnoses (see: http://msis.cms.hhs.gov/) – this author was able to obtain data from all states, through a data use agreement with CMS, to enable the first national analysis of Medicaid beneficiaries with HIV/AIDS, as well as comparisons of this group to beneficiaries without HIV/AIDS (Kates, 2011). This analysis found that Medicaid covered an estimated 47% of people living with HIV/AIDS in regular care in the U.S. Spending on beneficiaries with HIV/AIDS in 2007 totaled $5.3 billion, and annual spending per capita was $24,867 (Kates, 2011). This dissertation aims to build on this initial analysis.

Summary of the Literature on Medicaid & HIV/AIDS

Taken together, this body of literature, while underscoring the importance of Medicaid as a source of coverage for people with HIV/AIDS throughout most of the epidemic, is fairly limited. Data from the first decade of the epidemic were not nationally representative, though with hospitalizations generally high among those with HIV/AIDS,

studies of hospital discharge data did provide important information on a fairly large share of the population of people with HIV/AIDS.

By the second decade, especially as inpatient data could no longer capture the care of many people living with HIV/AIDS (which had begun shifting to an outpatient setting, as hospitalization rates, as well as death rates, declined), new strategies were needed to produce more representative samples. Several efforts were undertaken, most notably ACSUS and HCSUS in the 1990s, and HIVRN and the MMP in the 2000s. As noted above, however, these efforts are either quite outdated or limited in their ability to capture representative information. Moreover, none is designed to assess Medicaid's role in particular. Because of the limited availability of more comprehensive and representative data on Medicaid and HIV/AIDS, CMS continues to base its Medicaid spending estimates and projections on these studies (W. Ferguson, personal communication, August 20, 2010), and federal officials have acknowledged that their information is limited (R. Valdiserri, personal communication, September 10, 2010). The recent analysis by this author of data from all states is one exception, upon which this dissertation builds.

The Literature on Medicaid Variation by State

Whereas the preceding review of the literature on Medicaid and HIV/AIDS was designed to show the current state of knowledge about Medicaid's role for people with HIV, and identify gaps in that knowledge, this section of Chapter two explores the literature that forms the theoretical and methodological basis of the dissertation's exploration of

Medicaid variation across the states. As noted earlier, Medicaid variation by state is a feature of the program, built in by design, and numerous studies have documented wide variations in Medicaid eligibility, benefits, spending, payment rates, and other factors by state (see, for example: KFF, 2010a; Holahan, 2002, 2007; Public Citizen, 2007a, 2007b; GAO, 1983, 1987, 2003; U.S. House of Representatives, 2004).

The extent of variation has raised concerns about access and equity among policymakers and others (see, for example: Stuart, 1972; GAO, 1983, 1987, 2003; Adams, 1995; Cromwell, Adamache, Ammering, Bartosch, & Boulis, 1995; Adams & Wade, 2001; Holahan, 2002, 2007; IOM, 2005; Public Citizen, 2007a, 2007b; CRS, 2010; KFF, 2010a). While variation reflects the flexibility given to states, researchers have also found that it appears to be a function of a state's political philosophy toward those who are poor, and other state-specific factors (Holahan & Cohen, 1986; Holahan & Liska, 1997), resulting in a level of variation that is often "hard to justify" (Holahan, 2007).

Concerns about disparities in Medicaid eligibility and services across the states have prompted efforts to identify ways in which policymakers might be able to promote more equity and access to Medicaid across the country. As Holahan states, the "decentralized approach to Medicaid and the variations in spending created thereby have consequences in access and health outcomes that seem to belie a presumed national interest in equity" (2007, p. w667). Thus a literature examining key correlates of Medicaid variation has developed around this question, with a particular focus on policy and programmatic levers that may be influenced at the federal and state levels.

The literature on state variation in Medicaid enrollment and spending was reviewed here. The results of the literature review are described below and detailed information on each study is presented in Appendix B. The review was limited to studies that used "state" as their unit of analysis; thus, for example, studies that focused on physicians as the unit of analysis or on individuals, either Medicaid beneficiaries specifically or a broader population, were not included. In addition, only studies that looked specifically at outcomes related to the Medicaid program were included; thus, for example, studies that sought to assess how Medicaid program components, such as Medicaid spending levels, might influence non-Medicaid programs, such as Medicare or the AIDS Drug Assistance Program, were not included. Overall, thirty-four studies on Medicaid variation by state were identified for inclusion. The review assessed the ways in which each study defined its dependent variable(s), the range of explanatory variables tested, study results, and the study methods used.

The Dependent Variable

While there is a range of outcomes explored by studies of Medicaid variation, most studies reviewed defined their dependent variables as some measure of the number of Medicaid beneficiaries served and/or Medicaid expenditures (24 of 34 studies); these studies generally standardized the measure of the dependent variable (e.g., spending per recipient or number of beneficiaries per capita). A smaller number of studies defined their dependent variables in terms of Medicaid eligibility (7 studies), Medicaid benefits

(3), and/or Medicaid policy (2),[6] but most studies included Medicaid eligibility criteria and Medicaid policies as independent variables in their analyses. Four of the studies reviewed considered HIV as a control variable, or looked specifically at state variation in Medicaid outcomes related to beneficiaries with HIV/AIDS, but none of the latter did so on a national basis, i.e., using data from all states.

The Independent Variables

As described above, the literature on Medicaid variation across states examines factors both external and internal to states that may be associated with state-level Medicaid policies, programmatic decisions, and health care supply/capacity. Factors considered external to states (those outside their decision-making or policy choice realm) include the federal matching rate for Medicaid as well as the policies of neighboring states. Factors internal to states (factors that states can influence or that are specific characteristics of states) include state socio-demographic composition, economic conditions, and political dynamics. State-level Medicaid policy, programmatic, and supply/capacity factors include variables such as eligibility criteria, benefits, and payments to physicians. These independent, or control variables, are described below.

External Factors

The Federal Medical Assistance Percentage (FMAP) is one of the more frequently tested external factors in this literature. Studies typically hypothesize that the greater the match, the less costly the Medicaid program to the state, and the more likely the state will have a

[6] These are not mutually exclusive groupings. Some studies examined multiple types of outcomes. See Appendix B.

more generous Medicaid program, primarily measured by overall Medicaid spending. Results have generally borne out this finding (E.A. Miller, 2005). The FMAP, in a sense, is one measure of the price of Medicaid to states (medical prices are as well, and those are captured below as an internal factor). For example, studies by Holahan & Cohen (1986), GAO (1987), Adams & Wade (2001), Kousser (2002), and the Lewin Group & Rockefeller Institute (2004) found a positive correlation between the FMAP and spending. Garfield (2008a) found that, as the federal match went up, state spending went down. However, it is likely that overall spending still rose, given that the match by the federal government is more than half the state's cost, but Garfield did not report on this specifically. Baughman & Milyo (2008) and Howard (2010) found a negative correlation between the FMAP and Medicaid outcomes, which could be related to the outcome they examined – eligibility. Howard's results were mixed; he found a negative correlation between the FMAP and state spending on young Medicaid recipients, but a positive correlation between the FMAP and spending on disabled Medicaid recipients.

At the same time, studies have also found that the FMAP has not been able to fully reduce variation across states, and concerns have been raised about the need to improve the equity effect of the FMAP (GAO, 1983, 2003; Holahan & Cohen, 1986; Holahan, 2002; Grannemann & Pauly, 2010). These studies pointed to the fact that the FMAP's reliance on per capita income is not the best measure of need, since it measures the total population, rather than the needy population. GAO (1983) found, for example, that states which cover a greater share of their low income population generally spend more per person in poverty. Holahan & Cohen (1986) similarly found an inverse relationship

between the FMAP and Medicaid spending per poor person, concluding that wealthier states, defined as those that shouldered more of the cost of the Medicaid program, appeared to be more willing to support generous Medicaid programs than poorer states, even though it was more costly for wealthier states to do so. Buchanan, Cappelleri, & Ohsfeldt (1991) found that the price effect of a higher FMAP may not always be sufficient to offset the income effect of lower income states (those who receive higher FMAPs), leading potentially to inconclusive findings or findings that were less significant than expected (also see, GAO, 1987). Holahan (2002) similarly found that the FMAP is not sufficient to reduce spending differentials between states.

Several studies have examined the correlation between state Medicaid policies and the policies of neighboring states (as measured either by contiguousness or state region). These studies posited a positive relationship between the policies of a state and those of its neighbors (E.A. Miller, 2005). Studies using region as a proxy have found that states in the Northeast generally have higher Medicaid spending and more generous Medicaid eligibility criteria compared to those in other regions, and, conversely, states in the South have lower spending or generosity (Holahan & Cohen, 1986; GAO, 1987; Pascal, Cvitanic, Bennett, Gorman, & Serrato 1989; Kousser, 2002; Grannemann & Pauly, 2010). On the other hand, Schneider (1993) found that states in the Northeast region had higher Medicaid expenditures overall, but lower AFDC expenditures. Of those studies examined that looked at region as a variable, only Baughman & Milyo (2009) found no significant correlation between region and their dependent variables (Medicaid and SCHIP eligibility).

Internal Factors

Policy & Programmatic Variables

Studies have also looked at several different state-level policy and programmatic factors – factors that states can define or influence – that may affect Medicaid enrollment and spending. These include factors such as Medicaid eligibility levels and payments to providers, with studies positing that states with greater Medicaid generosity, e.g., more expansive eligibility, would have higher enrollment and spending. The findings across many of the studies reviewed support this conclusion. Several studies found positive correlations between eligibility, Medicaid enrollment, and Medicaid spending (Hanson, 1984; McDevitt, Buczko, Mauskopf, Rodgers, & Dobson, 1985; Schneider, 1993; Harrington, Carillo, & Wellin, 2000; Kitchener, Carrillo, & Harrington, 2003/2004; Garfield, 2008a).

Medicaid payment generosity is generally measured either as a state's Medicaid physician fee relative to the national average, or as a ratio of Medicaid-to-Medicare physician fees, since the latter is generally considered to be higher than Medicaid fees and more uniform across states. Only a small number of the reviewed studies assessed the relationship between Medicaid payments and Medicaid enrollment and spending. Schneider (1993) and Harrington et al. (2000) found a positive relationship between payment rates and spending while McDevitt found no relationship (1985). E.A. Miller's review found mixed results (2005). Because studies have documented a relationship between Medicaid physician fees and patient access (Zuckerman, McFeeters,

Cunningham, & Nichols, 2004; Shen & Zuckerman, 2005; and Cohen, 1993), Medicaid payment generosity remains an important variable to consider.

Supply Variables

Studies have looked at the association between the supply of Medicaid providers and Medicaid, generally positing that the greater the supply of physicians, other health care providers, and health care facilities, would be associated with higher levels of Medicaid spending and enrollment. Numerous studies appear to support this association. Supply variables such as physicians per capita, hospital beds, nursing home beds, and home health beds, have been found to be positively associated with Medicaid spending and enrollment (McDevitt et al., 1985; Holahan & Cohen, 1986; GAO, 1987; Barrilleaux & Miller, 1988; Buchanan et. al, 1991; Baumgardner, 1993; Harrington et al., 2000; Adams & Wade, 2001; Kitchener et al., 2003/2004; and N.A. Miller, et al., 2005; N.A. Miller, Elder, Kitchener, Kang, & Harrington, 2008). A small number of studies have found negative associations between supply and Medicaid spending and enrollment in some cases (Harrington et. al, 2000; Kitchener et al., 2003/2004, N.A. Miller, et al., 2005).

Socio-demographic/Economic Factors

Socio-demographic and economic variables are among the internal factors most frequently assessed in the literature on state variation in Medicaid programs; these factors are posited to represent both demand for Medicaid as well as the ability and/or willingness of states to provide services. Economic factors appear to predict Medicaid spending, eligibility, benefits, and other factors in many cases, and generally appear to

support the hypothesis that the greater a state's income, the more likely a state is to spend on their Medicaid programs or otherwise expand services or access relative to states with lower incomes (E.A. Miller, 2005). Numerous studies have found that state income measures, such as median household income and income per capita, were positively correlated with Medicaid spending and enrollment (Holahan & Cohen, 1986; Holahan, 2002; GAO, 1987; Pascal, 1989; Buchanan et al., 1991; Schneider, 1993; Baumgardner, 1993; Grogan, 1994/1996; Harrington et al., 2000; Adams & Wade, 2001; Ullman & Hill, 2001; N.A. Miller, Harrington, Ramsland, & Goldstein, 2002; Kousser, 2002; GAO, 1987; Barrilleaux & Bernick, 2003; Kitchener et al 2003/2004; Lewin & Rockefeller Institute, 2004; N.A. Miller et al., 2005; Grannemann & Pauly, 2010; and Howard, 2010). Some studies have also found an inverse relationship between a state's fiscal or tax capacity, and Medicaid spending and eligibility (E.A. Miller, 2005; GAO, 1987; Grannemann & Pauly, 2010).

As noted above, the FMAP captures one dimension of the price of Medicaid to states. Another is medical prices within states, given that that prices have been shown to be a key a driver of Medicaid expenditures overall (Adams, 1995). Several studies have looked at the effect of medical prices on Medicaid variation in expenditures, enrollment, and services. GAO (1987) reported a positive correlation between medical prices and benefits while Wade & Berg (1995) found a negative correlation between medical prices and Medicaid expenditures. Howard (2010) found that Medicaid spending on the elderly was positively correlated with the price of care for the elderly, and negatively correlated with the price of care of young beneficiaries, and found a similar pattern for spending on

young people. Finally, Adams found that while price does play a role, Medicaid spending still varied across states even after adjusting for price differences (1995).

Studies have found relationships between the poverty rate and various Medicaid measures, although findings have been inconsistent (E.A. Miller, 2005). For example, Kousser (2002), Barrilleaux & Bernick (2003), Garfield (2008a), and Oyun (2010), found a positive relationship between poverty rate and spending, while Baumgardner (1993) and N.A. Miller et al. (2005) found a negative relationship between poverty rate and spending. GAO (1987) found a negative relationship between poverty and benefits, and Garfield (2008b) found a negative relationship between the poverty rate and Medicaid eligibility. Baumgardner (1993) and Garfield (2008a) found positive correlations between poverty and Medicaid spending per capita. Garfield found a negative correlation between poverty and Medicaid eligibility, while E.A. Miller (2005) generally found a positive correlation in his review of the literature. These conflicting findings likely reflect the fact that poverty has two different and opposite potential effects on the Medicaid program: on the one hand, increasing poverty leads to more demand on the Medicaid program, which would likely lead to more spending and enrollment; on the other, poverty also leads to decreasing state revenue, which could lead to decreased Medicaid spending.

The unemployment rate has been shown to have a positive correlation with Medicaid spending and/or beneficiaries in several studies (McDevitt, et al.,1985; Barrilleaux & Miller, 1988; Grogan, 1994/1996; Lewin & Rockefeller Institute, 2004; Garfield, 2008a;

Howard, 2010), though a few studies have found a negative correlation (Grogan, 1994/1996 and Howard 2010).

Several studies have looked at the relationship between the share of a state's population that is non-white, or black specifically, and Medicaid spending and enrollment. These studies have had mixed findings, with some detecting a positive relationship – the greater the share of the non-white or black population, the greater the expenditures (e.g., Holahan & Cohen, 1986, N.A. Miller et al., 2005) – while others have found the opposite (Kousser, 2002; Garfield, 2008a; Oyun, 2010). The former studies appear to suggest that a greater share of non-white residents results in greater demand on services as measured by spending, while the latter studies suggest that states with larger minority residents may be less generous in their access to Medicaid, as measured by enrollment and spending. However, it is important to note several studies have found no significant correlation between the racial composition of a state and Medicaid spending or enrollment (e.g., Harrington et al., 2000; N.A. Miller, et al., 2002; Kitchener, et al., 2003/2004; Garfield, 2008b).

Urbanization is another variable examined in studies of Medicaid program variation across states (E.A. Miller, 2005). Some studies that have found a positive correlation between urbanization and Medicaid spending and enrollment (Barrilleaux & Miller, 1988; N.A. Miller, et al., 2005), but these findings are not consistent across studies. Holahan & Cohen (1986) and Kitchener et al. (2003/2004) found negative correlations

between urbanization and Medicaid spending and enrollment, as did N.A. Miller et al. (2005) for one of her dependent variables.

The few studies that examined the relationship between measures of Medicaid spending and enrollment and the share of a state's population that is uninsured, a measure of demand, generally found no relationship (Ullman & Hill, 2001; Baughman & Milyo, 2009; Grannemann & Pauly, 2010), with the exception of Rigby & Wright (2008) who found a negative relationship between Medicaid eligibility and the percent uninsured.

Several studies have also attempted to control for population size or density, in examining variation across state Medicaid programs. Hanson (1984), Pascal (1989), Baumgardner (1993), N.A. Miller, et al. (2008), Oyun (2010), and Howard (2010) all found positive associations between population size, and Medicaid spending and enrollment. Only Lewin & Rockefeller (2004) found a negative association between population density and Medicaid spending.

Political Ideology

Finally, some studies have looked at political factors, including state ideology and party of Governor or legislature, positing that states with more liberal electorates and political officials will have more generous Medicaid policies resulting in greater enrollment and spending. Studies tend to support this, with several finding positive correlations between liberal state ideology (or negative correlations between more conservative ideology or Republic party control) and various Medicaid program measures (Hanson, 1984; GAO,

1987; Barrilleaux & Miller, 1988; Schneider, 1993; Grogan, 1994/1996; Adams & Wade, 2001; Kousser, 2002; Barrilleaux & Bernick, 2003 for SSI spending; N.A. Miller et al., 2008; Garfield, 2008a,b; Rigby & Wright, 2008; Baughman & Milyo, 2009; Howard, 2010 for some outcomes; Bernick, 2011).

HIV/AIDS & State Variation

As mentioned above, four of the studies reviewed considered HIV as a control variable or looked specifically at state variation in Medicaid program measures related to people with HIV/AIDS. Pascal et al. (1989) assessed predictors of Medicaid eligibility and service generosity for people with HIV/AIDS, as measured by a policy generosity score the researchers generated for each state (based on a survey of states in the 1980s), and state Medicaid spending per AIDS case. Their data source was based on a survey of state health officials to obtain information on Medicaid policies and the state share of Medicaid spending, but they did not have data on Medicaid beneficiaries with HIV/AIDS. They found positive correlations between the size of a state's population, its AIDS caseload, and per capita income, holding other variables constant. In addition, they found that states in the South were less generous in terms of Medicaid eligibility, services, and spending.

Wade & Berg (1995) and Adams & Wade (2001) included AIDS cases as a potential predictor of Medicaid expenditures in their analyses. Both studies found AIDS cases to be a positive predictor of Medicaid spending. Finally, N.A. Miller et al. (2008) looked at factors associated with a state offering a home and community based (HCBS) Medicaid

waiver option for people with HIV/AIDS (a state option for providing long-term care in a non-institutionalized setting).[7] She found that states with Democratic governors, larger populations, and greater nursing home bed supply were more likely to have HCBS waivers. The FMAP, however, was found to be negatively correlated with having an HCBS waiver (N.A. Miller, et al., 2008).

State Variation Study Methods

In addition to reviewing the literature on Medicaid variation across states to help define my dependent variables and identify the range of explanatory variables to include in my study, I also reviewed their methodological approaches to help inform the analytic strategy employed in my dissertation. I was specifically interested in identifying how many studies employed a cross-sectional approach or a pooled time-series, cross-sectional (panel) approach. In addition, for those studies that pooled data across states, I was interested in assessing how many used techniques to control for unobservable heterogeneity across states and/or by time. E.A. Miller, for example, noted the limitations of cross-sectional data analysis in assessing correlates of state variation, and pointed to the increasing move toward the use of more robust methodological approaches, including pooled time-series cross-sectional data (2004). In addition, he assigned higher quality scores to studies that used panel data and fixed or random effects techniques in his methodological review of the literature on state health determinants (E.A. Miller, 2005).

[7] Thirteen states use such an option specifically for people with HIV and other states include people with HIV within a broader HCBS program, though beneficiaries served by this program are a much smaller subset of the larger HIV/AIDS beneficiary population in Medicaid (in 2007, there were an estimated 12,312 HCBS beneficiaries with HIV/AIDS). See: KFF, 2011e; CMS, 2011b.

Of the 34 studies reviewed for this dissertation, 21 pooled state-level data over multiple years to create a state-level panel data set, while eight analyzed cross-sectional state-level data for a single year period only. Five studies were either literature reviews or descriptive analyses. Of the 21 studies that pooled data, 11 used a fixed effects model, or its equivalent to control for state fixed effects (all unobservable heterogeneity between states that is fixed over time), and/or time fixed effects (all unobservable heterogeneity between time periods that is fixed by state). Five used a random effects model, which assumes that the differences between states are random and uncorrelated with the independent variables. The remaining five studies using panel data sets did not control for state or time fixed effects or random effects, potentially resulting in biased estimates.

Summary of the Literature on Medicaid Variation by State

The literature on correlates of Medicaid variation by state examines a wide array of variables, and the findings are not consistent. Still, among the many state-level variables explored, a few rise to the top as consistently demonstrating significant relationships with Medicaid program measures. Predictors of variation in Medicaid enrollment and spending include measures of state income (e.g., per capita income); measures of political ideology or culture (e.g., Democratic Governor, liberal ideology); measures of supply (e.g., physicians or hospital beds per capita, or nursing home capacity); the federal matching rate for Medicaid; and the poverty rate. Variables such as the share of the state's population that is non-white or black, state population size, region, and unemployment, were less likely to be significant predictors of Medicaid program

variation in the studies reviewed, after controlling for other factors. A majority of the studies reviewed pooled data by state across multiple years and, of those, half used fixed effects methods to adjust for unobservable heterogeneity across states and/or time.

Contribution to the Literature

This dissertation makes several contributions to the literature. First, it contributes to the literature on Medicaid and HIV. By conducting the first-ever HIV-specific analysis of Medicaid data from all states, this dissertation fills a major gap in knowledge about the experience of a population that is heavily reliant on Medicaid. As noted earlier, most prior studies of Medicaid and HIV have been based on analyses of data from only a limited number of states, medical sites and settings, and/or patient populations, and are therefore not necessarily representative of the experiences of all Medicaid beneficiaries with HIV/AIDS in the United States; did not analyze variation across the country; and many are significantly outdated. In addition, few of these studies looked specifically at Medicaid, instead focusing more generally on people with HIV in care, and, therefore, are unable to provide detailed information on Medicaid beneficiaries with HIV/AIDS. This dissertation, therefore, not only provides more robust national estimates than prior studies, it provides the first state-level description of Medicaid beneficiaries with HIV/AIDS and analyzes variation by state. As such, for the first time in the epidemic's 30 year history, this study provides state-level estimates of the single most important coverage source for people with HIV/AIDS.

In addition, by going beyond descriptive analyses to identify the key correlates of variation in Medicaid HIV enrollment and spending across states, this dissertation provides new information about ways in which policymakers may be able to increase access to and enhance equity in the Medicaid program for people with HIV/AIDS. This study also contributes to the broader literature that has developed to assess the determinants of Medicaid variation by state.

Conclusion

This Chapter described the conceptual framework used in this dissertation for assessing the association between factors external and internal to states and Medicaid spending and enrollment. It also reviewed the literature in two areas. First, it reviewed the literature on HIV/AIDS and Medicaid, describing prior findings related to Medicaid coverage of and cost estimates for people with HIV/AIDS. Of note, it finds that to date, no analysis of Medicaid beneficiaries from all states has ever been conducted, other than a preliminary analysis conducted by this author. It also identifies the limitations of prior studies. It thus points to a major research gap that this dissertation aims to fill. The second body of literature examined is the literature focused on explaining variation in the Medicaid program across states, variation that has raised concerns about equitable access to health care. Many of the studies reviewed searched for potential ways in which policymakers may address variation in access to Medicaid, a key goal of this dissertation as well.

Chapter three, which follows, describes the methods used in this dissertation. It presents the research questions addressed, describes how the dependent and independent variables were measured, discusses the main data sources used, and describes the analytic strategy employed. It also discusses the potential limitations of the analyses and findings.

Chapter Three: Methods

Introduction

The aim of this dissertation is to provide new information on Medicaid's role for people with HIV/AIDS in the United States, first by developing a detailed profile of Medicaid beneficiaries with HIV/AIDS, spending, and service use nationally and by state; second, by documenting variation in these factors across states; and finally, by analyzing the key correlates of state-level variation in HIV enrollment and spending. In Chapter one, I introduced the policy problem this dissertation seeks to address. In Chapter two, I described the dissertation's conceptual framework and reviewed the literature in the two key areas upon which this dissertation is based: the literature on what is known about Medicaid and HIV/AIDS and the literature on state variation in Medicaid. The previous studies were reviewed to inform the theoretical and methodological framework for the analytic approach employed in this study.

In this Chapter, I describe the methods used in the dissertation. I present the main research questions, the definition and measurement of the dependent and independent variables, the data sources used, and the analytic strategy employed, including both descriptive and multivariate techniques. I also discuss the potential limitations of the analysis, as well as the ways in which I seek to address and minimize these limitations.

Research Questions

This dissertation is designed to provide new information on Medicaid's role for people with HIV/AIDS. To do so, my research is structured around five questions, listed below. These are followed with a presentation of the analytic strategy used to address them.

1. What is the size of the Medicaid enrollee population with HIV/AIDS at the national and state-levels?
    a. What share of Medicaid beneficiaries, nationally and by state, do they represent? How does this vary by state?
    b. What share of the people with HIV/AIDS, nationally and by state, do they represent? How does this vary by state?

2. What are the demographic characteristics and eligibility pathways of Medicaid beneficiaries with HIV/AIDS in the United States?
    a. How do these factors (demographic and eligibility pathways for beneficiaries with HIV/AIDS) vary by state?

3. How much does Medicaid spend on beneficiaries with HIV/AIDS in the United States?
    a. How does spending on beneficiaries with HIV/AIDS vary by state?

4. What services do Medicaid beneficiaries with HIV/AIDS in the United States use?

a. How does service use among Medicaid beneficiaries with HIV/AIDS vary by state?

5. What explains variation in Medicaid HIV enrollment and spending outcomes y state? What socioeconomic and political factors are correlated with variation?

Of particular interest is the identification of potential policy and programmatic levers that may be available to policymakers to enhance access to and equity in the Medicaid program for beneficiaries with HIV/AIDS.

Dependent Variables

A main purpose of this dissertation is to identify factors that may be associated with variation in Medicaid program measures across states. As noted in Chapter two, most studies of Medicaid program variation across states define these measures in terms of the number of Medicaid beneficiaries and/or Medicaid expenditures. Four dependent variables were constructed for this analysis, designed to measure enrollment and spending in different ways:

1. Medicaid beneficiaries with HIV/AIDS as share of all Medicaid beneficiaries, per 1,000;
2. Medicaid spending per beneficiary with HIV/AIDS;
3. Medicaid spending on beneficiaries with HIV/AIDS as share of all Medicaid spending, per 1,000; and

4. Medicaid spending for beneficiaries with HIV/AIDS per person living with AIDS

Enrollment and spending, respectively, are measured as a share of a state's overall Medicaid enrollment and spending (dependent variables one and three). As such, they are intended to capture the "generosity" of a state relative to its overall Medicaid program and serve as proxy measures of access. The other two dependent variables assess variation in spending per enrollee with HIV and spending per person with AIDS, respectively. They are intended to capture the "generosity" of states relative to one another (on a standardized measure of per capita spending), and in this way serve as different types of proxy measures of equity.

Each of the four dependent variables was transformed into its logarithmic form (natural logarithm). There are several reasons for doing so. First, each showed signs of non-normality. Second, such a transformation reduces the chance that size-related variables produce heteroskedasticity. Lastly, a logarithmic form is often used when a variable is measured in positive dollar amounts as is the case for three of the four dependent variables. In addition, the number of Medicaid beneficiaries with HIV/AIDS and Medicaid spending on beneficiaries with HIV/AIDS were expressed per 1,000 beneficiaries, which also helps to reduce heteroskedasticity (Stock & Watson, 2010). All spending data used in the analysis were adjusted to represent constant 2007 dollars, using the Consumer Price Index. The definitions of each dependent variable are provided in Table 3.1.

Independent Variables

As discussed in the literature review in Chapter two, and presented in the conceptual framework, there are several factors that are expected to be associated with Medicaid outcomes for beneficiaries with HIV/AIDS. These include factors external to states, such as federal Medicaid law and policy and the policies of neighboring states, and factors internal to states, such as state policy, programmatic, and supply factors, as well as socio-demographic composition, economic conditions, and political ideology. While numerous variables have been examined in the literature, a smaller subset has been the focus of theory and analysis, and has consistently demonstrated significant explanatory results. I largely drew from these variables in developing the models tested here. The independent variables used are presented in Table 3.1, which includes their definition and data source. Several of the independent variables (those consisting of population-based measures) were transformed into their log form for the reasons discussed above. Each of these variables is described below.

Factors External to States

FMAP: The FMAP is one of the most frequently tested variables in the literature, and findings consistently support its positive association with Medicaid outcomes. An increase in the FMAP effectively reduces the price of Medicaid to states. I expect the FMAP to be positively correlated with most of my dependent variables, although the expected effect on Medicaid spending per enrollee with HIV/AIDS, a standardized measure across states, is more uncertain. As noted in the literature review in Chapter

two, studies have found an inverse relationship between the FMAP and Medicaid spending per enrollee and per poor person (see, for example, Holahan & Cohen, 1986). FMAP data by year were obtained from the HHS Assistant Secretary for Planning and Evaluation (ASPE) office which is responsible for calculating the FMAP on an annual basis.

Region/Neighboring State Policy: Region is also tested in the literature, though less frequently and with less consistent results. I explore the effect of region in both bivariate analysis and in OLS regression models without fixed effects (region, which is time invariant, cannot be assessed in the fixed effects models). State regional classifications were obtained from the U.S. Census Bureau.

Internal State Policy & Programmatic Factors

Medicaid coverage of non-disabled, childless adults: As noted in the literature, Medicaid eligibility policy is one potential determinant of Medicaid enrollment and spending outcomes. I constructed a variable indicating whether a state covers non-disabled, childless adults, a group that is categorically excluded from the Medicaid program unless a state chooses to cover it. This variable serves as a measure of Medicaid generosity and something that is at the discretion of states. Data for this measure were obtained from the Kaiser Family Foundation (KFF, 2011d).

Medicaid coverage of low-income parents: Similarly, Medicaid coverage of low income parents is another measure of Medicaid generosity. I constructed a variable indicating whether a state provides such coverage at or above 100% FPL. Data for this measure were obtained from the Kaiser Family Foundation (KFF, 2011d).

Medically needy program: The availability of a Medically Needy program in a state is yet another measure of more generous access. I constructed a variable indicating whether a state has such a program or not. Because this variable was time invariant, it was only tested in the cross sectional and pooled OLS models. Data for this measure were obtained from the Kaiser Family Foundation (2010b).

*Medicaid provider payments***.** Medicaid payments to physicians have been shown to be associated with Medicaid outcomes. Here, I used the Medicaid-to-Medicare fee ratio as a measure of payment generosity. Because of limited data availability for this variable, however, it was only tested in the cross sectional and pooled OLS models.[8] Data for this measure were obtained from the published literature.

Table 3.1: Dependent & Independent Variables: Definitions and Data Sources

Variables	Dimension	Variable	Definition/Measurement	Data Source(s)
Dependent Variables	**Enrollment**	Medicaid beneficiaries with HIV/AIDS as share of all Medicaid beneficiaries	Medicaid beneficiaries with HIV/AIDS as a share of all Medicaid beneficiaries, per 1,000 (logged)	MSIS
	Spending	Medicaid spending per beneficiary with HIV/AIDS	Medicaid spending per beneficiary with HIV/AIDS (logged and expressed in 2007 constant dollars)	MSIS
		Medicaid spending on HIV/AIDS as share of all Medicaid spending	Medicaid spending on beneficiaries with HIV/AIDS as a share of all Medicaid spending, per 1,000 (logged and expressed in 2007 constant dollars)	MSIS
		Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS	Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS (logged and expressed in 2007 constant dollars)	MSIS; CDC
	Federal Law/ Policy	Federal matching rate (FMAP)	Percent of Medicaid expenditures financed by the federal government	ASPE, 2003-2007
		Region	Dummy variable for each region	Census
	Policy/ Programmatic	Medicaid coverage of childless adults	Dummy variable: Yes = 1, No = 0	KFF, 2011d

[8] Data were available for 2003 and 2008 only and therefore, an average value was used for this variable.

Table 3.1: Dependent & Independent Variables: Definitions and Data Sources				
Variables	**Dimension**	**Variable**	**Definition/Measurement**	**Data Source(s)**
Independent Variables		Medicaid coverage of low income parents ≥100% FPL	Dummy variable: Yes = 1, No = 0	KFF, 2011d
		Medically needy program	Dummy variable: Yes = 1, No = 0	KFF, 2010b
		Medicaid Payments to Physicians	Medicaid-to-Medicare fee index	Zuckerman et al., 2004, 2009
	Supply/ Capacity	Physician capacity	Nonfederal physicians per 1,000 population	NCHS, 2003-2007
		Hospital bed capacity	Hospital beds per 1,000 population	KFF, 2011c
	Socio-Demographic	Black population	Percent black	Census, 2003-2007
		Urban population	Percent urban	Census, 2005-2007
		AIDS case burden	AIDS prevalence rate per 100,000 (logged)	CDC, 2005b; KFF 2011f, 2005-2007
		Population density	Population per square mile (logged)	Census, 2003-2007
	Economic	Income	Personal income per capita (expressed in 2007 constant dollars)	BEA, 2003-2007
		Poverty	Percent with incomes < 100% of Federal Poverty Level (FPL)	Census, 2003-2007
		Supplemental Security Income (SSI) recipients	SSI recipients per 1,000 (logged)	SSA, 2003-2007
		Health spending per capita	Health spending per capita (logged and expressed in 2007 constant dollars)	CMS, 2011c
		Medical prices	Consumer price index, medical care	BLS, 2003-2007
	Political Ideology	Citizen Ideology index	Liberal citizen ideology index	Berry et al., 1998 updated series, 2003-2007
		Government Ideology index	Liberal government ideology index	Berry et al., 1998 updated series, 2003-2007

Internal State Supply Factors

Physician Supply: As shown in the literature, physician supply is associated with Medicaid outcomes. For this variable, I used a standardized measure of physician supply – physicians per capita – in the analysis. Data were obtained from the National Center for Health Statistics for this measure.

Hospital Supply: Similarly, hospital supply is another supply variable shown to be correlated with Medicaid outcomes. Data on hospitals per capita were obtained from the American Hospital Association's Annual Surveys, as provided by the Kaiser Family Foundation's State Health Facts online database (KFF, 2011c).

Internal State Socio-demographic Factors

Black population: Percent black (or non-white) is frequently tested in the literature with analyses generally finding a positive association between % black and Medicaid outcomes. In addition to its support in the literature, this is an important variable to include in my model, given the highly disproportionate impact of HIV/AIDS in the Black community in the United States. Data for this measure were obtained from the U.S. Census Bureau.

*Urban population***:** The share of a state's population that lives in urban areas is seen as a proxy for demand for Medicaid, and is expected to be positively correlated with Medicaid spending and beneficiaries, though there has been inconsistency in previous research findings. Data were obtained from the U.S. Census Bureau for this measure.[9]

[9] Data on the urban population were only available for 2005-2007. Estimates for 2003 and 2004 were interpolated.

AIDS Case burden: AIDS prevalence was used as another control variable, functioning as a proxy for potential demand for Medicaid. While it would be preferable to use HIV/AIDS prevalence as a measure of demand, data on HIV/AIDS prevalence by state were not available for several years of this analysis. Fortunately, AIDS prevalence and HIV/AIDS prevalence have a similar, relative distribution across states. To standardize this measure, I converted the variable into AIDS prevalence per 100,000 population. I also transformed it into its log form. Data for this measure were obtained from the Centers for Disease Control and Prevention (CDC, 2005b) and through special data requests made by the Kaiser Family Foundation for its State Health Facts online database (KFF, 2011f).[10]

Population Density: Population density measures the number of people per square mile of land in a state. I included population density as an additional control for demand on the Medicaid program. I transformed the variable into its log form. Population and land area data were obtained from the U.S. Census Bureau, and population density was calculated.

Internal State Economic Factors

Income: Income has consistently been shown to be positively and significantly associated with Medicaid spending and beneficiaries. It is an important variable to include in my analysis because it provides a control for the relative wealth of states. Income per capita data were obtained from the Bureau of Economic Analysis and were expressed in 2007 constant dollars.

[10] Data on AIDS prevalence were available for 2004-2007 only. Estimates for 2003 were interpolated.

Poverty: The poverty rate has been shown to have mixed effects on Medicaid spending and beneficiaries. On the one hand, it may be expected to be positively correlated with these outcomes, since as the poverty rate increases, demand and eligibility for Medicaid increases. On the other hand, the increase in poverty has a negative effect on state tax revenues, and may lead states to restrict their Medicaid programs. Still, it is important measure to include in this analysis because it provides a control both for demand, as well as a state's generosity in serving its poor population. Data on income were obtained from the U.S. Census Bureau.

SSI recipients: SSI recipients are included as an additional control because SSI is a key way in which people with disabilities, including AIDS-related disability, become eligible for Medicaid. I standardized this measure per capita and transformed it into its log form. Data on the number of SSI recipients by state were obtained from the Social Security Administration.

Health spending per capita: An additional control variable used was that of health care spending per person by state. This measure was used to assess whether variation in Medicaid outcomes for beneficiaries with HIV/AIDS persists after controlling for overall health spending per capita by state. Data on state health spending were obtained from the Centers for Medicare & Medicaid Services (CMS, 2011c), and were logged and expressed in 2007 constant dollars.

Medical prices. Lastly, while the FMAP provides one control of price, and is an important policy variable to consider for this analysis, I also control for differences in medical prices across states, although previous studies do not suggest a consistent effect.

While there is no source of Medicaid price variation by state, I used the annual Consumer Price Index for medical prices by region as a proxy for medical prices.

Internal State Political Factors

Measures of political ideology are routinely included in analyses of state Medicaid variation. Measures developed by Berry, Ringquist, Fording, & Hanson (1998) are widely used for this purpose. They construct an index of both citizen ideology and government ideology, along a liberal to conservative continuum, with higher scores indicated more liberal ideology. Data for both measures, updated through 2010, were included (Berry, Fording, Ringquist, Hanson, & Klamer, 2010).

A summary of the expected direction of the associations between dependent and independent variables is presented in Table 3.2. For example, it is expected that the FMAP and income will be positively associated with some of the dependent variables, as found in most studies, though its effect on spending per beneficiary with HIV/AIDS and spending per person living with AIDS is uncertain. Positive associations are expected in states with more generous eligibility, as measured for example by offering coverage of non-disabled low income adults, or low income parents. At the same time, the expected associations between race, poverty, region, and the dependent variables, are unknown, as studies have found conflicting results.

Table 3.2: Expected Relationships				
Predictors	**Dependent Variables**			
	Medicaid beneficiaries with HIV/AIDS as share of Medicaid beneficiaries in State, per 1,000 (logged)	Medicaid spending per beneficiary with HIV/AIDS (logged)	Medicaid spending on beneficiaries with HIV/AIDS as share of Medicaid spending in State, per 1,000 (logged)	Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS (logged)
Federal Matching Rate (FMAP)	+	?	+	?
Region = NE	+	+	+	+
Region = S	-	-	-	-
Region = W	?	?	?	?
Region = MW	?	?	?	?
Medicaid coverage of childless adults (Y=1)	+	+	+	+
Medicaid coverage of low-income parents ≥100%FPL (Y=1)	+	+	+	+
Medically needy program (Y=1)	+	+	+	+
Medicaid to Medicare fee index	+	+	+	+
Physicians per capita	+	+	+	+
Hospital beds per capita	+	+	+	+
Percent Black	?	?	?	?
Percent Urban	+	+	+	+
AIDS Case rate per 100,000 (logged)	+	+	+	+
Population density (logged)	+	+	+	+
Income per capita	+	+	+	+
Poverty rate	?	?	?	?
SSI Recipients per capita (logged)	+	+	+	+
Health spending per capita (logged)	+	+	+	+
Consumer Price Index, medical prices	?	?	?	?
Liberal citizen ideology index	+	+	+	+
Liberal government ideology index	+	+	+	+

Data Sources

The primary data source used for this analysis is the Medicaid Statistical Information System (MSIS) Summary File, maintained by the federal Centers for Medicare and Medicare Services (CMS). MSIS is the main source of Medicaid eligibility and claims

data reported by states to the federal government. It is an electronic reporting system that has been mandatory for all state Medicaid programs since 1999, as required by the Balanced Budget Act (BBA) of 1997; prior to that date, states submitted data in hard-copy format (see, http://www.cms.gov/MedicaidDataSourcesGenInfo/). As part of MSIS, states submit quarterly computer files containing specified data elements for: (1) persons covered by Medicaid (Eligible files); and, (2) adjudicated claims (Paid Claims files) for medical services reimbursed by Medicaid.

State eligibility files contain records for each person covered by Medicaid for at least one day during the reporting period, and include demographic characteristics, information about how the individual qualified for Medicaid, and the months in which they were enrolled. Enrollees are designated using their Basis of Eligibility in MSIS as: elderly (age 65 and older); disabled under age 65; non-disabled adults; and non-disabled children. The files also include International Statistical Classification of Diseases and Related Health Problems Code (ICD codes), which identify the specific diagnosis related to the receipt of a service. State claims files contain paid claims for inpatient, long term care, prescription drugs and non-institutional (outpatient) services, including fee for service and managed care claims. Expenditures reported in MSIS do not include disproportionate share payments to providers, payments to Medicare, or administrative payments. Individuals in MSIS are classified by the level of benefits they receive, as either full-benefit (entitled to the full scope of Medicaid benefits) or partial-benefit (entitled to only a subset of services, such as pregnancy-related or substance abuse-services), and whether they are full-year or part-year enrollees. All analyses were

performed on all beneficiaries regardless of whether they were full or part time enrollees, or received full or limited benefits, with the exception of a subset of the descriptive analyses (gender, race/ethnicity, age, eligibility pathway) for which data were only available for full-benefit, full-year enrollees.

MSIS data are used by CMS to produce program information for states and federal agencies, although some public use data are available. The public use data, however, are limited. For example, public use data files do not include diagnosis codes, and therefore do not permit an analysis of beneficiaries by medical condition. Additional MSIS data may be made available to outside researchers through select Data Use Agreements (DUAs). The Kaiser Family Foundation (Kaiser) and the Urban Institute have a joint DUA with CMS that provides them with MSIS data, including diagnosis codes, after removal of personal identifiers. Under this agreement, the author of this dissertation was able to obtain MSIS eligibility and claims data by state for all Medicaid enrollees with HIV/AIDS, and for enrollees without an HIV-related diagnosis.

To identify enrollees with an HIV-related diagnosis, a "flag" created by CMS containing standard ICD-9 diagnosis codes for HIV disease was used. This flag captures any enrollee with at least one of these ICD-9 codes, regardless of when they received their diagnosis (see Table 3.3 for diagnosis codes). For a given year, however, enrollees were only included if they have received at least one service (of any kind – not just an HIV-related service).

Table 3.3: HIV/AIDS ICD-9 Diagnosis Codes		
Diagnosis	**ICD-9 Code**	**Label/Description**
AIDS/HIV and Related Conditions	42	Human immunodeficiency virus (HIV) disease, AIDS, AIDS-like syndrome or related complex
	79.53	HIV, type 2 (HIV 2)
	795.71	Nonspecific serologic evidence of HIV
	V08	Asymptomatic HIV infection status

Other data used in the analyses were drawn from multiple sources, including the U.S. Census Bureau, the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Centers for Disease Control and Prevention (CDC), the Kaiser Family Foundation, and the literature. A full list of sources is provided in Table 3.1.

Analytic Strategy

The analytic strategy used in my dissertation includes both descriptive and multivariate techniques. The unit of analysis is the state. To address the first four research questions, profiles of Medicaid beneficiaries with HIV/AIDS, spending, and service use at the national and state-levels for the year 2007 were developed, based on analysis of data from all fifty states and the District of Columbia (DC). In addition, for each of these questions, the extent of variation by state was analyzed.

To address research question five, I go beyond descriptive statistics to analyze state-level variation. To do so, I pooled data across states for a five year period, 2003-2007, and assessed the key correlates of state Medicaid HIV enrollment and spending. I begin with bivariate analyses to examine correlations between my dependent and independent variables. I then employed a series of multivariate model specifications, each designed to

provide successive levels of control of both observable and unobservable factors that may influence the outcomes of interest. These strategies are described below.

Descriptive Analysis

Because there is so little information available on Medicaid beneficiaries with HIV/AIDS, one goal of this dissertation is to provide the first-ever national and state-level estimates of Medicaid beneficiaries with HIV/AIDS, including by key demographic characteristics and eligibility pathways, Medicaid spending on beneficiaries with HIV/AIDS, and Medicaid service use by beneficiaries with HIV/AIDS, and to describe how these vary by state. To do so, I analyzed data on Medicaid beneficiaries with HIV/AIDS from all 50 states and the District of Columbia for the year 2007, the most recent year for which these data are available, and construct a series of tables with data by state. Descriptive statistics (mean, median, minimum, maximum, quartiles, and percent distributions) are provided to describe and summarize the data across key variables, e.g., Medicaid beneficiaries with HIV/AIDS as share of all Medicaid beneficiaries; Medicaid spending per enrollee with HIV; gender, race/ethnicity, age, and eligibility pathway, and to examine variation by state. For the analyses of overall enrollment, spending, and services, I analyzed data for the whole population of beneficiaries with HIV/AIDS. For the analyses of beneficiaries by key demographic characteristics and eligibility pathways, data were only available for the subset of beneficiaries who were enrolled for a full year and received full benefits only.[11] To analyze service use, I looked at the number of enrollees who used a service by type of

[11] I did not have access to data by these characteristics for all beneficiaries.

service and spending by service. Because enrollees typically use more than one type of service, counts of beneficiaries by service are not additive.

Multivariate Analysis

While descriptive statistics are important for describing HIV enrollment and expenditures and documenting variation by state, they do not provide information on why such variation might occur. Therefore, based on the literature on state variation in Medicaid, I identified a series of predictor variables that are expected to be associated with variation in Medicaid enrollment and spending, based on both theory and previous empirical analyses. These potential predictors include several policy, programmatic, and supply factors, as well as other socio-demographic, economic, and political controls, described earlier. Medicaid HIV enrollment and spending are measured using the four separate dependent variables described above, and each is tested separately.

Bivariate analysis was first used to examine the relationships between my dependent and explanatory variables. Scatter plots were generated to examine the visual relationship between each dependent variable and the independent variables. The scatter plots revealed that Washington D.C. was a significant outlier and it was therefore excluded from the multivariate analyses; it was also excluded because data for several of the predictor variables included in the analysis were not available for DC (DC was included in the descriptive analysis). The scatter plots also showed that a few other states appeared to be "influential cases." To assess their potential effects on my final model results, I re-ran the final models excluding these states. The relationship between the

dependent and independent variable was also assessed by calculating the Pearson product-moment correlation coefficients for each relationship, and testing for statistical significance.

Bivariate analysis is useful for providing information on the direction and strength of the relationships between the dependent and explanatory variables. However, it is not able to identify the unique effects predictors on the dependent variables. Therefore, I used multivariate analyses to test for the separate effects of each independent variable while holding all others constant. I constructed a series of four multivariate model specifications, each designed to provide successive levels of control of both observable and unobservable factors that may influence my dependent variables. In addition, for each of the four model specifications, I first tested a basic model which included policy, programmatic and supply variables only, and then tested an expanded model which included additional controls for state socio-demographic, economic, and political characteristics.

My initial model, performed on each dependent variable, was an Ordinary Least Squares (OLS) regression using data only for the year 2007. This model specification, Model (1) takes the following general form:

$$(1)\quad Y_i = \beta_o + \beta_1 X_{1i} + \ldots + \beta_k X_{ki} + u_i$$

Where:

Y_i= the dependent variable

i = the entity (the state)

B_0 = constant

β_k = coefficient of each independent variable

X_{ki} = independent variable(s)

u_i = error term

However, as noted earlier, such an approach has limitations (E.A. Miller, 2004, 2005; Oyun, 2010). First, the number of observations is relatively small (N=50), which restricts the degrees of freedom available, and therefore limits the number of explanatory variables that may be tested. Second, a one-year snapshot may not capture longer term trends or influences, and/or may be unduly influenced by a one-time shock or factor. Finally, cross-sectional analysis cannot control for unobservable factors that may vary by state, such as cultural attitudes, but are constant over time, thereby introducing bias into the model.

To address these limitations, I created a pooled state-level panel data set that included data from a five-year period, 2003 to 2007.[12] The result is a balanced panel of n different entities (50 states) over T different time periods (5), yielding an N of 250. There are many advantages to using panel data. The larger sample size is more informative for analysis, allowing for more degrees of freedom. Moreover, pooling data across entities and time provides a greater ability to model differences across entities (states in this

[12] Data for Maryland were not available for the year 2003; instead, Maryland data for 2004 were used for 2003.

case), including, for example, controlling for variables that may vary across states, but are constant over time.

I first ran identical regressions to Model 1 on the pooled data set, without controlling for state fixed effects, and compared the two different approaches. The specification for this second model, Model 2, is as follows:

(2) $Y_{it} = \beta_0 + \beta_1 X_{1it} + \ldots + \beta_k X_{kit} + u_{it}$

Where:

Y_{it} = the dependent variable

i = entity (state)

t = time (year)

B_0 = constant

β_k = coefficient of each independent variable

X_{kit} = independent variable(s)

u_{it} = error term

Because such a specification is likely to suffer from omitted variable bias (it assumes a constant intercept and slope regardless of entity), an entity-fixed effects model was next employed, which is designed to control for factors that may affect the outcomes of interest and vary across states, but are time invariant. Such an approach assumes that intercepts vary by state, but the slopes do not. The state fixed effects model specification, Model 3, is as follows:

(3) $Y_{it} = \beta_1 X_{1it} + \ldots + \beta_k X_{kit} + a_i + u_{it}$

Where:

Y_{it} = the dependent variable

i = the entity (state)

t = time (year)

β_k = the coefficient of each independent variable

X_1-X_k = independent variable(s)

a_i = entity fixed effect variable

u_{it} = error term

One way to estimate an entity-fixed effects model is to use a "binary regressor" model, by creating dummy variables for each state, resulting in N-1 dummy variables overall (since they are binary variables of either 1 or 0 for each state). It uses a least squares dummy variable (LSDV) regression, or an OLS with dummy variables. This approach, however, requires the creation of a large number of dummy variables, which is not only cumbersome, but the intercepts for each state dummy variable are not necessarily the focus of the analysis; rather, they are included to control for unobserved heterogeneity. A second method used to estimate entity-fixed effects, and the one used in this analysis, is the "entity-demeaned" or "within effects" model. Instead of using dummy variables, the entity-demeaned model uses deviations from entity means; in other words, it estimates the difference between the value of the dependent variable in a given state for a given

year and the average value of the dependent variable in that state over the entire time period (Park, H., 2009; StataCorp, 2009).

One issue to consider in using an entity-fixed effects model is that the effects of time-invariant variables, such as region, are removed from the predictor variables, so that the "net" effect of the predictor variables can be measured. Because region has often been tested in the literature on state determinants, I test for its effects in both the cross-sectional and pooled cross-sectional analyses and briefly report those findings in the next Chapter. The results of the state fixed effects model are compared to the simple pooled OLS model, without fixed effects controls.

While an entity-fixed effects approach is important for controlling for factors that vary across states but are constant over time, pooling data over time introduces potential time effects - that is, things that may affect my outcomes of interest, and change over time but are constant across states (the effects of time on the intercepts). Because this is a plausible concern, confirmed by statistical tests, the final model used in this analysis, Model 4, was a two-way fixed effects model, which includes both state and year fixed effects and is specified as follows:

$$(4) \quad Y_{it} = \beta_1 X_{1it} + \ldots + \beta_k X_{kit} + a_i + y_t + u_{it}$$

Where:

Y_{it}= the dependent variable

i = the entity (state)

t = time (year)

β_k = the coefficient of each independent variable

X_{kit} = independent variable(s)

a_i = entity fixed effects variable

y_t = time fixed effects variable

u_{it} = error term

Time-fixed effects can similarly be estimated using a time-demeaned approach. However, the statistical program used for this analysis does not fit the two-way model in this way; rather, N- 1 time dummies are used (4 time dummy variables).

For all estimations, I used robust standard errors to control for potential heteroskedasticity. For the fixed effects analyses, these standard error adjustments also adjusted for potential serial correlation that could occur due to cluster effects (such intra-cluster correlation violates assumptions of both homoscedasticity and independence, resulting in standard errors that are underestimated). Two-tailed t-tests were used to assess significance of independent variables, with results assessed at the 0.05 significance level, though consistent with the literature, I report results at the 0.01 and 0.1 significance levels as well. I also report R-squared and adjusted R-squared values for all model specifications.

Statistical Software

I used Microsoft Excel to create and analyze national and state-level profiles of Medicaid beneficiaries with HIV/AIDS, spending, and service use. I used STATA data analysis and statistical software, release 11, to construct my panel data set and variables, and to conduct all multivariate analysis. For fixed effects estimates, I used STATA's xtreg procedure which is specifically designed to fit regression models to panel data, and employ fixed effects techniques, with appropriate standard error adjustments.

Potential Limitations

There are several potential limitations to this analysis that must be considered and addressed to the extent possible. Many of these limitations derive from that fact that my analysis uses a non-experimental design, and not a randomized controlled study (which, in this case, would require randomly assigning states into a control and experimental group, which is not possible). Limitations primarily concern issues of validity. Validity refers to the accuracy of measures and representativeness of the study findings and includes several components – construct, external, internal and statistical conclusion validity. There are fewer concerns related to reliability, which refers to the consistency and repeatability of measures, in this study design (GAO, 1993; Shadish, Cook, & Campbell, 2002). I discuss these concerns below along with my strategies for addressing them.

Validity

Construct Validity

Construct validity refers to whether the analysis is able to accurately measure what it is intending to measure. This is a concern for the current study given that the main data source, MSIS, is a coded eligibility and claims database for which data are entered at the state-level. This could result in accidental misrepresentation through miscoding and/or underreporting – for example, not all people with HIV/AIDS may be captured in the data. While these issues are important to acknowledge, MSIS is considered the standard, comprehensive, and uniform database for Medicaid claims and eligibility across states. In addition, CMS produces an accompanying "MSIS State Anomalies/Issues" document which specifies information by state important to consider in interpreting MSIS data and the Kaiser Family Foundation has assessed these issues and there is no indication that HIV/AIDS is disproportionately miscoded or data that are problematic (CMS, 2009; KFF, 2006b).

In addition to potential miscoding or under-reporting, the data do not capture people with HIV/AIDS who did not receive a service in the 2003 to 2007 period, or those who had not yet been diagnosed with an HIV-related illness. Neither of these issues, however, is a serious limitation to this study. In the first case, it is unlikely that an individual diagnosed with HIV prior to 2003 and who is still alive and on Medicaid would not have received another service for the next five years; if this were the case, it would be indicative of poor quality care and while important, is not part of the study scope (which is not designed to measure quality of care). Similarly, it is not part of the current study's scope or intention to measure the experiences of those on Medicaid who are HIV-infected but not yet

diagnosed with HIV, which would be indicative of other kinds of factors and issues, such as the reasons why people do not know their HIV status.

A more serious limitation is the way in which CMS has created its standard flag for HIV diagnoses. CMS includes one ICD-9 diagnosis code (V01.7) that is not necessarily indicative of an HIV diagnosis. Rather, it is used for exposure to HIV and other viral diseases. As such, some individuals without HIV may have been included in the analysis erroneously, and it was not possible to check the person-level data to assess this problem. However, a preliminary analysis of data provided to this author by CMS for the year 2008 found that enrollees with this code (regardless of whether or not they also had another HIV-flag) accounted for less than 1% of all paid claims for enrollees with any HIV flag, indicating that this is likely a very small concern if one at all.

Lastly, construct validity must also be considered regarding the dependent variables I created. While I created variables that were analogous to many used in the literature, it is possible that they are not capturing what they are intending to measure. For example, I used Medicaid spending per beneficiary with HIV/AIDS by state as a measure of the relative generosity of state Medicaid programs compared to one another and, as such, a proxy for equity. In addition, I use Medicaid beneficiaries with HIV/AIDS as a share of all Medicaid beneficiaries with HIV/AIDS in a state as a measure of the relative generosity within a state, and as a proxy for access. However, it is possible that these measures are not truly capturing equity or access, and instead are reflective of other factors. In addition, even if they do capture these concepts, it is possible that there are

other factors that explain their variation. I attempt to control for this as much as possible by including several other control economic and other related variables in the analysis.

External Validity

External Validity refers to the generalizability of the findings; that is, the extent to which they can be generalized beyond the study population. On the one hand, this study is the first to be conducted of all Medicaid beneficiaries with HIV/AIDS who received a service between 2003 and 2007, and other than potential issues of miscoding, is considered representative of this population during this time period. However, the study findings are not necessarily generalizable to Medicaid beneficiaries with HIV/AIDS who did not receive a service within the time period of the study, and who may be different than those who did. The findings are also not generalizable to Medicaid beneficiaries who are HIV-infected but have not yet been diagnosed with HIV, to smaller (sub-state) geographic units, to Medicaid beneficiaries with other disabling conditions, or beyond Medicaid to apply to people with HIV/AIDS who have other sources of insurance coverage. In addition, for the subset of descriptive analysis that used data from states only for beneficiaries who were enrolled for a full year and received full benefits, findings are not generalizable to beneficiaries with HIV who received only part year or partial benefits (this is not an issue for the multivariate analyses).

There are also potential time effects to consider – while this study will provide an analysis that includes the most recent year of data available, 2007, it is possible that the treatment or care environment for people with HIV/AIDS, or the economic, political, or

policy context of states has changed since that time, and therefore, the findings cannot necessarily be generalized to any time period later than 2007. Since the study period, for example, the country has experienced a significant economic downturn that could have altered the context of the findings, for example, making some states less likely to cover those who are not part of federally mandated eligibility groups. Finally, it is not possible to assess whether there are multiple treatment interference effects, which could occur if some beneficiaries with HIV/AIDS also have access to other sources of care or services beyond Medicaid, which could in turn influence the amount and type of services they use through the Medicaid program; and this could vary by state, if, for example, a state had a special program that others did not or had a more generous program.[13] While this is important, it is beyond the scope of this study to also assess any other program that might be available to Medicaid beneficiaries with HIV/AIDS. Finally, there are potential threats to external validity due to differential mortality, which could occur if some beneficiaries with HIV/AIDS leave Medicaid through loss of eligibility, death, or other factors.

Internal validity

Internal validity refers to concern about cause and effect – whether, for example, the study is able to determine that the outcomes of interest, e.g., Medicaid spending per beneficiary with HIV/AIDS, are due to the independent variables included in the model, such as state income per capita or provider capacity. As a non-experimental study, it is

[13] The Ryan White program is one such example. The Ryan White program functions as "payer of last resort" and therefore it is legally prohibited from paying for services that are covered by Medicaid, although it can pay for services needed by Medicaid beneficiaries with HIV/AIDS where they are not covered. While it is possible, then, that some Medicaid beneficiaries with HIV/AIDS are also receiving some services through Ryan White, this cannot be assessed by the proposed study.

not possible to determine causality and it is certainly the case that other factors, not observed or measured in the study, may account for observed differences. This could occur, for example, due to selection bias; that is, bias that results from the fact that pre- and post-test groups were not randomly assigned. In the case of this study, only people with HIV/AIDS who were actually enrolled in Medicaid were included, not those who were eligible for, but did not enroll in the program. It is possible that in some states, people with HIV who are Medicaid-eligible are less likely to enroll in the program, compared to other states, and that the reasons for this differential are correlated with some of the independent variables. This would bias the results of the study. However, it was not possible to assess this potential effect.

Where it was possible, my study design guards against internal validity threats by pooling data over a several-year period and by employing numerous controls for both observable and non-observable factors, including one way and two-way fixed effects models. The use of entity- and time- fixed effects minimized omitted variable bias. State fixed effects control for factors that may affect the outcomes of interest and that vary by state but are constant over time, and year fixed effects controls for factors that change over time but are constant across states. I also include several other control variables that could affect outcomes. Still, it was not possible to include some controls in the final models that are theoretically plausible to affect the outcomes due to the lack of data availability, including, for example, the Medicaid to Medicare fee ratio and prescription limits in the Medicaid program.

Statistical conclusion validity

Statistical conclusion validity refers to concerns about the ability to detect a relationship or effect in the analysis and may be limited by inadequate sample size, measurement error, and insufficient statistical power. Sample size is a potential concern in this analysis particularly when using cross-sectional data from one year, which has an N of 50 (as noted above, DC was not included in the multivariate analyses primarily because it was an outlier). To address this, I pooled data over a five-year period for the final models used, yielding an N of 250. I was careful not to over-specify the model by including too many independent variables, which would reduce its statistical power. In particular, I took several steps to reduce the likelihood of including irrelevant variables which, while not biasing the estimates, would result in higher standard errors. First, I included variables that are supported by theory, as found in my review of the literature. Second, I compared the goodness of fit, as measured by the adjusted R-squared statistic (which adjusts for the degrees of freedom lost or gained as the number of variables change in the model), across model specifications. I also looked at the t-statistics in different models, to assess whether the model overall was significant but none of the variables was individually significant. Finally, I checked to see if adding additional variables changed the magnitude and/or sign of other variables in my models.

There are also concerns about multicollinearity, heteroskedasticity, and serial correlation. Multicollinearity occurs when two or more independent variables are highly correlated with one another, which violates the classical OLS assumption that no explanatory variable is a perfect linear combination of another. This is a plausible concern in this

analysis for several of the independent variables, such as state-level income and poverty rates, for example. While multicollinearity does not affect the unbiasedness of the estimates, it increases their standard errors, which in turn affect confidence intervals and statistical significance. Although some degree of multicollinearity is expected, I tested for it and, where possible, took steps to address multicollinearity. First, I created a correlation matrix to examine the correlations between independent variables. Only two variables showed a correlation above .80, and one of these was eliminated. In some cases, variables were left in even if they were relatively highly correlated with others, due to their theoretical importance. For example, AIDS prevalence rates and percent black were highly correlated, but both are important potential explanatory variables to include. I also constructed variance inflation factors and found them to be in satisfactory range. In addition, I examined the R-squared and coefficient values of my models to see if the overall regression was significant, but none of the t-tests were. This did occur in some of the specifications I tested, but not in the final models.

An additional concern is heteroskedasticity, which can occur if the variance of the error term is related to one or more independent variables, meaning that the error term does not have constant variance, which violates another classical OLS assumption. This is a concern where the sizes of observations, in this case, states, vary, e.g., larger states having may have a greater variance in income compared to smaller states. While this does not affect the unbiasedness of the estimates, it affects the standard errors, and therefore the statistical significance tests. Statistical tests indicated that there was some heteroskedasticity. To address this, I used robust standard errors in all model

specifications. I also transformed many of my variables to adjust for size, by using logs, ratios and rates.

Lastly, there is a concern about autocorrelation, including serial correlation, correlation across time, and cross-correlation, correlation across units, which violates the OLS classical assumption that individual observations of the error term are uncorrelated with each other. This is an issue in both time series and cross-sectional analyses, and given that I am using a time series, cross-sectional model, it is a concern that I needed to address. For example, autocorrelation could occur due to clustering, in which the error terms of observations within a cluster – in this case, a state – are correlated with each other. This would affect the magnitude of the standard errors and statistical significance. Statistical tests indicate that some serial correlation was occurring although cross-correlation did not appear to be an issue. I took steps to correct for serial correlation by using standard error adjustments that corrected for autocorrelation.

Reliability

Reliability involves the quality of measurement and the consistency or repeatability of study measures. As mentioned above, there are fewer concerns related to reliability in this study design. This is because the main Medicaid data source, MSIS, is a database maintained by the federal government, based on data it receives from each state Medicaid program. Data are checked, cleaned, and standardized at the federal level. This minimizes the likelihood that repeated measurement of MSIS data for the same period would yield different findings.

Conclusion

This chapter provided a description of the analytic approach used in the dissertation to analyze Medicaid's role for people with HIV/AIDS. It presented the research questions, variables, data sources, and analytic strategy used. The overall research goal of the analysis is to provide new information on Medicaid's role for people with HIV/AIDS, using both descriptive and multivariate techniques. While the descriptive analysis provides state-level profiles of Medicaid beneficiaries with HIV/AIDS, spending, and service use and document variation by state, the multivariate analysis is used to test for the independent effects of several variables expected to be associated with variation in Medicaid enrollment and spending outcomes, while controlling for factors both external and internal to states. The multivariate strategy is designed to provide successive levels of control of both observable and unobservable factors that may influence the outcomes of interest and the final model used includes both state and time fixed effects. Lastly, this Chapter addressed the potential limitations of the study which primarily include concerns about validity, and discussed the ways in which the analytic strategy attempts to mitigate their effects. The findings of my research are provided next, in Chapter four.

Chapter Four: Findings

Introduction

The purpose of this dissertation is to provide new information on the role of Medicaid for people with HIV/AIDS. As noted earlier, despite the importance of Medicaid for this population, there is a lack of national and state-level data on Medicaid beneficiaries with HIV/AIDS and most prior studies of Medicaid's role for this population have been quite limited in nature. In particular, there are no studies of variation in Medicaid HIV enrollment and spending by state. The lack of such analyses has limited the ability of policymakers and others to understand how Medicaid is serving people with HIV, including ways in policymakers may be able to enhance access and equity for people with HIV. The lack of data has also limited the ability of policymakers to prepare for and measure expected changes in Medicaid as a result of the ACA. Chapter one provided an overview of this problem, discussing the gaps that this dissertation aims to fill. Chapter two presented the conceptual framework used in the dissertation, and presented the results of the literature reviews of two different bodies of literature used in this analysis: the literature on Medicaid and HIV, reviewed to provide the current state of knowledge in this area, as well as identify limitations; and the literature on Medicaid variation by state, reviewed to identify the key correlates of variation found in prior studies as well as the methodological approaches used. Chapter three described the research methods, including the research questions, analytic strategy, data sources, and the potential limitations of this study.

This Chapter provides the results of my analysis in two parts. Part I presents the results of my descriptive analyses, looking at Medicaid beneficiaries with HIV/AIDS, spending, and services in 2007. First, I analyze the distribution of beneficiaries with HIV/AIDS by state, including as a share of a state's Medicaid beneficiaries overall. I also examine Medicaid beneficiaries with HIV/AIDS as a share of a state's HIV/AIDS epidemic,[14] a measure of the Medicaid coverage rate. I also describe the key characteristics of Medicaid beneficiaries with HIV/AIDS by gender, race/ethnicity, age, and eligibility pathway, broken down by state. Medicaid spending on beneficiaries with HIV/AIDS is examined next, followed by Medicaid service utilization. For each of these areas, I examine the extent of variation by state.

To assess the potential reasons for variation across states in Medicaid HIV enrollment and spending, Part II of this Chapter provides the results of my multivariate analyses, which uses pooled data across states over a five-year period, 2003-2007 to examine correlations between Medicaid HIV enrollment and spending, and several potential explanatory variables. First, the findings of the bivariate analyses are presented, followed by the results of the multivariate analyses, which includes a set of different model specifications designed to increasingly incorporate controls for both observable and non-observable factors that may affect Medicaid HIV enrollment and spending.

[14] Not including those who have not yet been diagnosed.

Part I: Descriptive Analysis

Medicaid Beneficiaries with HIV/AIDS

In 2007, there were 212,892 Medicaid beneficiaries with HIV/AIDS in the United States, accounting for <1% of the Medicaid population. Although beneficiaries with HIV represented just a small fraction of the Medicaid population, they accounted for approximately a quarter (26%) of people estimated to be living with HIV/AIDS in 2007 and, as found in Kates (2011), 47% of those estimated to be in regular care. There was considerable variation by state in the size of the Medicaid beneficiary population with HIV. The number of Medicaid beneficiaries with HIV by state ranged from just 36 in Wyoming (<1% of beneficiaries with HIV) to 59,455 in New York (28%); the average was 4,174. Ten states accounted for 73% of all Medicaid beneficiaries with HIV.

While Medicaid beneficiaries with HIV overall accounted for <1% of all Medicaid beneficiaries, they represented a larger share in some states. In three states - Washington DC, Maryland, and New York – Medicaid beneficiaries with HIV accounted for at least 1% of the state's Medicaid beneficiaries (1%, 1.2%, and 2.1%, respectively). Medicaid also played a varying coverage role by state. While Medicaid covered 26% of those estimated to be living with HIV/AIDS nationwide in 2007, its coverage ranged from 7.5% in Colorado to 50% in New York. Medicaid covered a third or more of people living with HIV/AIDS in seven states. Summary statistics are provided in Table 4.1 and analyses of data broken down by state are provided in Table 4.2. Figures 4.1 and 4.2 provide maps showing the distribution of Medicaid beneficiaries with HIV/AIDS as a

share of a state's Medicaid population, and as a share of a state's HIV/AIDS prevalence, respectively.

Table 4.1: Medicaid Beneficiaries with HIV/AIDS in the U.S. States, 2007 - Summary Statistics
(N = 212,982)

	Number of Medicaid Beneficiaries with HIV/AIDS	Medicaid Beneficiaries with HIV/AIDS as Share of All Beneficiaries in State	Medicaid Beneficiaries with HIV/AIDS as Share of HIV/AIDS Prevalence in State (coverage rate)
Mean	4,174	0.4%	26.1%
Median	1,449	0.2%	24%
Lower Quartile	475	0.13%	19.9%
Upper Quartile	3535	0.37%	27%
Minimum	36	0.05%	7.5%
Maximum	59,455	2.1%	50%

Figure 4.1 Medicaid Beneficiaries with HIV/AIDS as a Share of State's Medicaid Beneficiaries, 2007

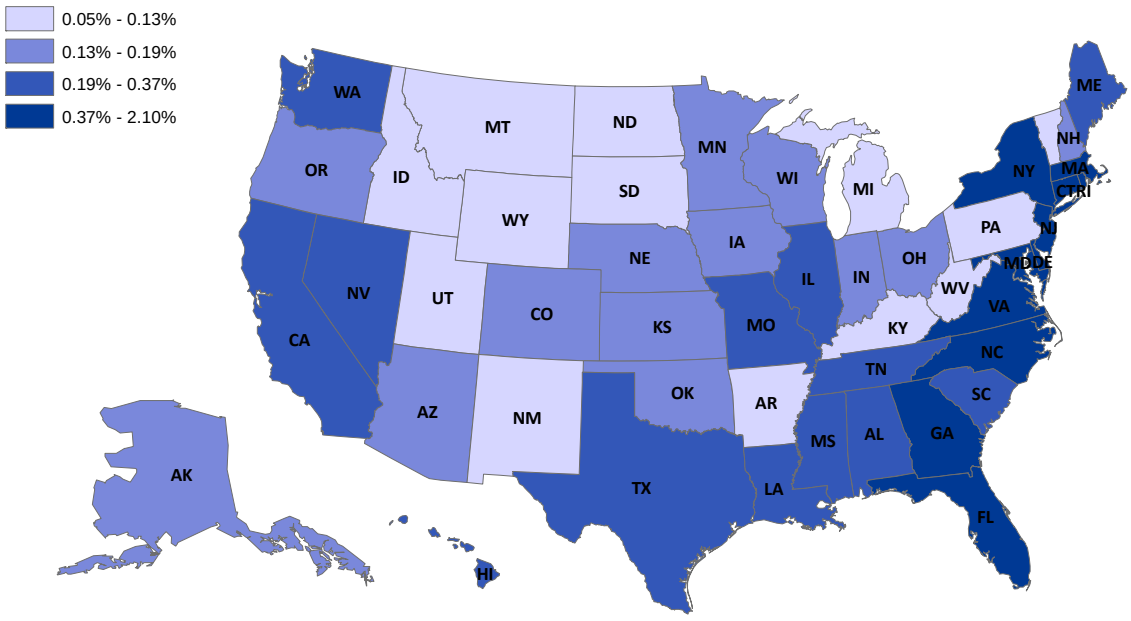
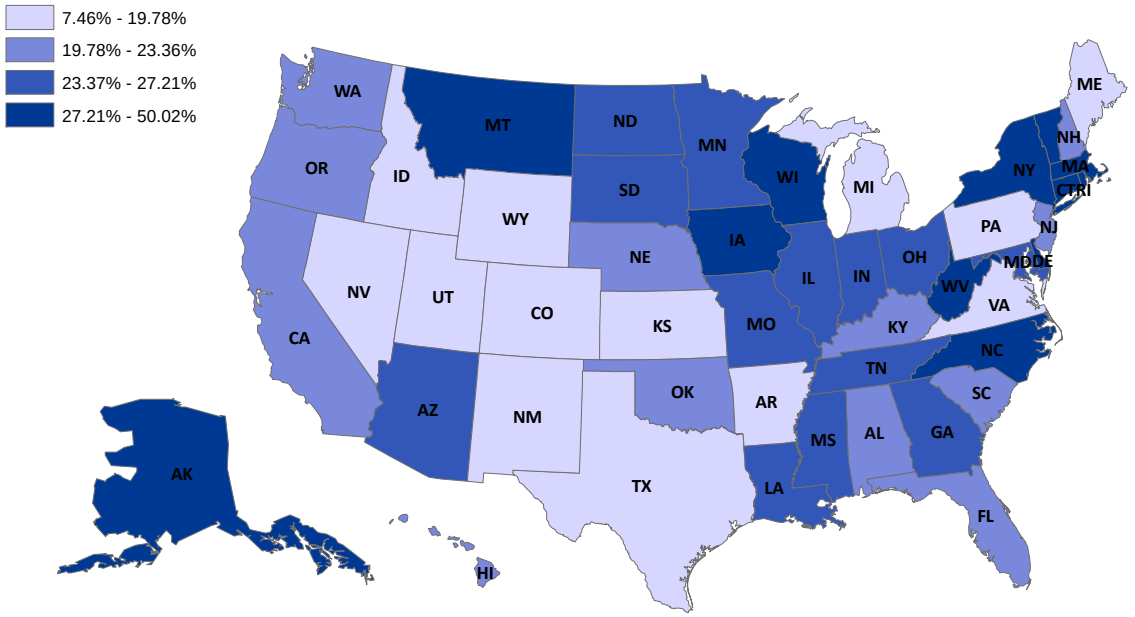


Figure 4.2 Medicaid Beneficiaries with HIV/AIDS as a Share of People Living with HIV/AIDS in State, 2007



Note: Data not available for Maine

Table 4.2: Medicaid Beneficiaries with HIV/AIDS by State, 2007

	Number of Medicaid Beneficiaries with HIV/AIDS	Medicaid Beneficiaries with HIV/AIDS as Share of All Beneficiaries with HIV/AIDS in U.S.	Medicaid Beneficiaries with HIV/AIDS as Share Medicaid Beneficiaries in State	Medicaid Beneficiaries with HIV/AIDS as Share of HIV/AIDS Prevalence in State (Coverage Rate)
U.S.	212,892	100%	0.4%	26.3%
AL	2,090	1.0%	0.2%	21.2%
AK	184	0.1%	0.2%	29.8%
AZ	2,744	1.3%	0.2%	24.7%
AR	872	0.4%	0.1%	18.6%
CA	23,350	11.0%	0.2%	22.3%
CO	767	0.4%	0.1%	7.5%
CT	2,910	1.4%	0.5%	27.4%
DE	1,381	0.6%	0.7%	45.0%
DC	3,457	1.6%	2.1%	22.8%
FL	18,691	8.8%	0.7%	21.4%
GA	6,743	3.2%	0.4%	23.8%
HI	475	0.2%	0.2%	22.7%
ID	121	0.1%	0.1%	18.1%
IL	7,804	3.7%	0.3%	24.4%
IN	1,956	0.9%	0.2%	23.9%
IA	724	0.3%	0.2%	46.7%
KS	520	0.2%	0.1%	19.8%
KY	903	0.4%	0.1%	20.4%
LA	4,015	1.9%	0.4%	24.8%
ME*	1,076	0.5%	0.3%	--
MD	7,719	3.6%	1.0%	25.0%
MA	7,364	3.5%	0.5%	46.3%
MI	1,640	0.8%	0.1%	12.5%
MN	1,449	0.7%	0.2%	24.9%
MS	2,060	1.0%	0.3%	25.3%
MO	2,580	1.2%	0.3%	23.9%
MT	114	0.1%	0.1%	35.1%
NE	342	0.2%	0.1%	23.4%
NV	818	0.4%	0.3%	12.3%
NH	221	0.1%	0.2%	20.7%
NJ	7,262	3.4%	0.8%	21.7%
NM	415	0.2%	0.1%	18.3%
NY	59,455	27.9%	1.2%	50.0%
NC	6,649	3.1%	0.4%	30.9%
ND	39	0.0%	0.1%	24.2%
OH	3,973	1.9%	0.2%	25.4%
OK	1,068	0.5%	0.1%	23.3%
OR	934	0.4%	0.2%	19.9%
PA	2,765	1.3%	0.1%	8.9%
RI	828	0.4%	0.4%	35.5%
SC	3,144	1.5%	0.4%	22.1%
SD	96	0.0%	0.1%	27.2%
TN	3,535	1.7%	0.2%	25.5%
TX	9,805	4.6%	0.2%	16.2%
UT	219	0.1%	0.1%	10.2%
VT	199	0.1%	0.1%	45.0%
VA	3,207	1.5%	0.4%	17.2%
WA	2,341	1.1%	0.2%	23.1%
WV	432	0.2%	0.1%	29.8%
WI	1,400	0.7%	0.1%	29.8%
WY	36	0.0%	0.0%	17.4%

*HIV/AIDS prevalence estimates from Maine for 2007 were not reliable and therefore Maine is not included here.

Of the 212,892 Medicaid beneficiaries with HIV/AIDS in FY 2007, 142,940 (67%) were enrolled for the full fiscal year, with full Medicaid benefits. This subset of full-year, full benefits beneficiaries was used for the descriptive analyses by gender, race/ethnicity, age, eligibility pathway, and dual eligibility status, with summarize statistics reported in Tables 4.3 through 4.7 and state-level data reported in Tables 4.8 through 4.12.

In 2007, 57% of Medicaid beneficiaries with HIV/AIDS enrolled for the full fiscal year and with full benefits were male (80,843). As found by Kates (2011), this is the opposite of the gender distribution of Medicaid beneficiaries without HIV/AIDS, i.e., 57% were female. This likely reflects two different dynamics at play between HIV disease and Medicaid. First, the greater share of male Medicaid beneficiaries with HIV relative to their counterparts without HIV likely reflects the demographics of the HIV epidemic, in which three quarters of all people living with the disease are men. At the same time, men with HIV are still under-represented on Medicaid relative to their share of people living with HIV, likely reflecting limitations of current Medicaid eligibility rules, which make it more difficult for men, particularly those without dependent children, to qualify for Medicaid (Kates, 2011).

This analysis finds that there is a significant range in the gender distribution composition of Medicaid beneficiaries with HIV/AIDS by state (see Tables 4.3 and 4.8). For example, the share of Medicaid beneficiaries with HIV who were male ranged from 30% in Maine to more than 70% in four states – Colorado, Hawaii, New Mexico, and Oregon.

The number of male Medicaid beneficiaries with HIV ranged from 6 in North Dakota to more than 23,000 in New York.

In 2007, half of the full-year, full-benefits Medicaid beneficiaries with HIV/AIDS were black, a quarter were white and 17% were Hispanic. Small shares of Medicaid beneficiaries with HIV were Asian-Pacific Islander, American Indian, or Alaska Native. By contrast, Kates (2011) found that 42% of Medicaid beneficiaries without HIV were white, 26% were black, and 20% were Latino (Kates, 2011). This is likely a reflection of the demographic composition of the population living with HIV/AIDS, 46% of whom are black, a much greater share than the proportion of the U.S. population that is black (13%).

The race/ethnicity distribution of Medicaid beneficiaries with HIV/AIDS by state also ranged significantly (see Tables 4.4 and 4.9). In 10 states, blacks represented at least 70% of Medicaid beneficiaries with HIV, including 85% of Medicaid beneficiaries with HIV in Maryland and 92% of Medicaid beneficiaries with HIV in Washington DC, compared to the national average of 50%. Similarly, whites, who represented a quarter of Medicaid beneficiaries with HIV nationally, comprised 70% or more in 8 states, including almost all Medicaid beneficiaries (98%) in Idaho.

In 2007, almost all Medicaid beneficiaries with HIV/AIDS who received full-year, full-benefits were between the ages of 19 and 64 (90%), with those between the ages of 45 and 64 accounting for almost half (48%) of Medicaid beneficiaries with HIV/AIDS.

Seven percent of Medicaid beneficiaries with HIV were under the age of 19 and only 3% were age 65 or older. The age distribution of Medicaid beneficiaries with HIV is similar to that of people with HIV nationally. By contrast, the majority (56%) of beneficiaries without an HIV diagnosis were under the age of 19, and 32% were between the ages of 19 and 64 (Kates, 2011).

This analysis finds that the age distribution of Medicaid beneficiaries with HIV varied by state (see Tables 4.5 and 4.10). For example, Medicaid beneficiaries with HIV under age 19 comprised 10% or more of Medicaid beneficiaries in 11 states, including 19% in Michigan, compared to 7% nationally. In North Dakota, 70% of Medicaid beneficiaries with HIV were between the ages of 19 and 44, compared to the national average of 42%.

As mentioned above, to qualify for Medicaid under current law, individuals must meet financial eligibility criteria, and must be part of a group that is "categorically eligible"; non-disabled adults without dependent children are categorically excluded from Medicaid by federal law, unless a state has a waiver or uses state-only dollars to cover them. Because people with HIV are more likely to be male and less likely to have dependent children than the population overall, they typically cannot qualify for Medicaid until they become disabled and receive Supplemental Security Income (SSI) benefits. As shown in Tables 4.6 and 4.11, disability is by far the most common eligibility pathway for Medicaid beneficiaries with HIV/AIDS (74%). This compares to only 22% for Medicaid beneficiaries without HIV/AIDS (Kates, 2011). By contrast, many fewer Medicaid beneficiaries with HIV/AIDS were low income children (5%), the most common

eligibility pathway for those without HIV (53%). Only 17% of people with HIV, and 12% of those without the disease, qualified as non-disabled adults, reflecting eligibility limitations faced by all low-income non-disabled adults under current Medicaid rules (Kates, 2011).

Disability is also the most common eligibility pathway for beneficiaries with HIV in almost every state (see Tables 4.6 and 4.11). In eight states, 90% or more of Medicaid beneficiaries with HIV qualify as disabled. Maine was a notable exception, where only 37% of its beneficiaries with HIV qualified as disabled. This could be due to Maine being one of just a handful of states that has received a waiver from the federal government to allow it to expand Medicaid to people with HIV before they are disabled; however, other states with such waivers (DC and MA) do not show similar patterns.

Finally, as shown in Tables 4.7 and 4.12, a significant share of Medicaid beneficiaries with HIV – about three in 10 (29%) – were dually eligible for Medicare. This is greater than the share of Medicaid beneficiaries without HIV who are dually eligible (19%) and likely reflects the fact that Medicare beneficiaries with HIV are more likely to be low-income than those without the disease, and thus need to rely on Medicaid for supplemental coverage (Kates, 2011). There was a significant range in dual eligibility status by state, from a low of just 12% in South Dakota to a high of 61% in Oklahoma. In two states, Nebraska and Pennsylvania, more than half of Medicaid beneficiaries with HIV/AIDS were dually eligible for Medicare.

Table 4.3: Medicaid Beneficiaries with HIV/AIDS by Gender in the U.S. States, 2007 - Summary Statistics
(N=142,939*)

	Male		Female	
Mean	1,585	57%	1,218	43%
Median	540	57%	404	43%
Lower Quartile	192	50%	90	35%
Upper Quartile	1244	65%	1143	50%
Minimum	6	30%	4	22%
Maximum	23,087	78%	18,962	70%

*Beneficiaries with full-year, full benefits only

Table 4.4: Medicaid Beneficiaries with HIV/AIDS by Race/Ethnicity in the U.S. States, 2007 - Summary Statistics
(N=142,940*)

	White		Black		Hispanic		API		Other	
Mean	702	25%	1,392	50%	481	17%	44	2%	184	7%
Median	316	41%	273	35%	24	4%	9	1%	29	4%
Lower Quartile	162	22%	45	12%	6	1%	4	0%	1	0%
Upper Quartile	710	59%	1668	63%	83	10%	38	4%	147	8%
Minimum	5	2%	1	2%	0	0%	0	0%	0	0%
Maximum	6,304	98%	19,263	92%	13,981	36%	666	42%	3,113	59%

*Beneficiaries with full-year, full benefits only

Table 4.5: Medicaid Beneficiaries with HIV/AIDS by Age in the U.S. States, 2007-Summary Statistics
(N=142,939*)

	≤18		19-44		45-64		65+	
Mean	188	7%	1,183	42%	1,346	48%	86	3%
Median	50	6%	476	46%	421	45%	22	2%
Lower Quartile	16	4%	145	42%	125	38%	7	2%
Upper Quartile	168	9%	978	52%	1071	49%	71	3%
Minimum	0	0%	7	32%	3	20%	0	0%
Maximum	2,411	19%	16,835	70%	21,405	64%	1,398	14%

*Beneficiaries with full-year, full benefits only

Table 4.6: Medicaid Beneficiaries with HIV/AIDS by Eligibility Pathway in the U.S. States, 2007-Summary Statistics
(N=142,940*)

	Elderly		Disabled		Non-Disabled Adults		Children	
Mean	86	3%	2,088	74%	486	17%	143	5%
Median	22	2%	759	82%	102	9%	41	5%
Lower Quartile	7	2%	235	77%	26	5%	15	3%
Upper Quartile	71	3%	1917	88%	299	15%	155	7%
Minimum	0	0%	8	37%	0	0%	0	0%
Maximum	1,398	14%	24,062	97%	14,811	43%	1,779	19%

*Beneficiaries with full-year, full benefits only

Table 4.7: Medicaid Beneficiaries with HIV/AIDS Dually Covered by Medicare in the U.S. States, 2007 - Summary Statistics
(N=142,940*)

	Dual		Non-Dual	
Mean	802	29%	2,000	71%
Median	380	33%	558	67%
Lower Quartile	117	28%	186	57%
Upper Quartile	890	43%	1739	72%
Minimum	3	12%	7	39%
Maximum	7,496	61%	34,554	88%

*Beneficiaries with full-year, full benefits only

Table 4.8: Medicaid Beneficiaries with HIV/AIDS by Gender by State, 2007

	Male		Female	
	Number	%	Number	%
U.S.	80,843	57%	62,096	43%
AL	610	47%	680	53%
AK	80	66%	41	34%
AZ	1,101	68%	510	32%
AR	240	50%	242	50%
CA	11,703	69%	5,174	31%
CO	354	70%	153	30%
CT	1,055	51%	1,000	49%
DE	500	56%	392	44%
DC	1,355	57%	1,037	43%
FL	5,545	52%	5,191	48%
GA	1,965	49%	2,042	51%
HI	260	78%	75	22%
ID	39	60%	26	40%
IL	3,595	59%	2,464	41%
IN	680	63%	404	37%
IA	193	43%	251	57%
KS	168	65%	90	35%
KY	309	55%	248	45%
LA	1,146	48%	1,256	52%
ME	244	30%	558	70%
MD	2,494	50%	2,505	50%
MA	3,877	64%	2,172	36%
MI	575	62%	353	38%
MN	540	55%	446	45%
MS	535	47%	604	53%
MO	1,065	68%	494	32%
MT	47	63%	28	37%
NE	136	59%	96	41%
NV	240	60%	157	40%
NH	69	49%	73	51%
NJ	2,470	47%	2,745	53%
NM	192	75%	63	25%
NY	23,087	55%	18,962	45%
NC	2,376	51%	2,290	49%
ND	6	60%	4	40%
OH	1,244	62%	777	38%
OK	499	67%	243	33%
OR	379	72%	151	28%
PA	1,043	62%	632	38%
RI	322	51%	305	49%
SC	1,172	51%	1,116	49%
SD	21	40%	31	60%
TN	1,549	53%	1,373	47%
TX	3,159	56%	2,499	44%
UT	60	69%	27	31%
VT	70	56%	55	44%
VA	941	45%	1,143	55%
WA	802	67%	400	33%
WV	167	65%	90	35%
WI	554	57%	416	43%
WY	10	45%	12	55%

*Beneficiaries with full-year, full benefits only

Table 4.9: Medicaid Beneficiaries with HIV/AIDS by Race/Ethnicity by State, 2007

	White		Black		Hispanic		API-Native		Other	
	Number	%	Number	%	Number	%	Number	%	Number	%
U.S.	35,811	25%	70,987	50%	24,527	17%	2,227	2%	9,388	7%
AL	251	19%	940	73%	15	1%	4	0%	80	6%
AK	70	58%	13	11%	5	4%	32	26%	1	1%
AZ	860	53%	242	15%	337	21%	73	5%	99	6%
AR	184	38%	273	57%	5	1%	2	0%	18	4%
CA	6,304	37%	5,053	30%	3,978	24%	666	4%	876	5%
CO	225	44%	45	9%	66	13%	2	0%	169	33%
CT	447	22%	862	42%	735	36%	11	1%	0	0%
DE	221	25%	624	70%	40	4%	7	1%	0	0%
DC	52	2%	2,190	92%	62	3%	0	0%	88	4%
FL	2,445	23%	5,749	54%	1,507	14%	41	0%	994	9%
GA	495	12%	3,113	78%	38	1%	17	0%	344	9%
HI	173	52%	14	4%	24	7%	124	37%	0	0%
ID	64	98%	1	2%	0	0%	0	0%	0	0%
IL	1,215	20%	4,011	66%	627	10%	57	1%	149	2%
IN	591	55%	425	39%	47	4%	5	0%	16	1%
IA	222	50%	118	27%	5	1%	4	1%	95	21%
KS	162	63%	71	28%	15	6%	9	3%	1	0%
KY	312	56%	196	35%	8	1%	5	1%	36	6%
LA	439	18%	1,803	75%	20	1%	8	0%	132	5%
ME	644	80%	26	3%	6	1%	13	2%	113	14%
MD	531	11%	4,262	85%	46	1%	17	0%	143	3%
MA	3,504	58%	1,276	21%	604	10%	53	1%	612	10%
MI	316	34%	587	63%	16	2%	6	1%	3	0%
MN	397	40%	462	47%	44	4%	54	5%	29	3%
MS	166	15%	866	76%	6	1%	5	0%	96	8%
MO	710	46%	808	52%	4	0%	11	1%	26	2%
MT	61	81%	5	7%	0	0%	9	12%	0	0%
NE	138	59%	68	29%	11	5%	8	3%	7	3%
NV	199	50%	154	39%	39	10%	2	1%	3	1%
NH	106	75%	17	12%	18	13%	1	1%	0	0%
NJ	1,032	20%	3,240	62%	453	9%	22	0%	468	9%
NM	98	38%	12	5%	83	33%	38	15%	24	9%
NY	5,140	12%	19,263	46%	13,981	33%	553	1%	3,113	7%
NC	821	18%	3,439	74%	64	1%	68	1%	274	6%
ND	5	50%	2	20%	0	0%	3	30%	0	0%
OH	855	42%	1,041	52%	120	6%	4	0%	1	0%
OK	490	66%	169	23%	21	3%	61	8%	1	0%
OR	431	81%	47	9%	0	0%	28	5%	24	5%
PA	681	41%	766	46%	187	11%	4	0%	37	2%
RI	238	38%	173	28%	129	21%	6	1%	81	13%
SC	463	20%	1,668	73%	7	0%	3	0%	147	6%
SD	16	31%	6	12%	0	0%	22	42%	8	15%
TN	870	30%	1,839	63%	30	1%	20	1%	163	6%
TX	1,365	24%	3,019	53%	994	18%	47	1%	233	4%
UT	65	75%	4	5%	11	13%	3	3%	4	5%
VT	98	78%	9	7%	4	3%	1	1%	13	10%
VA	452	22%	1,564	75%	52	2%	12	1%	4	0%
WA	799	66%	222	18%	20	2%	69	6%	92	8%
WV	199	77%	58	23%	0	0%	0	0%	0	0%
WI	173	18%	171	18%	42	4%	13	1%	571	59%
WY	16	73%	1	5%	1	5%	4	18%	0	0%

*Beneficiaries with full-year, full benefits only

Table 4.10: Medicaid Beneficiaries with HIV/AIDS by Age Group by State, 2007

	≤18		19-44		45-64		65+	
	Number	%	Number	%	Number	%	Number	%
U.S.	9,587	7%	60,357	42%	68,631	48%	4,364	3%
AL	129	10%	640	50%	497	39%	24	2%
AK	2	2%	56	46%	60	50%	3	2%
AZ	76	5%	827	51%	663	41%	45	3%
AR	48	10%	271	56%	156	32%	7	1%
CA	919	5%	6,899	41%	8,475	50%	584	3%
CO	32	6%	217	43%	242	48%	16	3%
CT	15	1%	651	32%	1,324	64%	65	3%
DE	27	3%	341	38%	502	56%	22	2%
DC	35	1%	955	40%	1,315	55%	87	4%
FL	1,406	13%	3,918	36%	5,010	47%	402	4%
GA	296	7%	1,777	44%	1,796	45%	138	3%
HI	13	4%	146	44%	168	50%	8	2%
ID	0	0%	37	57%	27	42%	1	2%
IL	368	6%	2,563	42%	2,952	49%	176	3%
IN	72	7%	599	55%	383	35%	30	3%
IA	40	9%	263	59%	134	30%	7	2%
KS	26	10%	112	43%	112	43%	8	3%
KY	43	8%	284	51%	226	41%	4	1%
LA	194	8%	1,257	52%	907	38%	44	2%
ME	86	11%	547	68%	162	20%	7	1%
MD	487	10%	1,903	38%	2,497	50%	112	2%
MA	133	2%	2,548	42%	3,268	54%	100	2%
MI	174	19%	421	45%	316	34%	17	2%
MN	61	6%	476	48%	421	43%	28	3%
MS	84	7%	593	52%	437	38%	25	2%
MO	72	5%	838	54%	617	40%	32	2%
MT	4	5%	42	56%	29	39%	0	0%
NE	23	10%	118	51%	89	38%	2	1%
NV	37	9%	145	37%	206	52%	9	2%
NH	16	11%	66	46%	53	37%	7	5%
NJ	444	9%	1,767	34%	2,822	54%	182	3%
NM	10	4%	115	45%	125	49%	5	2%
NY	2,411	6%	16,835	40%	21,405	51%	1,398	3%
NC	254	5%	2,135	46%	2,127	46%	150	3%
ND	0	0%	7	70%	3	30%	0	0%
OH	100	5%	978	48%	913	45%	30	1%
OK	39	5%	315	42%	335	45%	53	7%
OR	23	4%	239	45%	249	47%	19	4%
PA	134	8%	678	40%	792	47%	71	4%
RI	27	4%	269	43%	315	50%	16	3%
SC	150	7%	961	42%	1,071	47%	106	5%
SD	6	12%	23	44%	23	44%	0	0%
TN	168	6%	1,714	59%	1,003	34%	37	1%
TX	412	7%	2,649	47%	2,427	43%	170	3%
UT	5	6%	47	54%	34	39%	1	1%
VT	5	4%	66	53%	52	42%	2	2%
VA	353	17%	879	42%	781	37%	71	3%
WA	50	4%	573	48%	561	47%	18	1%
WV	15	6%	147	57%	90	35%	5	2%
WI	62	6%	442	46%	449	46%	17	2%
WY	1	5%	8	36%	10	45%	3	14%

*Beneficiaries with full-year, full benefits only

Table 4.11: Medicaid Beneficiaries with HIV/AIDS by Eligibility Category by State, 2007

	Elderly		Disabled		Non-Disabled Adults		Children	
	Number	%	Number	%	Number	%	Number	%
U.S.	4,364	3%	106,474	74%	24,792	17%	7,310	5%
AL	24	2%	1120	87%	62	5%	84	7%
AK	3	2%	110	91%	7	6%	1	1%
AZ	45	3%	941	58%	566	35%	59	4%
AR	7	1%	409	85%	32	7%	34	7%
CA	584	3%	14000	83%	1518	9%	775	5%
CO	16	3%	437	86%	27	5%	27	5%
CT	65	3%	1917	93%	55	3%	18	1%
DE	22	2%	721	81%	136	15%	13	1%
DC	87	4%	1850	77%	440	18%	15	1%
FL	402	4%	8801	82%	590	5%	943	9%
GA	138	3%	3489	87%	192	5%	188	5%
HI	8	2%	257	77%	64	19%	6	2%
ID	1	2%	63	97%	1	2%	0	0%
IL	176	3%	4909	81%	625	10%	349	6%
IN	30	3%	870	80%	115	11%	69	6%
IA	7	2%	257	58%	139	31%	41	9%
KS	8	3%	212	82%	16	6%	22	9%
KY	4	1%	489	88%	35	6%	29	5%
LA	44	2%	1927	80%	299	12%	132	5%
ME	7	1%	296	37%	343	43%	156	19%
MD	112	2%	4071	81%	393	8%	423	8%
MA	100	2%	4958	82%	932	15%	59	1%
MI	17	2%	651	70%	105	11%	155	17%
MN	28	3%	759	77%	144	15%	55	6%
MS	25	2%	967	85%	93	8%	54	5%
MO	32	2%	1331	85%	133	9%	63	4%
MT	0	0%	71	95%	0	0%	4	5%
NE	2	1%	185	80%	26	11%	19	8%
NV	9	2%	348	88%	15	4%	25	6%
NH	7	5%	107	75%	12	8%	16	11%
NJ	182	3%	4142	79%	553	11%	338	6%
NM	5	2%	233	91%	11	4%	6	2%
NY	1398	3%	24062	57%	14811	35%	1779	4%
NC	150	3%	3913	84%	410	9%	193	4%
ND	0	0%	8	80%	2	20%	0	0%
OH	30	1%	1822	90%	102	5%	67	3%
OK	53	7%	633	85%	31	4%	25	3%
OR	19	4%	468	88%	26	5%	17	3%
PA	71	4%	1368	82%	127	8%	109	7%
RI	16	3%	532	85%	61	10%	18	3%
SC	106	5%	1832	80%	234	10%	116	5%
SD	0	0%	32	62%	14	27%	6	12%
TN	37	1%	2119	73%	611	21%	155	5%
TX	170	3%	5068	90%	155	3%	265	5%
UT	1	1%	78	90%	4	5%	4	5%
VT	2	2%	90	72%	27	22%	6	5%
VA	71	3%	1445	69%	291	14%	277	13%
WA	18	1%	1061	88%	85	7%	38	3%
WV	5	2%	235	91%	7	3%	10	4%
WI	17	2%	794	82%	113	12%	46	5%
WY	3	14%	16	73%	2	9%	1	5%

*Beneficiaries with full-year, full benefits only

Table 4.12: Medicaid Beneficiaries with HIV/AIDS Dually Eligible for Medicare by State, 2007

	Dual Eligibles		Non-Duals	
	Number	%	Number	%
U.S.	40,925	29%	102,015	71%
AL	381	30%	909	70%
AK	49	40%	72	60%
AZ	584	36%	1027	64%
AR	136	28%	346	72%
CA	6361	38%	10516	62%
CO	236	47%	271	53%
CT	649	32%	1406	68%
DE	342	38%	550	62%
DC	488	20%	1904	80%
FL	2798	26%	7938	74%
GA	1177	29%	2830	71%
HI	143	43%	192	57%
ID	31	48%	34	52%
IL	1802	30%	4257	70%
IN	306	28%	778	72%
IA	162	36%	282	64%
KS	117	45%	141	55%
KY	170	31%	387	69%
LA	663	28%	1739	72%
ME	150	19%	652	81%
MD	954	19%	4045	81%
MA	2555	42%	3494	58%
MI	380	41%	548	59%
MN	440	45%	546	55%
MS	302	27%	837	73%
MO	640	41%	919	59%
MT	30	40%	45	60%
NE	121	52%	111	48%
NV	111	28%	286	72%
NH	59	42%	83	58%
NJ	1364	26%	3851	74%
NM	97	38%	158	62%
NY	7496	18%	34554	82%
NC	2004	43%	2662	57%
ND	3	30%	7	70%
OH	523	26%	1498	74%
OK	451	61%	291	39%
OR	255	48%	275	52%
PA	890	53%	785	47%
RI	203	32%	424	68%
SC	1062	46%	1226	54%
SD	6	12%	46	88%
TN	940	32%	1982	68%
TX	1670	30%	3988	70%
UT	37	43%	50	57%
VT	54	43%	71	57%
VA	644	31%	1440	69%
WA	399	33%	803	67%
WV	71	28%	186	72%
WI	412	42%	558	58%
WY	7	32%	15	68%

*Beneficiaries with full-year, full benefits only

Medicaid Spending on Beneficiaries with HIV/AIDS

In FY 2007, Medicaid spending on beneficiaries with HIV/AIDS totaled $5.3 billion; it averaged at $103.8 million across states. Total spending on Medicaid beneficiaries with HIV/AIDS represented 1.8% of overall Medicaid spending, a slightly greater share than their representation among all Medicaid beneficiaries, and indicative of the high costs of HIV care (Kates, 2011). Indeed, per capita Medicaid spending for beneficiaries with HIV was $24,867, almost five times higher than for those without an HIV diagnosis ($5,091) (Kates, 2011). Summary statistics are shown in Table 4.13. Figures 4.2 and 4.3 provide maps showing Medicaid spending on beneficiaries with HIV/AIDS as a share of Medicaid spending in each state, and per capita spending on beneficiaries with HIV/AIDS, respectively.

Spending patterns for beneficiaries with HIV/AIDS varied by state. As shown in Table 4.14, spending by state ranged from just $346,631 in North Dakota to $2.2 billion in New York, which alone represented 42% of all Medicaid spending on beneficiaries with HIV in the country (10 states, including New York, accounted for 81% of Medicaid spending on beneficiaries with HIV/AIDS). After New York, the next highest spending state – California – spent less than a quarter of this amount, or $454 million, on its Medicaid beneficiaries with HIV/AIDS in 2007.

The picture as told by per capita Medicaid spending, a standardized measure of spending across states, is somewhat different. Per capita spending ranged from a low of $7,719 per capita in Arizona to a high of $37,075 in New York, an almost five-fold difference. Four

other states, Illinois, Maryland, South Dakota, and Wyoming, had spending per beneficiary with HIV of $30,000 or more. Looking at Medicaid spending on beneficiaries with HIV as a share of a state's Medicaid spending also reveals a range, though in most states, spending on beneficiaries with HIV was less than 1% of Medicaid spending overall. It was 4.7% in Maryland, 5.3% in New York, and 7.2% in DC.

Table 4.13: Medicaid Spending on HIV in the U.S. States, 2007 - Summary Statistics

	Medicaid Spending on Beneficiaries with HIV/AIDS	Per Capita Spending on Medicaid Beneficiaries with HIV/AIDS	Medicaid Spending on Beneficiaries with HIV as Share of All Medicaid Spending in State
Mean	$103,804,052	$24,867	1.8%
Median	$21,764,143	$17,594	0.6%
Lower Quartile	$6,747,593	$13,609	0.3%
Upper Quartile	$74,422,955	$19,840	1.4%
Minimum	$346,631	$7,719	0.1%
Maximum	$2,204,312,023	$37,075	7.2%

Figure 4.3 Medicaid Spending on Medicaid Beneficiaries with HIV/AIDS as a Share of All Medicaid Spending in State, 2007

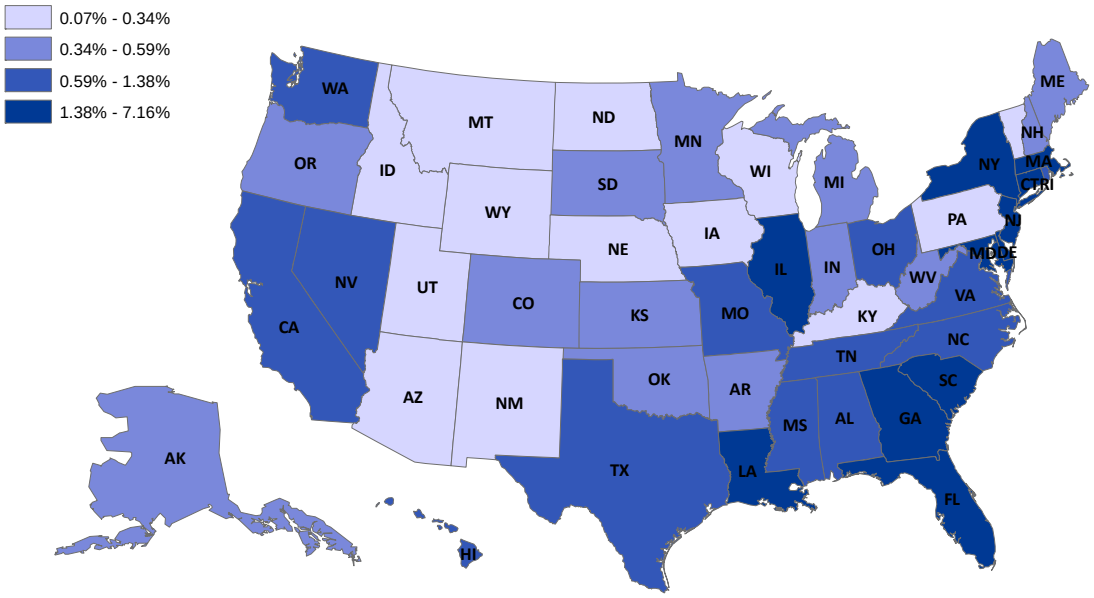


Figure 4.4 Per Capita Spending on Medicaid Beneficiaries with HIV/AIDS by State, 2007

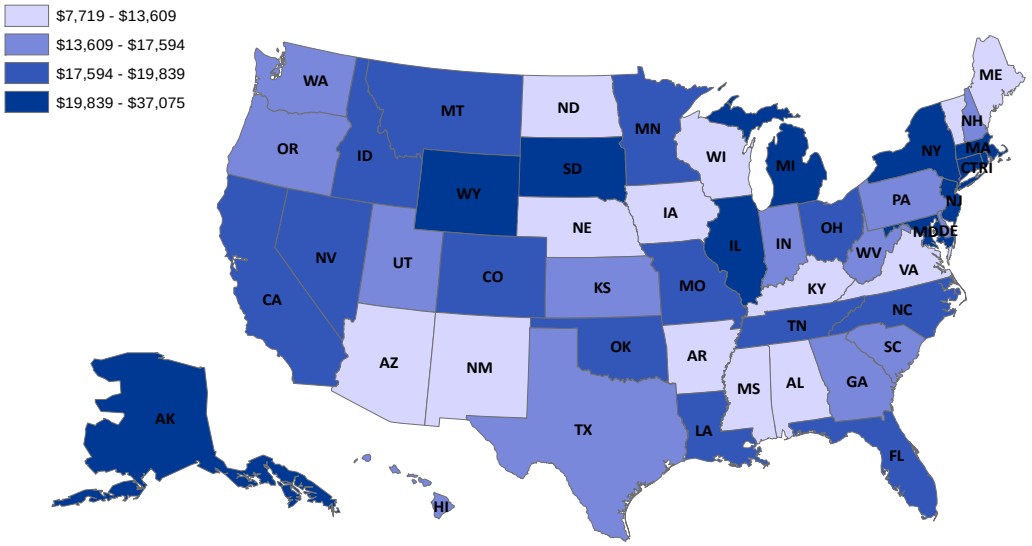


Table 4.14: Medicaid Spending on HIV/AIDS by State, 2007

	Medicaid Spending on Beneficiaries with HIV/AIDS	Medicaid Spending on Beneficiaries with HIV/AIDS as Share of All Medicaid Spending in U.S.	Per Capita Spending on Medicaid Beneficiaries with HIV/AIDS	Medicaid Spending on Beneficiaries with HIV as Share of All Medicaid Spending in State
U.S.	$5,294,006,640	100%	$24,867	1.8%
AL	$21,764,143	0.4%	$10,413	0.6%
AK	$5,395,801	0.1%	$29,325	0.6%
AZ	$21,181,671	0.4%	$7,719	0.3%
AR	$11,174,564	0.2%	$12,815	0.4%
CA	$454,079,420	8.6%	$19,447	1.4%
CO	$14,356,786	0.3%	$18,718	0.5%
CT	$74,422,955	1.4%	$25,575	1.9%
DE	$22,505,637	0.4%	$16,297	2.2%
DC	$93,683,093	1.8%	$27,100	7.2%
FL	$366,465,754	6.9%	$19,607	2.9%
GA	$112,251,523	2.1%	$16,647	1.7%
HI	$6,619,833	0.1%	$13,936	0.6%
ID	$2,393,379	0.0%	$19,780	0.2%
IL	$272,636,487	5.1%	$34,935	2.2%
IN	$27,425,223	0.5%	$14,021	0.6%
IA	$6,747,593	0.1%	$9,320	0.3%
KS	$8,320,108	0.2%	$16,000	0.4%
KY	$11,734,825	0.2%	$12,995	0.3%
LA	$79,656,988	1.5%	$19,840	1.8%
ME	$10,445,732	0.2%	$9,708	0.5%
MD	$244,107,534	4.6%	$31,624	4.7%
MA	$158,836,084	3.0%	$21,569	1.5%
MI	$34,160,199	0.6%	$20,829	0.4%
MN	$28,478,041	0.5%	$19,654	0.5%
MS	$28,034,596	0.5%	$13,609	0.9%
MO	$47,396,962	0.9%	$18,371	0.8%
MT	$2,209,356	0.0%	$19,380	0.3%
NE	$4,454,473	0.1%	$13,025	0.3%
NV	$14,895,307	0.3%	$18,209	1.3%
NH	$3,888,335	0.1%	$17,594	0.4%
NJ	$205,146,807	3.9%	$28,249	2.8%
NM	$4,849,889	0.1%	$11,686	0.2%
NY	$2,204,312,023	41.6%	$37,075	5.3%
NC	$128,514,757	2.4%	$19,328	1.4%
ND	$346,631	0.0%	$8,888	0.1%
OH	$74,015,077	1.4%	$18,630	0.6%
OK	$19,402,948	0.4%	$18,168	0.6%
OR	$14,599,263	0.3%	$15,631	0.5%
PA	$47,175,005	0.9%	$17,061	0.3%
RI	$20,038,124	0.4%	$24,201	1.2%
SC	$52,399,388	1.0%	$16,666	1.4%
SD	$2,953,459	0.1%	$30,765	0.5%
TN	$62,292,459	1.2%	$17,622	0.9%
TX	$161,893,709	3.1%	$16,511	0.9%
UT	$3,525,353	0.1%	$16,098	0.3%
VT	$2,397,566	0.0%	$12,048	0.3%
VA	$35,079,486	0.7%	$10,938	0.7%
WA	$40,295,937	0.8%	$17,213	0.7%
WV	$7,555,710	0.1%	$17,490	0.4%
WI	$16,328,573	0.3%	$11,663	0.3%
WY	$1,162,073	0.0%	$32,280	0.3%

Medicaid Services for Beneficiaries with HIV/AIDS

Medicaid services were categorized into five broad service types: long term care; inpatient care; outpatient care; prescription drugs; and other acute care. Several different measures of service use were examined. These included the number of Medicaid beneficiaries with HIV/AIDS who used each type of service; Medicaid spending on beneficiaries with HIV/AIDS by type of service; and Medicaid spending per beneficiary with HIV/AIDS by type of service. Tables 4.15 through 4.17 provide summary data on these service measures; Tables 4.18 through 4.20 provide data broken down by state.

As shown in Tables 4.15 and 4.18, beneficiaries with HIV/AIDS were more likely to use outpatient services than any other service category, with 184,926 beneficiaries (89%) using outpatient services in 2007 (the state average was 3,699 beneficiaries). The next largest category was acute care, used by 85% of beneficiaries. Prescription drugs accounted for the third largest amount of users in 2007 (76%). As found by Kates (2011), Medicaid beneficiaries with HIV/AIDS were much more likely to have used outpatient care and prescription drugs in 2007 compared to their counterparts without the disease.

There was considerable range across the states in the number of Medicaid beneficiaries with HIV/AIDS by service type, but the general pattern was consistent, with beneficiaries most likely to use outpatient services. Despite the greater number of beneficiaries with HIV/AIDS using outpatient and other acute care services, however, prescription drugs accounted for the largest share of spending of any service category in 2007 (31%),

followed by inpatient care (27%), and long-term care (17%), reflecting the higher costs of these types of services. By contrast, among beneficiaries without HIV, long term care accounted for the largest share of spending (38%), followed by other acute care (31%); prescription drugs account for just 7% of spending (Kates, 2011).

Medicaid spending per beneficiary with HIV/AIDS by type of service provides a useful standardized measure to compare across states. As shown in Tables 4.17 and 4.20, inpatient care accounted for the highest Medicaid spending per beneficiary ($22,343), followed closely by long term care ($21,170). Per beneficiary Medicaid spending on prescription drugs was the third highest, and about half the cost ($10,279). There was a considerable range by state. For example, Medicaid spending per beneficiary with HIV/AIDS on long term care ranged from $4,712 to $38,190. Spending per beneficiary with HIV/AIDS on prescription drugs ranged from $3,825 to $17,489.

Table 4.15: Number of Medicaid Beneficiaries with HIV/AIDS by Service in the U.S. States, 2007 -Summary Statistics

	Long Term Care	Inpatient Care	Outpatient Care	Prescription Drugs	Other Acute Care
Mean	856	1,264	3,699	3,154	3,522
Median	204	333	1,149	1,043	1,303
Lower Quartile	49	91	401	306	328
Upper Quartile	675	1,222	3,393	2,784	3,023
Minimum	5	5	36	24	15
Maximum	11,959	20,524	52,522	50,508	50,823

Table 4.16: Medicaid Spending on Beneficiaries with HIV/AIDS in the U.S. States, by Service, 2007-Summary Statistics

	Long Term Care	Inpatient Care	Outpatient Care	Prescription Drugs	Other Acute Care
Mean	$18,129,572	$28,232,054	$13,193,901	$32,417,327	$13,777,525
Median	$3,954,953	$4,762,276	$3,088,253	$6,459,966	$3,210,294
Lower Quartile	$1,068,668	$834,009	$1,197,462	$2,720,550	$684,437
Upper Quartile	$10,461,712	$20,057,396	$11,733,735	$20,794,996	$9,950,567
Minimum	$32,981	$40,531	$99,664	$119,376	$15,692
Maximum	$456,713,342	$647,509,591	$237,916,249	$665,545,243	$201,748,556

Table 4.17: Medicaid Spending Per Beneficiary with HIV/AIDS in the U.S. States, by Service, 2007-Summary Statistics					
	Long Term Care	Inpatient Care	Outpatient Care	Prescription Drugs	Other Acute Care
Mean	$21,170	$22,343	$3,567	$10,279	$3,911
Median	$16,957	$15,529	$2,910	$8,078	$2,459
Lower Quartile	$12,892	$8,953	$2,469	$6,766	$1,512
Upper Quartile	$23,427	$19,065	$3,807	$9,823	$4,204
Minimum	$4,712	$2,602	$997	$3,825	$605
Maximum	$38,190	$47,509	$21,297	$17,489	$20,389

Table 4.18: Number of Medicaid Beneficiaries with HIV/AIDS by Service by State, 2007*

	Long Term Care		Inpatient Care		Outpatient Care		Prescription Drugs		Other Acute Care		Total
U.S.	42,820	21%	63,178	30%	184,926	89%	157,681	76%	176,124	85%	207,993
AL	328	16%	285	14%	2,028	97%	1,504	72%	1,733	83%	2,081
AK	30	16%	50	27%	181	99%	140	77%	141	77%	182
AZ	--	--	--	--	--	--	--	--	--	--	--
AR**	95	11%	269	31%	866	99%	589	68%	782	90%	872
CA	6,029	26%	5,047	22%	20,117	86%	16,598	71%	21,374	92%	23,313
CO	211	28%	159	21%	740	96%	508	66%	746	97%	767
CT	827	28%	1,050	36%	2,881	99%	2,610	90%	2,090	72%	2,906
DE	705	51%	266	19%	958	69%	1,092	79%	1,344	97%	1,381
DC	352	10%	1,339	39%	3,219	93%	2,783	81%	1,967	57%	3,451
FL	5,988	32%	7,873	43%	17,721	96%	13,860	75%	14,912	81%	18,523
GA	456	7%	2,014	30%	6,388	95%	4,265	64%	5,993	89%	6,716
HI	67	14%	83	18%	399	84%	308	65%	326	69%	474
ID	28	23%	39	32%	121	100%	85	70%	103	85%	121
IL	2,174	28%	2,553	33%	7,539	97%	6,736	87%	5,675	73%	7,755
IN	171	9%	392	21%	1,645	87%	1,067	56%	1,659	88%	1,894
IA	96	13%	264	37%	717	99%	578	80%	703	97%	723
KS	103	21%	125	26%	451	94%	300	63%	374	78%	480
KY	79	9%	135	15%	700	78%	420	47%	804	89%	903
LA	582	15%	1,528	38%	3,934	99%	2,948	74%	2,972	74%	3,992
ME	37	3%	263	25%	1,048	98%	966	90%	683	64%	1,073
MD	1,296	17%	1,971	26%	6,150	80%	4,095	53%	6,276	82%	7,657
MA	876	12%	1,447	20%	7,242	99%	5,937	81%	6,260	85%	7,325
MI	169	10%	496	30%	1,605	98%	1,252	76%	1,582	97%	1,638
MN	621	43%	520	36%	1,249	87%	1,018	71%	1,121	78%	1,440
MS	129	6%	734	36%	1,972	98%	1,303	64%	1,365	68%	2,022
MO	444	17%	472	18%	2,377	92%	1,788	69%	2,512	97%	2,579
MT	12	11%	31	27%	102	89%	83	73%	101	89%	114
NE	44	13%	93	27%	301	88%	275	80%	302	88%	342
NV	101	13%	197	25%	696	87%	560	70%	681	85%	804
NH	37	17%	65	30%	215	99%	165	76%	93	43%	217
NJ	1,656	23%	1,825	25%	5,837	81%	5,781	80%	5,800	80%	7,239
NM	51	12%	37	9%	256	62%	52	13%	329	80%	410
NY	11,959	20%	20,524	35%	52,522	89%	50,508	85%	50,823	86%	59,268
NC	1,635	25%	1,766	27%	6,557	99%	4,909	74%	6,109	92%	6,645
ND	7	18%	5	13%	36	95%	25	66%	21	55%	38
OH	665	17%	1,061	27%	3,916	99%	2,787	70%	3,177	80%	3,957

Table 4.18: Number of Medicaid Beneficiaries with HIV/AIDS by Service by State, 2007*

	Long Term Care		Inpatient Care		Outpatient Care		Prescription Drugs		Other Acute Care		Total
OK	404	38%	371	35%	1,044	98%	695	65%	1,050	98%	1,068
OR	196	21%	57	6%	401	44%	518	57%	861	94%	913
PA	465	17%	973	35%	2,076	75%	1,646	60%	2,640	96%	2,760
RI	105	13%	209	25%	698	85%	579	70%	736	90%	822
SC	1,193	38%	867	28%	3,073	98%	2,328	74%	2,960	94%	3,139
SD	5	5%	35	36%	95	99%	80	83%	96	100%	96
TN	229	7%	777	22%	2,993	85%	2,391	68%	3,485	99%	3,505
TX	1,288	15%	2,833	33%	5,779	67%	6,904	80%	7,237	84%	8,582
UT	13	6%	36	17%	208	97%	165	77%	118	55%	215
VT	22	11%	43	22%	199	100%	184	92%	176	88%	199
VA	314	10%	1,183	37%	2,040	64%	1,197	37%	2,214	69%	3,200
WA	353	15%	409	18%	2,157	93%	1,986	85%	2,100	90%	2,331
WV	37	9%	102	24%	427	100%	325	76%	242	57%	427
WI	126	9%	295	21%	1,014	73%	764	55%	1,261	90%	1,398
WY	10	28%	10	28%	36	100%	24	67%	15	42%	36

*Row percentages total more than 100% because beneficiaries typically use more than one type of service in a given year.

**The quality of Arizona's data by service type was not sufficient to permit inclusion in the service-level analyses.

Table 4.19: Medicaid Spending on Beneficiaries with HIV by Service by State, 2007											
	Long Term Care		Inpatient Care		Outpatient Care		Prescription Drugs		Other Acute Care		Total
U.S.	$906,478,621	17%	$1,411,602,724	27%	$659,695,034	12%	$1,620,866,367	31%	$688,876,260	13%	$5,287,519,007
AL	$2,590,612	12%	$741,597	3%	$6,311,412	29%	$9,862,545	45%	$2,349,623	11%	$21,855,789
AK	$1,104,658	20%	$771,472	14%	$1,233,774	23%	$1,811,458	33%	$508,225	9%	$5,429,588
AZ*	--	--	--	--	--	--	--	--	--	--	--
AR	$1,420,589	13%	$1,482,835	13%	$2,993,305	27%	$4,017,843	36%	$1,261,246	11%	$11,175,818
CA	$79,892,975	18%	$85,608,714	19%	$55,415,579	12%	$185,552,100	41%	$47,820,186	11%	$454,289,553
CO	$3,592,095	25%	$2,980,066	21%	$1,782,027	12%	$4,136,122	29%	$1,867,580	13%	$14,357,890
CT	$20,125,547	27%	$12,409,494	17%	$12,246,296	16%	$27,416,373	37%	$2,270,013	3%	$74,467,724
DE	$6,140,445	27%	$2,489,362	11%	$2,652,096	12%	$7,961,370	35%	$3,291,130	15%	$22,534,403
DC	$7,190,845	8%	$46,233,121	49%	$10,075,556	11%	$20,760,380	22%	$9,754,098	10%	$94,014,000
FL	$45,361,159	12%	$104,800,337	28%	$45,941,150	12%	$136,011,118	37%	$36,087,086	10%	$368,200,849
GA	$6,706,887	6%	$40,283,296	36%	$18,406,436	16%	$36,474,400	32%	$10,539,975	9%	$112,410,993
HI	$616,163	9%	$781,100	12%	$1,400,992	21%	$3,044,627	46%	$804,953	12%	$6,647,834
ID	$726,840	30%	$229,216	10%	$321,463	13%	$914,163	38%	$201,697	8%	$2,393,379
IL	$29,795,192	11%	$121,291,625	44%	$40,633,675	15%	$61,920,054	23%	$20,238,901	7%	$273,879,447
IN	$2,888,215	10%	$6,126,703	22%	$3,932,904	14%	$10,514,167	38%	$4,143,315	15%	$27,605,303
IA	$753,379	11%	$1,425,395	21%	$1,781,734	26%	$2,210,912	32%	$645,823	9%	$6,817,243
KS	$1,540,977	19%	$2,253,288	27%	$946,753	11%	$2,890,429	35%	$697,308	8%	$8,328,756
KY	$1,399,449	12%	$1,577,033	13%	$1,823,073	16%	$4,074,688	35%	$2,860,582	24%	$11,734,825
LA	$9,324,616	12%	$26,083,649	33%	$11,562,881	14%	$28,356,056	36%	$4,521,837	6%	$79,849,039
ME	$522,897	5%	$1,953,182	19%	$1,198,909	11%	$3,740,127	36%	$3,030,616	29%	$10,445,732
MD	$40,162,690	16%	$42,412,421	17%	$16,686,272	7%	$18,211,701	7%	$127,963,569	52%	$245,436,654
MA	$20,256,400	13%	$27,916,434	18%	$30,638,972	19%	$50,157,542	32%	$30,120,979	19%	$159,090,326
MI	$4,783,087	14%	$9,440,646	28%	$3,309,920	10%	$10,066,071	29%	$6,634,687	19%	$34,234,411
MN	$9,085,648	32%	$5,378,599	19%	$4,042,665	14%	$6,815,232	24%	$3,276,522	11%	$28,598,666
MS	$2,778,114	10%	$7,517,771	27%	$5,242,739	19%	$9,946,181	35%	$2,618,884	9%	$28,103,689
MO	$6,813,955	14%	$9,043,239	19%	$9,445,666	20%	$18,031,468	38%	$4,198,947	9%	$47,533,276
MT	$153,946	7%	$184,502	8%	$314,284	14%	$1,451,591	66%	$105,033	5%	$2,209,356
NE	$568,187	13%	$638,570	14%	$809,615	18%	$1,863,149	42%	$586,773	13%	$4,466,295
NV	$2,053,550	14%	$4,573,964	31%	$2,602,451	17%	$4,705,995	31%	$1,011,619	7%	$14,947,579
NH	$1,111,201	29%	$522,689	13%	$850,340	22%	$1,300,323	33%	$111,311	3%	$3,895,864
NJ	$37,316,344	18%	$35,965,344	17%	$27,427,227	13%	$76,973,645	37%	$28,445,395	14%	$206,127,955
NM	$1,141,016	23%	$501,328	10%	$356,627	7%	$300,957	6%	$2,564,638	53%	$4,864,566
NY	$456,713,342	21%	$647,509,591	29%	$237,916,249	11%	$665,545,243	30%	$201,748,556	9%	$2,209,432,981
NC	$14,712,461	11%	$25,097,794	20%	$23,483,309	18%	$41,362,686	32%	$23,964,208	19%	$128,620,458
ND	$32,981	9%	$79,588	23%	$99,664	29%	$119,376	34%	$15,692	5%	$347,301

Table 4.19: Medicaid Spending on Beneficiaries with HIV by Service by State, 2007

	Long Term Care		Inpatient Care		Outpatient Care		Prescription Drugs		Other Acute Care		Total
OH	$14,317,653	19%	$18,377,263	25%	$9,342,023	13%	$18,878,834	25%	$13,449,057	18%	$74,364,830
OK	$5,399,734	28%	$4,950,588	25%	$3,183,200	16%	$5,294,861	27%	$634,764	3%	$19,463,148
OR	$4,317,810	30%	$1,058,259	7%	$971,406	7%	$3,537,697	24%	$4,728,891	32%	$14,614,063
PA	$16,775,241	36%	$8,784,235	19%	$2,069,183	4%	$10,943,962	23%	$8,670,883	18%	$47,243,505
RI	$2,782,522	14%	$4,353,755	22%	$2,623,124	13%	$6,104,700	30%	$4,360,153	22%	$20,224,254
SC	$6,443,017	12%	$14,345,639	27%	$9,673,762	18%	$18,896,294	36%	$3,144,067	6%	$52,502,778
SD	$44,914	2%	$715,252	24%	$1,476,887	50%	$636,844	22%	$79,648	3%	$2,953,545
TN	$4,679,865	8%	$13,856,010	22%	$13,424,862	22%	$20,898,845	34%	$9,487,528	15%	$62,347,110
TX	$12,480,093	8%	$49,808,603	31%	$19,110,598	12%	$47,521,066	29%	$33,761,045	21%	$162,681,404
UT	$457,492	13%	$851,646	24%	$951,965	27%	$1,112,393	32%	$155,416	4%	$3,528,911
VT	$446,791	19%	$204,592	9%	$481,264	20%	$1,109,533	46%	$156,236	7%	$2,398,416
VA	$6,021,153	17%	$7,626,178	22%	$3,257,693	9%	$5,293,357	15%	$13,179,987	37%	$35,378,369
WA	$9,788,918	24%	$6,601,490	16%	$5,663,552	14%	$13,647,846	34%	$4,688,211	12%	$40,390,017
WV	$960,700	13%	$1,149,538	15%	$1,193,119	16%	$3,502,265	46%	$750,160	10%	$7,555,783
WI	$2,086,902	13%	$2,575,182	16%	$1,619,678	10%	$4,737,715	29%	$5,343,577	33%	$16,363,053
WY	$99,352	9%	$40,531	3%	$766,702	66%	$230,062	20%	$25,631	2%	$1,162,278

*The quality of Arizona's data by service type was not sufficient to permit inclusion in the service-level analyses.

Table 4.20: Medicaid Spending Per Beneficiary with HIV/AIDS, by Service by State, 2007					
	Long Term Care	Inpatient Care	Outpatient Care	Prescription Drugs	Other Acute Care
U.S.	$21,168	$22,341	$3,575	$10,280	$3,987
AL	$7,898	$2,602	$3,112	$6,558	$1,356
AK	$36,822	$15,429	$6,816	$12,939	$3,604
AZ*	--	--	--	--	--
AR	$14,954	$5,512	$3,456	$6,821	$1,613
CA	$13,251	$16,962	$2,755	$11,179	$2,237
CO	$17,024	$18,743	$2,408	$8,142	$2,503
CT	$24,336	$11,819	$4,251	$10,504	$1,086
DE	$8,710	$9,359	$2,768	$7,291	$2,449
DC	$20,429	$34,528	$3,130	$7,460	$4,959
FL	$7,575	$13,311	$2,592	$9,813	$2,420
GA	$14,708	$20,002	$2,881	$8,552	$1,759
HI	$9,196	$9,411	$3,511	$9,885	$2,469
ID	$25,959	$5,877	$2,657	$10,755	$1,958
IL	$13,705	$47,509	$5,390	$9,192	$3,566
IN	$16,890	$15,629	$2,391	$9,854	$2,497
IA	$7,848	$5,399	$2,485	$3,825	$919
KS	$14,961	$18,026	$2,099	$9,635	$1,864
KY	$17,715	$11,682	$2,604	$9,702	$3,558
LA	$16,022	$17,070	$2,939	$9,619	$1,521
ME	$14,132	$7,427	$1,144	$3,872	$4,437
MD	$30,990	$21,518	$2,713	$4,447	$20,389
MA	$23,124	$19,293	$4,231	$8,448	$4,812
MI	$28,302	$19,034	$2,062	$8,040	$4,194
MN	$14,631	$10,343	$3,237	$6,695	$2,923
MS	$21,536	$10,242	$2,659	$7,633	$1,919
MO	$15,347	$19,159	$3,974	$10,085	$1,672
MT	$12,829	$5,952	$3,081	$17,489	$1,040
NE	$12,913	$6,866	$2,690	$6,775	$1,943
NV	$20,332	$23,218	$3,739	$8,404	$1,485
NH	$30,032	$8,041	$3,955	$7,881	$1,197
NJ	$22,534	$19,707	$4,699	$13,315	$4,904
NM	$22,373	$13,549	$1,393	$5,788	$7,795
NY	$38,190	$31,549	$4,530	$13,177	$3,970
NC	$8,998	$14,212	$3,581	$8,426	$3,923
ND	$4,712	$15,918	$2,768	$4,775	$747
OH	$21,530	$17,321	$2,386	$6,774	$4,233
OK	$13,366	$13,344	$3,049	$7,619	$605
OR	$22,030	$18,566	$2,422	$6,830	$5,492
PA	$36,076	$9,028	$997	$6,649	$3,284
RI	$26,500	$20,831	$3,758	$10,544	$5,924
SC	$5,401	$16,546	$3,148	$8,117	$1,062
SD	$8,983	$20,436	$15,546	$7,961	$830
TN	$20,436	$17,833	$4,485	$8,741	$2,722
TX	$9,690	$17,582	$3,307	$6,883	$4,665
UT	$35,192	$23,657	$4,577	$6,742	$1,317
VT	$20,309	$4,758	$2,418	$6,030	$888
VA	$19,176	$6,446	$1,597	$4,422	$5,953
WA	$27,731	$16,141	$2,626	$6,872	$2,232
WV	$25,965	$11,270	$2,794	$10,776	$3,100
WI	$16,563	$8,729	$1,597	$6,201	$4,238
WY	$9,935	$4,053	$21,297	$9,586	$1,709

*The quality of Arizona's data by service type was not sufficient to permit inclusion in the service-level analyses.

The preceding section provides new information about Medicaid beneficiaries with HIV/AIDS nationally and by state, including a profile of beneficiaries by key characteristics, spending, and service use. The data depict significant variation across all these factors by state. Understanding the drivers of such variation, however, is complex. While the variation is likely due to multiple factors, including federal and state law and policy, Medicaid program choices, economic and socio-demographics, disentangling their respective effects is difficult. To better understand variation, the next section of this Chapter provides the results of multivariate analyses, employed to assess the independent effects of several potential explanatory variables at once.

Part II: Analysis of Variation

As the prior section indicates, there is considerable variation by state in terms of Medicaid HIV enrollment, spending, and service use. This section provides the results of the analysis of variation, looking at four dependent variables that measure Medicaid HIV enrollment and spending: Medicaid beneficiaries with HIV/AIDS as share of all Medicaid beneficiaries, per 1,000; Medicaid spending per beneficiary with HIV/AIDS; Medicaid spending on beneficiaries with HIV/AIDS as share of all Medicaid spending, per 1,000; and Medicaid spending for beneficiaries with HIV/AIDS per person living with AIDS. It first provides bivariate correlations between the dependent and independent variables used in the analysis. It then provides the results of the multivariate analyses.

Bivariate Analysis

Scatter plots were generated, plotting each dependent variable against the independent variables. The scatter plots revealed that Washington, DC was a significant outlier and it was therefore not included in the multivariate analyses. Other states that appeared to be influential cases were left in the models, but the final models were also run without them, to assess their effects on the study results (see discussion below). Appendix C contains examples of these scatter plots for each of the dependent variables and a subset of key independent predictors.

Table 4.21 provides the Pearson product-moment correlation coefficients for the dependent and independent variables, and tests for significance.at the 95% confidence level. As shown, many of the predictor variables, though not all, were significantly associated with the dependent variables at the 95% confidence level. Exceptions were Medicaid coverage of childless adults, which only showed a significant correlation with Medicaid beneficiaries with HIV/AIDS as a share of a state's Medicaid beneficiaries, and hospital beds per capita, which only showed a significant correlation with Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS. Poverty rate and health spending per capita were not significantly correlated with any of the dependent variables.

Table 4.21: Pearson product moment correlation coefficients between dependent and independent variables, 2003-2007, across 50 states. N=250

	Dependent Variables			
Independent Variables	Medicaid beneficiaries with HIV/AIDS as Share of Medicaid Beneficiaries in State, per 1,000 (logged)	Medicaid spending per beneficiary with HIV/AIDS (logged)	Medicaid spending on beneficiaries with HIV/AIDS as share of Medicaid spending in State, per 1,000 (logged)	Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS (logged)
Federal Matching Rate (FMAP)	-0.2811*	-0.4830*	-0.3353*	-0.1043
Northeast	0.2501*	0.2622*	0.1601*	0.2354*
South	0.3232*	-0.1138	0.3330*	-0.0865
West	-0.3298*	-0.1241*	-0.2682*	-0.2601*
Midwest	-0.2451*	0.0183	-0.2384*	0.1518*
Medicaid coverage of childless adults (Y=1)	0.1344*	-0.0578	0.0859	0.0259
Medicaid coverage of low income parents (Y=1)	0.4099*	0.1587*	0.3504*	0.3359*
Medically Needy program (Y=1)	0.1794*	0.1300*	0.1349*	0.1068
Medicaid to Medicare Fee index	-0.3909*	-0.3615*	-0.4376*	-0.0793
Physicians per capita	0.5795*	0.4303*	0.5341*	0.2105*
Hospital beds per capita	-0.0108	-0.072	-0.0812	0.2067*
Percent black	0.6360*	0.1703*	0.6506*	0.0296
Percent urban	0.4569*	0.4397*	0.5371*	-0.1318*
Poverty Rate	0.1085	-0.221	0.1082	-0.0878
Income per capita	0.5089*	0.5583*	0.5192*	0.1342*
Total taxable resources (TTR) per capita	0.4608*	0.5173*	0.4830*	0.1226
Population density (logged)	0.6953*	0.3503*	0.6892*	0.0651
SSI recipients per 1,000 (logged)	0.2288*	-0.092	0.2129*	0.069
Health spending per capita (logged)	-0.0702	0.0471	-0.0588	0.0286
CPI medical price index	-0.2748*	-0.0523	-0.2730*	-0.0205
AIDS prevalence rate (logged)	0.7800*	0.3971*	0.8298*	—[15]
Citizen liberal ideology index	0.2946*	0.2146*	0.2302*	0.2059*
Government liberal ideology index	0.2011*	0.037	0.1463*	0.1292*

*$p \leq .05$; two-tailed tests

[15] AIDS prevalence rate was not included as a predictor in models testing Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS because the dependent variable also includes AIDS prevalence data.

Most of the correlations are in the directions expected, although there were exceptions. One unexpected result is the negative correlation between the federal Medicaid matching rate, or FMAP, and all four dependent variables, which is counterintuitive and opposite of most research findings, except for those related to spending per enrollee. It implies that as the federal share of Medicaid increases, the number of enrollees and spending goes down. In a simple bivariate analysis, however, it is difficult to ascertain what might be going on. On the one hand, it is possible that states with a higher federal match also have less generous Medicaid programs, or other access barriers, that make it more difficult for people with HIV/AIDS to access Medicaid, resulting in fewer enrollees with HIV and/or less spending. On the other hand, this unexpected relationship could be due to other factors that are not controlled for in bivariate analysis. Similarly, the direction of the relationship between Medicaid payments, as measured by the Medicare to Medicaid fee index, and the dependent variables is the opposite of what is expected.

Medical prices were significantly and negatively correlated with Medicaid beneficiaries as a share of a state's beneficiary population and Medicaid spending on HIV/AIDS as a share of state Medicaid spending; they were not significant for the other two dependent variables. Finally, there are mixed findings related to hospital beds per capita and poverty, though none of the counterintuitive findings for these explanatory variables is statistically significant.

It is not possible to determine the actual effects of each of the predictors on the four Medicaid enrollment and spending measures without controlling for multiple factors

simultaneously. My multivariate analytic strategy is designed to explore these relationships in more depth. One concern is that several of the predictor variables are likely correlated with one another. In an effort to examine multicollinearity, and to ensure that the models were as parsimonious as possible (to guard against over-fitting), I checked the correlations between all independent variables with the goal of eliminating at least one of any pair with a correlation above 80%. Only one pair of variables was correlated above this level – income per capita and total taxable resources per capita – and income per capita was left in the models because it showed a higher correlation with all four dependent variables than total taxable resources per capita. I excluded hospital beds per capita, given its low and insignificant correlation with my dependent variables, and because it was highly correlated with physicians per capita, another supply measure. In addition, physicians per capita was significantly correlated with my dependent variables. I also excluded health spending per capita in the final models, which showed low and insignificant correlations with all four dependent variables (although I did test it in the fixed effects models and found no significant results nor did its inclusion change the overall model findings or fit). Poverty rate, while demonstrating a low and insignificant correlation with the dependent variables in bivariate analyses, was kept in the models, given its theoretical importance as discussed in my literature review. In addition, for the pooled OLS model specifications, I calculated the VIF scores which were within the acceptable range.

Two explanatory variables, region and whether a state had a Medically Needy program, were not included in the fixed effects models because they were time invariant. As discussed in Chapter three, time invariant variables cannot be included in an entity-fixed

effects model which by definition controls for things that vary across states. In addition, there were insufficient data to include the Medicaid-to-Medicare fee index in the pooled data analyses. These variables were tested in cross-sectional models without fixed effects and were found to be significant predictors in only few of the cross-sectional models tested.

Multivariate Analysis

This section of the dissertation provides the results of the multivariate analyses, which included four model specifications tested on each of the four dependent variables. Of particular interest is whether any of the policy and programmatic predictors included in the models was significantly associated with the dependent variables, as these provide the potential policy levers for enhancing access and equity for beneficiaries with HIV/AIDS across the states. Overall, I find that there are two such significant predictors in most of the final models – the FMAP and physicians per capita. Medicaid coverage of childless adults and Medicaid coverage of low income parents at or above 100% FPL are significant in some of the model specifications but not all. While the analyses cannot demonstrate a causal relationship between these factors and Medicaid HIV enrollment and spending, the findings suggest potential avenues for policymakers seeking to reduce variation.

Descriptive statistics for the final set of variables used in the multivariate models are provided in Table 4.22. Tables comparing the results across all four model specifications are provided below, by dependent variable. Only the final four model specifications are included. I ran other models containing only policy, programmatic, and supply factor

variables, without socio-demographic, economic, political ideology controls. As might be expected, these models were not as strong, as measured by adjusted R-squared, and more importantly not supportable theoretically. For example, it is appropriate to control for demographic and economic differences across states.

Table 4.22: Descriptive Statistics, final dependent and independent variables, 2003-2007, across 50 states. N=250

	Mean	SD	Min	Max
Medicaid beneficiaries with HIV/AIDS as Share of all Medicaid beneficiaries, per 1,000 (logged)	0.918661	0.741125	-0.79542	2.845652
Medicaid spending per beneficiary with HIV/AIDS (logged)	9.778382	0.360864	8.746007	10.58871
Medicaid spending on beneficiaries with HIV/AIDS as share of all Medicaid spending, per 1,000 (logged)	2.086081	0.850065	-0.37786	4.104465
Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS (logged)	9.228945	0.606021	6.902325	10.58102
Federal matching rate (FMAP)	60.37744	8.247062	50	77.08
Medicaid coverage of childless adults (Y=1)	0.252	0.435032	0	1
Medicaid coverage of low income parents ≥ 100% FPL (Y=1)	0.304	0.460905	0	1
Physicians per capita	25.9996	5.466014	17.7	43.2
Percent black	0.10416	0.09552	0	0.37
Percent urban	0.705712	0.144654	0.364514	0.9428
Poverty Rate	11.8572	2.967422	5.4	22.6
Income per capita	36640.47	5290.016	27017.56	56510
Population density (logged)	4.448207	1.405586	0.126581	7.067849
SSI recipients per 1,000 (logged)	2.85993	0.373437	2.080694	3.724799
CPI medical price index	323.4299	21.91101	288.6	374.231
AIDS prevalence rate (logged)	4.308896	0.773582	2.267661	5.959746
Citizen liberal ideology index	53.28956	15.37197	20.25	93.28
Government liberal ideology index	49.33072	13.00273	25.12	73.94

Medicaid Beneficiaries with HIV/AIDS as a Share of All Medicaid Beneficiaries in State

Table 4.23 presents the results for dependent variable 1, Medicaid beneficiaries with HIV/AIDS as a share of all Medicaid beneficiaries in a state, for each of the four model specifications. While all four models appear to explain much of the variation, the fixed effects models provide a substantially better fit than the models without fixed effects. The FMAP is found to be positively correlated with the dependent variable in both fixed

effects models. Specifically, the state fixed effects model suggests that a one percent increase in the FMAP is associated with a 9.9% increase in Medicaid beneficiaries with HIV/AIDS as a share of a state's Medicaid population, holding all else constant. The final, two-way fixed effects model suggests that a one percent increase in the FMAP is associated with an 8.8% increase in Medicaid beneficiaries with HIV/AIDS as a share of a state's Medicaid population.

Other policy and programmatic variables that are significantly associated with the dependent variable in the final model are Medicaid coverage of childless adults and physicians per capita, and in the expected direction. In states that offer coverage of childless adults, Medicaid beneficiaries with HIV/AIDS represent a 22% greater share of their overall Medicaid population, compared to states that do not offer such coverage. In addition, an increase in the number of physicians per capita is associated with a 24% increase in Medicaid beneficiaries with HIV/AIDS as a share of a state's Medicaid population.

Several of the other controls included were significant in the final model, including the poverty rate and percent urban – these were negatively associated with the dependent variable. For example, a one percent increase in the poverty rate was associated with a 4.7% decrease in beneficiaries with HIV/AIDS as a share of a state's Medicaid population, perhaps indicating that states with greater demands on their Medicaid programs and less resources to bear, as measured by poverty, have less generous Medicaid programs by this measure. Interestingly, the AIDS prevalence rate was

significant in all model specifications except for the final model, indicating that it is no longer a predictor when time fixed effects are included.

Table 4.23: Dependent Variable 1: Medicaid beneficiaries with HIV/AIDS as a share of All Medicaid beneficiaries in State, per 1,000 (logged)				
	Model[+]			
Predictors	(1)	(2)	(3)	(4)
Federal matching rate (FMAP)	0.00293 (0.0169)	0.0125 (0.00793)	0.0990*** (0.0298)	0.0879*** (0.0220)
Medicaid coverage of childless adults (Y=1)	-0.0584 (0.157)	-0.243*** (0.0750)	0.117 (0.0936)	0.224** (0.0915)
Medicaid coverage of low income parents >=100%FPL (Y=1)	0.203 (0.163)	0.489*** (0.0781)	0.0943 (0.0619)	0.0764 (0.0599)
Physicians per capita	0.0142 (0.0205)	0.0534*** (0.0102)	0.0422 (0.0786)	0.241** (0.0917)
Percent Black	1.635 (0.998)	2.549*** (0.607)	11.63 (8.064)	10.25 (6.994)
Percent Urban	-1.465* (0.813)	-0.810** (0.328)	-4.768 (4.076)	-7.602** (3.387)
Poverty Rate	0.0220 (0.0305)	0.0168 (0.0186)	-0.0533** (0.0262)	-0.0472** (0.0177)
Income per capita (2007 $)	1.55e-05 (2.56e-05)	-4.83e-06 (1.22e-05)	-3.74e-05* (1.98e-05)	8.01e-06 (2.30e-05)
Consumer Price Index, medical care	-0.00287 (0.00242)	-0.00200 (0.00130)	-0.000878 (0.00114)	-0.000333 (0.00111)
Population density (logged)	0.0545 (0.0553)	0.0308 (0.0338)	-2.945* (1.525)	1.039 (2.390)
SSI recipients per 1,000 (logged)	-0.629** (0.267)	-0.719*** (0.141)	-1.907* (1.135)	-0.839 (1.100)
AIDS Prevalence Rate (logged)	0.699*** (0.221)	0.504*** (0.102)	-0.944** (0.450)	0.163 (0.407)
Liberal citizen ideology index	0.00486 (0.00508)	-0.00573* (0.00318)	-4.56e-05 (0.00381)	0.00441 (0.00362)
Liberal government index	0.00103 (0.00173)	0.000864 (0.00124)	0.00179 (0.00153)	5.56e-05 (0.00105)
State Fixed Effects	No	No	Yes	Yes
Year Fixed Effects	No	No	No	Yes
Number of observations	50	250	250	250
R-squared	0.858	0.711	0.9311	0.9549
Adjusted R-squared	0.802	0.694	0.9078	0.9383

+Model 1 includes data for 2007 only; Models 2 through 4 pool data for 2003-2007
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Medicaid Spending per Beneficiary with HIV/AIDS

Findings for dependent variable 2, Medicaid spending per beneficiary with HIV/AIDS, are presented in Table 4.24. As with dependent variable 1, the fixed effects models provide a stronger fit than the models without fixed effects. Both fixed effects models show the FMAP to be a significant, negative predictor, holding all else constant and the final model shows a stronger relationship – in the state fixed effects model, a one percent increase in the FMAP was associated with a 3.3% decrease in spending per beneficiary with HIVAIDS; in the two way fixed effects model, a one percent increase in the FMAP was associated with a 4.4% decrease. This implies that states with a lower federal match spend more per beneficiary with HIV/AIDS than states with a higher FMAP (richer states spend more than poorer states per beneficiary), even after controlling for poverty, income, and medical prices. As mentioned in Chapter two, studies have found such an inverse relationship with per capita Medicaid spending (GAO, 1983, 2003; Holahan & Cohen, 1986; Grannemann & Pauly, 2010). This finding could signal the limitations of the FMAP as a policy tool for promoting greater equity, as measured by spending per beneficiary, across states.

No other policy or programmatic variables were significant in either fixed effects model, suggesting that the single most important lever tested in the models is the FMAP, which varies inversely with spending per beneficiary. The poverty rate was positively associated with spending per beneficiary but counter-intuitively, liberal citizen ideology was negatively associated with spending per beneficiary, although its effect was fairly small.

Table 4.24: Dependent Variable 2: Medicaid spending per beneficiary with HIV/AIDS (logged)				
	Model+			
	(1)	(2)	(3)	(4)
Federal Matching Rate (FMAP)	-0.00890 (0.0106)	-0.00606 (0.00528)	-0.0331* (0.0189)	-0.0441*** (0.0162)
Medicaid coverage of childless adults (Y=1)	-0.0928 (0.104)	-0.109** (0.0504)	-0.0409 (0.0496)	-0.0772 (0.0545)
Medicaid coverage of low income parents >=100%FPL (Y=1)	-0.0853 (0.154)	-0.0833 (0.0526)	-0.00731 (0.0318)	-0.0278 (0.0254)
Physicians per capita	0.0226 (0.0159)	0.0257*** (0.00653)	0.0251 (0.0512)	-0.0535 (0.0542)
Percent Black	0.974 (1.010)	0.0308 (0.362)	-2.896 (4.295)	-2.737 (4.874)
Percent Urban	1.043** (0.457)	0.419* (0.227)	0.446 (1.626)	1.368 (1.604)
Poverty Rate	-0.00558 (0.0343)	-0.0152 (0.0125)	0.0357** (0.0149)	0.0279** (0.0132)
Income per capita (2007 $)	2.22e-05 (1.64e-05)	1.30e-05 (8.03e-06)	-1.29e-05 (1.91e-05)	-3.45e-06 (2.04e-05)
Consumer Price Index, medical care	8.57e-05 (0.00308)	0.00108 (0.00111)	0.000360 (0.000842)	0.000256 (0.000743)
Population density (logged)	-0.0888** (0.0372)	-0.0463** (0.0223)	1.882* (0.963)	1.541 (1.515)
SSI recipients per 1,000 (logged)	0.332 (0.258)	0.135 (0.108)	-0.199 (0.681)	0.135 (0.676)
AIDS Prevalence Rate (logged)	-0.0946 (0.173)	0.0704 (0.0571)	0.371 (0.291)	0.381 (0.307)
Liberal citizen ideology index	-0.00477 (0.00693)	-0.00241 (0.00239)	-0.00494* (0.00249)	-0.00608** (0.00264)
Liberal government index	-0.000452 (0.00224)	-0.00120 (0.000860)	0.000446 (0.00138)	0.00137 (0.00114)
State Fixed Effects	No	No	Yes	Yes
Year Fixed Effects	No	No	No	Yes
Number of observations	50	250	250	250
R-squared	0.447	0.412	0.8370	0.8741
Adjusted R-squared	0.226	0.377	0.7817	0.8278

+Model 1 includes data for 2007 only; Models 2 through 4 pool data for 2003-2007
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Medicaid Spending on Beneficiaries with HIV/AIDS as a Share of Medicaid Spending in State

Table 4.25 presents the findings for dependent variable 3, Medicaid spending on beneficiaries with HIV/AIDS as a share of Medicaid spending in a state. Again, the fixed effects models show a better overall fit, and show the FMAP to be a significant

predictor in the expected direction. The FMAP is not found to be significant in either the cross sectional 2007 analysis or the pooled analysis without fixed effects. In the final, two way fixed effects model, a percent increase in the FMAP is associated with a 5.7% increase in spending on beneficiaries with HIV/AIDS as a share of a state's Medicaid spending.

Table 4.25: Dependent Variable 3: Medicaid spending on beneficiaries with HIV/AIDS as a share of all Medicaid spending in State, per 1,000 (logged)

	Model+			
	(1)	(2)	(3)	(4)
Federal Matching Rate (FMAP)	-0.00874 (0.0154)	0.00240 (0.00784)	0.0740** (0.0312)	0.0567** (0.0215)
Medicaid coverage of childless adults (Y=1)	-0.0526 (0.153)	-0.236*** (0.0721)	0.0864 (0.104)	0.162 (0.104)
Medicaid coverage of low income parents >=100%FPL (Y=1)	0.169 (0.204)	0.432*** (0.0885)	0.0937** (0.0464)	0.0681 (0.0521)
Physicians per capita	0.00475 (0.0221)	0.0388*** (0.0106)	0.0651 (0.0724)	0.203** (0.0884)
Percent Black	2.533* (1.379)	2.750*** (0.581)	8.790 (8.772)	7.603 (6.899)
Percent Urban	-0.528 (0.672)	-0.192 (0.317)	-4.035 (3.956)	-5.952 (3.682)
Poverty Rate	0.0163 (0.0439)	0.00385 (0.0189)	-0.0187 (0.0172)	-0.0167 (0.0122)
Income per capita (2007 $)	3.18e-05 (2.72e-05)	-3.42e-06 (1.28e-05)	-3.58e-05** (1.74e-05)	1.58e-05 (2.09e-05)
Consumer Price Index, medical care	-0.00304 (0.00319)	-0.000837 (0.00142)	-0.000859 (0.00114)	-0.000441 (0.00106)
Population density (logged)	0.00159 (0.0574)	-0.00745 (0.0319)	-2.087 (1.569)	1.631 (2.012)
SSI recipients per 1,000 (logged)	-0.205 (0.354)	-0.498*** (0.158)	-2.234* (1.245)	-1.011 (0.914)
AIDS Prevalence Rate (logged)	0.680*** (0.246)	0.646*** (0.104)	-0.353 (0.422)	0.737* (0.400)
Liberal citizen ideology index	-0.00124 (0.00906)	-0.00621 (0.00381)	-0.00400 (0.00402)	0.000175 (0.00371)
Liberal government index	0.000159 (0.00310)	-1.97e-05 (0.00138)	0.00203* (0.00113)	0.00118 (0.000982)
Number of observations	50	250	250	250
State Fixed Effects	No	No	Yes	Yes
Year Fixed Effects	No	No	No	Yes
R-squared	0.822	0.743	0.9533	0.9657
Adjusted R-squared	0.751	0.728	0.9375	0.9531

+Model 1 includes data for 2007 only; Models 2 through 4 pool data for 2003-2007
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Physicians per capita is also positively associated with Medicaid spending on beneficiaries with HIV/AIDS as a share of Medicaid spending in a state. An increase in the number of physicians per capita in a state is associated with a 20.3% increase in Medicaid spending on beneficiaries with HIV/AIDS as a share of a state's Medicaid spending. Medicaid coverage of low income parents at or above 100% FPL is a significant predictor in the state fixed effects model, but not in the final two-way fixed effects model.

Medicaid Spending on Beneficiaries with HIV/AIDS per Person Living with AIDS

Finally, results for dependent variable 4, Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS in a state, are presented in Table 4.26. Again, the FMAP and physicians per capita are found to be significantly and positively associated with spending on beneficiaries with HIV/AIDS per person living with AIDS. A one percent increase in the FMAP is associated with a 5.5% increase in Medicaid spending on beneficiaries per person living with AIDS in a state. An increase in the number of physicians per capita is associated with a 19.2% increase in spending per person with AIDS. Medicaid coverage of low income parents at or above 100% FPL was positively associated with the dependent variable in the state fixed effects model specification, 15.4% higher in states that offer this coverage, but not in the two-way fixed effects model.

Table 4.26: Dependent Variable 4: Medicaid Spending on Beneficiaries with HIV/AIDS per Person Living with AIDS (logged)				
	Model[+]			
	(1)	(2)	(3)	(4)
Federal Matching Rate (FMAP)	-0.00898 (0.0171)	0.00466 (0.00897)	0.0793** (0.0355)	0.0551*** (0.0199)
Medicaid coverage of childless adults (Y=1)	-0.0360 (0.179)	-0.297*** (0.0791)	0.0155 (0.118)	0.159 (0.103)
Medicaid coverage of low income parents >=100%FPL (Y=1)	0.364 (0.228)	0.640*** (0.0955)	0.154*** (0.0380)	0.0768 (0.0560)
Physicians per capita	0.0385 (0.0266)	0.0795*** (0.0117)	-0.0239 (0.0683)	0.192** (0.0851)
Percent Black	1.201 (0.932)	1.308*** (0.447)	10.13 (8.862)	9.611 (6.650)
Percent Urban	-1.365* (0.686)	-1.356*** (0.351)	-5.538 (4.464)	-6.977** (3.294)
Poverty Rate	0.0116 (0.0544)	0.00475 (0.0215)	-0.0111 (0.0202)	-0.0164 (0.0125)
Income per capita (2007 $)	2.88e-05 (2.79e-05)	-1.00e-05 (1.28e-05)	-4.11e-05* (2.05e-05)	3.23e-05 (2.05e-05)
Consumer Price Index, medical care	-0.00173 (0.00366)	-0.000911 (0.00164)	-0.00117 (0.00143)	-0.000226 (0.00123)
Population density (logged)	-0.106 (0.0732)	-0.109*** (0.0397)	-4.111** (1.563)	1.279 (1.869)
SSI recipients per 1,000 (logged)	0.197 (0.421)	-0.246 (0.182)	-1.922 (1.331)	-0.235 (0.965)
Liberal citizen ideology index	-0.00564 (0.00820)	-0.0105*** (0.00378)	-0.00789** (0.00371)	-0.00130 (0.00364)
Liberal government index	0.000769 (0.00322)	0.000295 (0.00154)	0.00253* (0.00127)	0.00142 (0.00111)
State Fixed Effects	No	No	Yes	Yes
Year Fixed Effects	No	No	No	Yes
Number of observations	50	250	250	250
R-squared	0.419	0.348	0.8847	0.9287
Adjusted R-squared	0.209	0.312	0.8465	0.9030

+Model 1 includes data for 2007 only; Models 2 through 4 pool data for 2003-2007
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

As mentioned earlier, scatter plots indicated that a few states appeared to be influential cases, raising a concern that the model findings might be sensitive to their inclusion. These states were Arizona, Mississippi, New York, North Dakota, and Pennsylvania (see Appendix C) Therefore, each final model specification was re-run without these states, and in each case, the final model results persisted, indicating that the findings presented here are robust (these findings are not shown here).

Conclusion

This Chapter provided the findings of my analysis. Part I presented the results of the descriptive analysis that depicted state profiles of Medicaid beneficiaries with HIV/AIDS, Medicaid spending on beneficiaries with HIV/AIDS, and Medicaid service use by beneficiaries with HIV/AIDS. The data showed variation across the states in these areas. Part II provided the results of my multivariate analyses, designed to explore variation across the states in more depth, by assessing the impact of key correlates of variation.

As shown in Part I, there were a total of 212,892 Medicaid beneficiaries with HIV/AIDS in the United States in 2007, representing less than 1% of all Medicaid beneficiaries, but 26% of people living with HIV/AIDS and 47% of those who are estimated to be in regular care. Spending on beneficiaries with HIV/AIDS in 2007 totaled $5.3 billion nationally, or 1.8% of overall Medicaid spending, a slightly greater share than their representation among all beneficiaries. Average spending per capita was $24,897 per beneficiary in 2007.

Among five major services categories – inpatient care, long term care, outpatient care, prescription drugs and other acute care services – beneficiaries with HIV/AIDS were more likely to have used outpatient services in 2007 than any other service category (89% used outpatient services), though prescription drugs accounted for the largest share of spending of any category. The most expensive services per capita were inpatient and

long-term care services. There was also considerable variation across all these factors by state. For example, Medicaid beneficiaries with HIV/AIDS as a share of a state's Medicaid population ranged from just .05% to 2.1%. Medicaid's coverage rate of people with HIV/AIDS ranged from 7.5% to 50%, compared to the national average of 26%. Finally, per capita spending on beneficiaries with HIV/AIDS ranged from $7,719 to $37,075, an almost 5-fold difference between the lowest and highest spending states.

To better understand variation, multivariate analyses were used to examine the independent effects of several potential explanatory variables on the four dependent variables measuring Medicaid HIV enrollment and spending. These analyses were employed to identify potential policy and programmatic levers that may be used to enhance Medicaid access and equity for beneficiaries with HIV/AIDS across the states. Overall, the analysis finds that there are two such significant predictors in most of the final models – the FMAP, the share of the Medicaid program financed by the federal government, and physicians per capita, a measure of physician supply – even after controlling for state income differentials, medical prices, demographics, and other factors. The FMAP is a positive predictor of the two Medicaid outcomes that assess a state's "generosity" relative to its overall Medicaid program, and serve as proxy measures of access. It is also positively associated with spending on HIV/AIDS per person living with AIDS by state, a proxy measure of equity in financing. However, the FMAP is a negative predictor of the other proxy measure for equity - spending per beneficiary with HIV/AIDS. This suggests that richer states spend more per beneficiary living with HIV/AIDS than poorer states, regardless of receiving fewer federal dollars.

Physician supply is a positive predictor in three of the final models, suggesting that states with a greater capacity to provide care see greater relative enrollment of and spending on beneficiaries with HIV/AIDS. In addition, Medicaid coverage of childless adults and Medicaid coverage of low income parents at or above 100% FPL, measures of Medicaid eligibility generosity, are significant, positive predictors in some of the model specifications, but not all. The implications of these findings for policy and research are discussed in Chapter five.

Chapter Five: Implications for Research and Policy

Introduction

The purpose of my dissertation is to provide new information on Medicaid's role for people with HIV/AIDS, including the identification of potential policy levers that may be available to enhance access and equity across the states. This Chapter summarizes the dissertation findings. It first presents an overview of the policy problem I address. It then reviews the conceptual framework and literature used to inform the dissertation's approach and its contributions, followed by a discussion of the dissertation methods. Finally, it presents the overall findings of the dissertation and discusses their implications for both research and policy going forward.

Summary

In Chapter one, I introduced the challenge presented by the lack of data and information on Medicaid's role for people with HIV/AIDS and the intention of this dissertation to help fill this critical information gap. To help provide context, I provided an overview of HIV disease, describing the current status of the HIV/AIDS epidemic in the United States, and the importance of Medicaid as a source of insurance coverage for people with HIV/AIDS. I also described the Medicaid program, including the respective roles played by the federal and state governments in designing the program, as well as its main components. I highlighted the fact that a key aspect of the Medicaid program is the significant variation in the way it is designed and implemented across the states, and noted that understanding this variation is essential to an assessment of Medicaid's role for

the populations it serves, including beneficiaries with HIV/AIDS. The lack of information on Medicaid and HIV/AIDS, however, has significantly hampered the ability of policymakers and others to assess Medicaid's role for this population.

In Chapter two, I provided the dissertation's conceptual framework, drawn from the literature on state health policy determinants and adapted to focus specifically on the Medicaid program and state-level variation in HIV enrollment and expenditures. The framework seeks to identify factors both external and internal to states that appear to influence Medicaid HIV enrollment and spending. Chapter two also provided the results of my literature review in two areas. The first was a review of the literature on Medicaid and HIV which documented the limitations of prior analyses. Of note, I find that to date, there has been no in depth analysis of Medicaid beneficiaries with HIV/AIDS based on data from all states (other than a preliminary analysis conducted by this author and upon which this dissertation builds), highlighting the contribution expected by this analysis. I also reviewed the literature on the determinants of variation across state Medicaid programs, used to inform the development of my theoretical and analytic approach, and to identify the policy and programmatic variables that could serve to enhance access and equity in the Medicaid program for people with HIV/AIDS.

Chapter three presented my methods, which included both descriptive analyses and multivariate techniques, using states as the units of analysis. Data from all states for the 2003-2007 period were obtained from the Medicaid Statistical Information System (MSIS), the main source of Medicaid eligibility and claims data reported by states to the

federal government. Because so little information is available about Medicaid and HIV/AIDS, I first used descriptive analysis to describe beneficiaries with HIV/AIDS in 2007 (the most recent year of the dataset), including by key demographic characteristics, eligibility pathways, spending, and services. I developed detailed state-level profiles for each of these factors, and I documented variation across states. To better understand this variation, I used multivariate analyses to assess the independent effects of several potential explanatory variables on measures of Medicaid HIV enrollment and spending. I pooled data from all states over the five-year, 2003-2007 period to create a state-level panel data set, which allowed for greater explanatory power. I tested several model specifications, each designed to provide successive levels of control of both observable and unobservable factors that may influence the outcomes of interest. The final model used was a two-way fixed effects model, which included both state and year fixed effects. State fixed effects control for all things that may vary by state but are constant over time, and year fixed effects control for all things that may vary over time but are constant by state. I also included numerous other control variables in my models.

In Chapter four, I presented the findings of my research, including that there were 212,892 Medicaid beneficiaries with HIV/AIDS in the U.S. in 2007, representing <1% of Medicaid beneficiaries overall, but 26% of people living with HIV/AIDS and 47% of people with HIV/AIDS estimated to be in regular care. Spending on beneficiaries with HIV/AIDS in 2007 totaled $5.3 billion nationally, or $24,897 per beneficiary. I then reported on the findings of the multivariate analyses, examining the effects of several explanatory variables on each of the four dependent variables, in an effort to identify

factors that may be leveraged by policymakers to enhance access and equity. I found that two potential policy levers are significant predictors in most of the final fixed effects models used – the FMAP, the share of the Medicaid program financed by the federal government, and physicians per capita, a measure of physician supply or capacity. In addition, two measures of Medicaid eligibility generosity – Medicaid coverage of childless adults and Medicaid coverage of low income parents – are significant predictors in some, but not all of the models. I next turn to the implications of these findings for research and policy.

Implications for Policy and Research

This dissertation's findings have several implications for research and policy. First, the findings fill a critical gap in what is known about Medicaid's role for people with HIV/AIDS, providing a first-ever baseline of Medicaid beneficiaries with HIV/AIDS, spending, and service use, based on analysis of comprehensive data from all states. The analysis itself demonstrates the feasibility and importance of using MSIS to assess Medicaid's role for people with HIV/AIDS and, going forward, the federal government should undertake such an effort on a regular basis. In addition, the findings presented here underscore the important role played by Medicaid for people with HIV/AIDS confirming prior, albeit limited, studies that found Medicaid to be their main source of coverage. Not only is Medicaid currently providing health insurance coverage to almost half of all people with HIV/AIDS in regular care, its reach is expected to expand significantly in 2014 with the implementation of health care reform. Therefore, concentrating efforts to improve access to and quality of care for people with HIV/AIDS

on the Medicaid program would go a long way in reaching a significant share of the population with HIV/AIDS in the United States. The Centers for Medicare and Medicaid Services (CMS) recently took a first step in this direction by issuing guidance to state Medicaid programs about their options for improving care for Medicaid beneficiaries with HIV/AIDS, including new options available under the ACA (CMS, 2011b), but further efforts will be needed to encourage states to take these up.

This dissertation also serves to inform policymakers and providers about the potential needs and challenges faced by Medicaid beneficiaries with HIV/AIDS by providing new information on their key characteristics broken down by state. For example, the finding that approximately three quarters of Medicaid beneficiaries with HIV are disabled, including more than 90% percent of beneficiaries with HIV in 8 states, points to the complex and multiple health care needs faced by this population. As such, Medicaid beneficiaries with HIV would benefit greatly from one of the new Medicaid options available to states under the ACA to provide "health homes", designed to better coordinate care, for enrollees with chronic conditions, including HIV (CMS, 2010). CMS could, therefore, target its outreach efforts about the health home option to those states with high shares of HIV enrollees, particularly states with the highest shares of enrollees with HIV who are disabled.

Second, this dissertation provides the first analysis of state-level variation in Medicaid HIV enrollment and spending. For example, it finds that there is a significant range in Medicaid's coverage rate of people with HIV/AIDS by state (ranging from 7.5% to 50%)

and an almost five-fold difference in per capita spending on beneficiaries with HIV/AIDS between the lowest and highest spending states. Without such information, the prior picture of Medicaid's role for people with HIV/AIDS had been incomplete.

Third, and perhaps the most important contribution made by this dissertation, is its analysis of the key correlates of variation in Medicaid HIV enrollment and spending across the states, which has significant implications for current policy discussions and future changes. As noted above, the multivariate analyses showed that there are two policy levers that are significant predictors in most of the final models – the FMAP, the share of the Medicaid program financed by the federal government, and physicians per capita, a measure of physician supply – even after controlling for state income differentials, medical prices, demographics, and other factors. In addition, states that opted to cover childless adults under their Medicaid programs, a group otherwise excluded from Medicaid under current federal law, had greater access for enrollees with HIV, as measured by their share of a state's overall Medicaid population. Although a causal relationship between these policy levers and Medicaid HIV enrollment and spending cannot be definitively demonstrated, the findings suggest potential avenues that might be pursued by policymakers seeking to reduce variation, and also point to challenges. They also have important implications for health care reform.

First, the finding that the FMAP is a positive predictor of Medicaid HIV enrollment and spending, relative to a state's overall Medicaid program, indicates that the FMAP is a potential policy tool for enhancing access for people with HIV/AIDS. In other words, an

increase in the federal matching rate, which effectively reduces the price of Medicaid to a state, could be expected to result in a greater share of beneficiaries with HIV/AIDS and spending on HIV/AIDS relative to a state's overall Medicaid program. The FMAP is also positively associated with Medicaid spending on beneficiaries with HIV/AIDS per person living with AIDS in a state, a proxy measure of equity, similarly suggesting that an increase in the FMAP could be used to enhance equity in Medicaid financing per person with AIDS. At the same time, the finding that the FMAP is a negative predictor of Medicaid spending per beneficiary with HIV/AIDS, a different measure of equity, points to its potential limits as a policy lever. Confirming prior research on Medicaid more generally (see, for example, Holahan, 2002), this finding suggests that richer states spend more per beneficiary living with HIV/AIDS than poorer states, regardless of receiving fewer federal dollars. In other words, the FMAP appears not to be sufficient to offset other factors that cut into a state's "generosity" for Medicaid beneficiaries with HIV/AIDS as measured by spending per enrollee.

The conflicting findings related to different equity measures in Medicaid spending presented here suggest lines for future research, including assessing which measure more accurately captures the concept Medicaid equity. It could be argued, for example, that Medicaid spending per enrollee with HIV/AIDS is a better measure of equity than Medicaid spending on HIV/AIDS per person living with AIDS since the former represents spending targeted at the low income population rather than the broader population of people living with HIV/AIDS, regardless of income. Nevertheless, these findings suggest the complexities of using the FMAP as a policy tool for enhancing

financing equity across states. Indeed, there is a growing literature devoted to the equity limitations of the FMAP formula, offering recommendations for improvement. Much of this literature calls for the need to incorporate new or better factors into the FMAP calculation, such as measures of a state's total taxable resources, its number of poor people, and medical prices (see, GAO, 1991, 2003; Grannemann & Pauly, 2010). It also calls for the need to assess whether the FMAP minimum (currently set at 50%) should be lowered in richer states (GAO, 1991, 2003). In addition to formula changes, there have also been recommendations to make the FMAP more responsive to economic shocks, targeting states with temporary additional assistance in times of national economic downturns (Grannemann & Pauly; GAO, 2011). While the specific ways in which FMAP could be improved were not a focus of this dissertation, the findings presented here underscore the need for the federal government to explore ways to modify the FMAP formula to achieve greater equity.

As of 2014, due to the ACA, states will receive a significantly increased FMAP for their mandated coverage of all new eligibles, effectively making the cost of covering this new group negligible (states will receive a 100% FMAP in 2014, going down to 90% in 2020 and beyond). This will not only result in a significant number of new Medicaid beneficiaries, the findings provided here suggest that it will result in an increased share of Medicaid beneficiaries with HIV/AIDS and spending on HIV/AIDS relative to a state's Medicaid population, and greater Medicaid spending on HIV/AIDS per person living with AIDS. At the same time, the increased FMAP may not be sufficient to entirely reduce variation by state, as measured by spending per beneficiary. Furthermore, such

variation is likely to persist for current enrollees, for whom a state's FMAP will not be changed. To the extent that policymakers and others find this level of variation "hard to justify" (Holahan, 2007), other solutions may still need to be pursued, including changes to the FMAP formula.

The finding that physician supply was a positive predictor in three of the final models also carries important implications for current policy discussions and for health care reform. It suggests that states with a greater capacity to provide care see greater relative enrollment of and spending on beneficiaries with HIV/AIDS. This is an important and timely finding because increasing the supply of physicians is not only something that can be achieved through policy,[16] it has already been identified as a critical need in order to meet the goals of health care reform. There is currently a physician shortage in the United States, and projections indicate that it will worsen over the next several years (AAMC 2010; HRSA 2010; IOM 2011). Shortages are also present in the HIV/AIDS physician workforce specifically, with a recent IOM report highlighting this issue as a significant barrier for the future, including for health care reform implementation (IOM 2011). The federal government should work to proactively address physician workforce shortages, including those specific to the HIV provider workforce. Without doing so, the success of health care reform could be seriously jeopardized.

[16] See, for example, AAFP, Workforce Reform (http://www.aafp.org/online/en/home/policy/policies/w/workforce.html) and Pear, R, "Shortage of Doctors an Obstacle to Obama Goals", New York Times, April 26, 2009 (http://www.nytimes.com/2009/04/27/health/policy/27care.html).

Lastly, the finding that states currently offering more generous coverage of their low income populations have greater relative HIV enrollment and spending, confirms the opportunity offered by health reform, which will essentially eliminate these barriers for most people with HIV/AIDS going forward. In other words, whereas coverage of low income childless adults is now only a state option, it will be mandated in 2014; in addition, all states will have to cover low income parents above 100% of the federal poverty level. This will go a long way to reaching low income people with HIV who have, to date, been shut out of the Medicaid program under current law.

Yet despite the promise of health care reform, there are limitations and potential threats to consider. While health care reform is expected to "even out" some of the variation across states by creating a "floor" for Medicaid income eligibility and a standard benefits package for new eligibles, states will still be afforded significant flexibility in their program design, suggesting that disparities will continue. As such, the need to explore options for enhancing equity and access will likely persist. Furthermore, many aspects of the ACA are being challenged in court, including the Medicaid expansion (KFF, 2012). To the extent that the court rules to limit or eliminate some of the expansion provisions of the ACA, beneficiaries with HIV/AIDS will continue to face access and equity limitations across the country. Under this scenario, policymakers should pursue efforts to enhance equity and access for people with HIV including modifications to the FMAP formula, efforts to increase physician supply, and outreach to states about the importance of covering childless adults under their Medicaid programs.

The findings presented in this dissertation also point the way for future research. While the multivariate analyses used in this study sought to identify the correlates of variation in Medicaid HIV enrollment and spending across the states by pooling data over a five-year period, they were not designed to analyze change over this period. Yet it is possible that there were changes in Medicaid HIV enrollment and spending unique to the beneficiary population with HIV/AIDS that warrant further analysis. Future research, for example, could undertake a time series analysis to assess whether there were any significant changes in Medicaid HIV enrollment and spending during this period, including whether these changes were specific to beneficiaries with HIV/AIDS or reflective of larger trends in the Medicaid population. Such research could also examine the extent to which changes in Medicaid HIV enrollment and spending over the period varied across the states.

Similarly, while the findings presented here are based on the most recent data available, they represent a time period just before the nation began to slip into its worst recession in decades, one which took a significant toll on state Medicaid programs (see, for example, KFF, 2009b). States saw the number of people on Medicaid, and state Medicaid spending, grow due to the recession, straining state budgets and leading states to seek ways in which to reduce services and spending. How these pressures affected beneficiaries with HIV/AIDS is unknown, and ongoing analysis of MSIS data will be needed to examine the impact of budgetary constraints on Medicaid services and access for people with HIV/AIDS going forward.

Moreover, future research should assess the impact of health care reform on beneficiaries with HIV/AIDS. Because states will implement Medicaid changes in different ways, health care reform may offer a "natural experiment" for assessing its impact on enhancing Medicaid access and equity for people with HIV/AIDS across the country.

Finally, another important avenue for future research would be to examine the quality of care received by Medicaid beneficiaries with HIV/AIDS, a critical area that could not be assessed by the current analysis. Such quality analyses could examine, for example, whether Medicaid beneficiaries with HIV/AIDS are getting the recommended standard of HIV care, such as a minimum number of recommended laboratory tests per year, or the right combinations of prescription medications (DHHS, 2011), and assess how the standard of care might vary by state. Adding a quality dimension to the findings presented here would enhance the understanding of Medicaid's role in meeting the needs of people with HIV/AIDS.

Conclusion

Overall, my dissertation offers new information about Medicaid's role for a population that is heavily reliant on the program – people living with HIV/AIDS. It also provides a baseline for monitoring change going forward, including changes due to the Affordable Care Act. Finally, it not only documents variation in Medicaid HIV enrollment and spending across the country, it identifies policy and programmatic levers that could be used to enhance access and promote equity across the states.

Health care reform will undoubtedly expand access to Medicaid, and ease some of the disparities across the country for people with HIV/AIDS. However, it will not be able to address these imbalances completely, and policymakers will still need to be concerned with how best to ensure that access to the program is as equitable as possible across the states. Ultimately, this dissertation provides a new baseline from which to assess that progress.

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Appendix A: Literature Review: Medicaid Cost and Coverage of HIV/AIDS

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
1.	1986	Hardy, Rauch, Echenberg, Morgan, & Curran	First 10,000 reported cases of AIDS	Cumulative through 1985	10,000	Various	Not provided	Estimated lifetime hospital costs of first 10,000 patients with AIDS of $1.4 billion, or $147,000 per Patient, all payers
2.	1986	Scitovsky, Cline, & Lee	Hospital patients with AIDS at San Francisco General Hospital	1984	445	Medical record abstraction, San Francisco General Hospital	Not provided	Mean charge per admission was $9,024, all payers
3.	1986	Seage, Landers, Barry, Groopman, Lamb, & Epstein	Hospital patients with AIDS at New England Deaconess Hospital	1984	45	Medical record abstraction from New England Deaconess Hospital physicians specializing in AIDS care	18% were covered by Medicaid	Annual per capita Medicaid costs were $40,687; annual per capita Medicaid costs per hospitalization were $11,686
4.	1986	IOM	Various	Various	Various	Review of estimates	Federal government estimates that 40% of AIDS patients covered by Medicaid; in some jurisdictions, coverage is as high as 69%	Average annual cost estimates, all payers, range from $20,000 to $60,000
5.	1987	Scitovsky & Rice	Various	1985, 1986, 1991	18,720 in 1985; 31,440 in 1986; 172,800 in 1991	Estimates made from multiple data sources	Not provided	Medical costs, all payers, estimated at $630 million in 1985, $1.1 billion in 1986, and $8.5 billion in 1991

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
6.	1987	Andrulis, Weslowski, Bentley, & Gage	Hospital patients with AIDS	1985	5,393 patients with AIDS in 169 hospitals	Survey of hospital members of two national hospital associations	Medicaid covered 54% of admissions	Annual per capita costs, all payers, were $20,320
7.	1987	Andrulis, Weslowski, Bentley, & Gage	Hospital patients with AIDS	1985	5,393 patients with AIDS in 169 hospitals	Survey of hospital members of two national hospital associations	Medicaid covered 58% of admissions in states with liberal Medicaid programs and 24% in states with restrictive Medicaid programs	Annual per capita costs were $21,384 for patients in states with liberal Medicaid programs and $15,314 in states with restrictive Medicaid programs
8.	1987	Roper	Not provided	Not provided	Not provided	HCFA Office of the Actuary estimates; Literature review	40% of all patients with AIDS are covered by Medicaid nationally; in areas such as New York City and New Jersey, the share may be as high as 65% to 70%.	Medicaid covers nearly 25% of the total medical care cost of AIDS
9.	1987	Graves & Moien	Hospital patients with AIDS	1984-1985	33,000	National Hospital Discharge Survey	21% of discharges were covered by Medicaid	Not provided
10	1987	Sisk	Various	Various	Various	Review of estimates	Medicaid coverage estimates range from 12% to 65%	Lifetime hospital costs, all payers, range from $24,517 to $147,000
11	1987	Boufford, as cited in Scitovsky, 1988	Hospital patients with AIDS in New York City	1987	Not available	New York Health and Hospital Corporation	70% were covered by Medicaid	Not provided
12	1988	Mackler, cited in Scitovsky 1988	Hospital patients with AIDS at San Francisco General Hospital	Not provided	Not provided	West Bay Hospital Conference and Hospital Council of Northern California	71% covered by Medicaid	Not provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
13	1988	Scitovsky	Various	Various	Various	Review of estimates	Range of estimates to date provided	Range of estimates to date provided
14	1988	Andrews, Keyes & Pine	Disabled adult male Medicaid enrollees with HIV/AIDS in California	1982-1984	1982 = 15 1983 = 121 1984 = 378	Analysis of Medicaid Tape to Tape database	N/A	Annual Medicaid costs per person ranged from $14,856 to $20,364
15	1988	Kaplowitz, Turshen, Myers, Staloch, Berry, & Settle	Hospital patients with AIDS in Medical College of Virginia	1983-1986	52 patients with 102 hospital stays	Analysis of admissions to the Medical College of Virginia Hospitals, Richmond	18% of admissions and 25.5% of patients covered by Medicaid	Medicaid charges per hospitalization were $14,786
16	1988	Roper	Not provided	Not provided	Not provided	HCFA Office of the Actuary estimates	40% of all patients with AIDS are covered by Medicaid nationally	Medicaid covers about 25% of the total medical care cost of AIDS
17	1988	Laudicina, Goldfield, & Cohen	Various	Various	Various	Review of estimates	40% of AIDS patients are covered by Medicaid which finances 23% of AIDS costs	Average cost of Medicaid-covered services in Michigan was $30,000 in 1985. Average annual cost, all payers, in California was $15,955 to $25,350 in 1984
18	1988	Bloom & Carliner	Various	Various	Various	Review of estimates	Range of estimates to date	Estimated lifetime cost of medical care per patient, all payers, will not exceed $80,000
19	1988	IOM	Various	Various	Various	Review of estimates	Range of estimates to date provided	Range of estimates to date provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
20	1989	Pascal, Cvitanic, Bennett, Gorman, & Serrato	People with AIDS	1986-1991	Estimated AIDS case load of 220,000 to 750,000 (400,000 is intermediate estimate)	Projected estimates based on data from multiple studies	Medicaid estimated to cover between 30% of people with AIDS and reimburse 60% of costs (45% is intermediate estimate)	Medicaid costs estimated to be between $2.3 billion and $47.3 billion over the period ($10.2 billion is intermediate estimate)
21	1989	GAO	People with HIV/AIDS in 5 communities (New Haven, Philadelphia, Baltimore, New Orleans, Seattle-King County)	1988-1989	Five communities	Case studies of 5 communities	30% to 50% of AIDS hospitalizations were covered by Medicaid	Not provided
22	1989	Solomon, Hogan, Bouknight, & Solomon	Medicaid enrollees with HIV/AIDS in Michigan	1984-1987	204	Michigan Medicaid, Michigan General Assistance Medical Program, Resident County Hospitalization Program, Michigan Death Registry, Michigan Department of Social Services	.N/A	Monthly per capita Medicaid payments were $1,500 in the 3-month period 3 prior to death to more than $8,000 in last month of life
23	1989	Andrulis, Weslowski, & Gage	Hospital patients with AIDS	1987	14,145 AIDS patients receiving treatment in 276 hospitals	Survey of hospital members of four national hospital organizations	44% of admissions were covered by Medicaid	Annual inpatient per capita costs, all payers, were $17,910
24	1989	IOM	Various	Various	Various	Review of estimates	Range of estimates to date provided	Range of estimates to date provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
25	1990	Green & Arno	Hospital patients with AIDS in New York City, San Francisco, and Los Angeles	1983-1988	78,057	Analysis of hospital discharge databases from New York and California to obtain data for New York City, San Francisco, and Los Angeles	Medicaid coverage of hospitalizations increased in all three cities over the period, from 39.7% in NY in 1983 to 53.4% in 1987, 18.5% to 30% in SF, and 10.4% to 27.8% in LA	Not provided
26	1991	Andrews, Keyes, & Pine	Medicaid enrollees with AIDS in California	1983-1986	1983 = 176 1984 = 439 1985 = 953 1986 = 1,628	Tape-to-Tape files for California; California AIDS case registry and California Death Certificate File	N/A	Total mean Medicaid expenditures in 1986 were $11,972 for adult males with AIDS, $17,318 for adult females with AIDS, and $27,210 for children with AIDS
27	1991	Andrews, Keyes, Fanning, & Kizer	Medicaid enrollees with AIDS in New York and California who died between October 1985 and September 1986	1985-1986	California = 681; New York = 2,137	Medicaid Management Information System for New York and Medicaid Tape-to-Tape files for California; California AIDS case registry and California Death Certificate File	N/A	Mean lifetime Medicaid expenditures were $20,085 in California and $29,755 in New York; expenditures varied by risk group, eligibility group, and diagnosis.
28	1991	Elwood, Fanning, & Dodds	People with AIDS in California and New York, who had died by 1987	1982-1987	California = 1,314; New York = 6,273	Analysis of Medicaid enrollment data in California and New York	N/A	Mean lifetime Medicaid expenditures ranged by eligibility group and state, from $17,263 to $30,524 in CA and $25,102 to $47,849 in NY
29	1991	Wilensky	Not provided	1992	Not provided	HFCA Office of the Actuary estimates	Medicaid provides some or all of the health care coverage for more than 40% of patients with AIDS.	Medicaid covers approximately 25% of the total AIDS care costs

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
30	1992	Solomon & Hogan	Medicaid enrollees with HIV/AIDS in Michigan	1985-1989	783	Michigan Medicaid payment records; Michigan Death Registry; Michigan AIDS Surveillance Registry	N/A	Monthly per capita Medicaid payments were $1,300 ($15,600 per year); varied by demographics and eligibility category. For example, mean monthly costs for disabled men with AIDS were $1,779; for disabled women, they were $1,896
31	1992	Andrulis, Weslowski, Lintz, & Spolarich	Hospital patients with HIV/AIDS	1988	27,290 patients with HIV/ AIDS in 325 hospitals	Survey of hospital members of five national hospital organizations	47.6% of inpatient care covered by Medicaid	Annual per capita inpatient costs, all payers, were $15,621
32	1992	Rosenblum, Buehler, Morgan, & Moien	HIV-related hospitalizations	1993-1998	222,200	National Hospital Discharge Survey	25% to 37% of payments were publicly financed (primarily Medicaid)	Not provided
33	1993	Kozak, McCarthy, & Moien	Hospital patients with HIV/AIDS	1984-1990	4,582	National Hospital Discharge Survey	27.4% of discharges were covered by Medicaid in 1984, rising to 40% in 1990; Medicaid covered 34.1% of discharges between 1988-1990	Not provided
34	1993	Rietmeijer, Davidson, Foster, & Cohn	Hospital patients with HIV/AIDS in Denver	1990	812	Identification of patients with HIV/AIDS in the Denver Health and Hospitals system based on surveillance sources and billing records		Annual per capita costs, all payers, were $9,678; for patients with AIDS, costs were $17,765

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
35	1993	Hellinger	Patients with HIV/AIDS in 10 cities	1992	1,164	Interviews with patients from 26 sites in 10 cities in the AIDS Cost and Services Utilization Study; Review of billing data from survey of providers	Not provided	Monthly per capita costs, all payers, ranged from $282 to $2,764 by disease stage. Total lifetime cost was $119,274, all payers.
36	1993	IOM	Various	Various	Various	Review of estimates	Range of estimates to date provided	Range of estimates to date provided
37	1994	Fleishman, Hsia & Hellinger	Patients with HIV/AIDS in 10 cities	1991-1992	2,090	Interviews with patients from 26 sites in 10 cities in the AIDS Cost and Services Utilization Study	43.2% had public coverage	Not provided
38	1994	Diaz, Chu, Conti, Nahlen, Whyte, Mokotoff,… Mukhtar	People with AIDS in 11 states/cities	1990-1992	1,958	Interviews of people with AIDS in 11 states/cities	49.5% were covered by Medicaid (90% of those with public coverage)	Not provided
39	1994	Hellinger, Fleishman, & Hsia	Patients with HIV/AIDS in 10 cities	1991-1992	688	Interviews with patients with HIV/AIDS in 10 cities in the AIDS Cost and Services Utilization Study; Review of billing data from survey of providers	52.4% were covered by Medicaid	Average monthly cost in last time period, all payers, was $5,840 for those who died and $1,680 for those still alive
40	1994	Kass, Munoz, Chen, Zucconi, & Bing	Gay and Bisexual men in 4 cities	1984-1990	2,863	Multicenter AIDS Cohort Study, longitudinal study of gay and bisexual men in 4 metropolitan areas	12% of men diagnosed with AIDS in past year had public coverage; 23% of those diagnosed more than a year ago had public coverage	Not provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
41	1994	Markson, McKee, Mauskopf, Houchens, Fanning, & Turner	Patients with HIV/AIDS in New York State Medicaid program, diagnosed between 1983 and 1990	1984-1990	8,265	Patients in New York State Medicaid HIV/AIDS Research Database	Not provided	Annual Medicaid expenditures, after an AIDS diagnosis, were $89.999 over the period.. They were higher over time and were $106,154 between 1989-1990.
42	1995	Fortgang & Moore	Hospital patients with HIV/AIDS in Maryland	1988, 1990, 1992	1988=2,548 1990=4,274 1992=6,755	Maryland statewide hospital discharge database	50.9% of discharges were publicly covered in 1988, 56.8% in 1990, and 66.8% in 1991	Charges, all payers, were $11,634 in 1988, $9,938 in 1990, and 8,618 in 1992
43	1995	Bartnyska, Schactman, & Hidalgo	People with AIDS in Maryland on Medicaid	1981- 1992	2,321	People with AIDS reported to the Maryland Department of Health and Human Hygiene between January 1981 and December 1991, matched to Maryland Medicaid program eligibility records from January 1981 to June 1992	49% of people with AIDS in Maryland had some period of enrollment on Medicaid	Not provided
44	1995	Cunningham, Hays, Williams, Beck, Dixon, & Shapiro	Hospital patients with HIV/AIDS at two public hospitals in Los Angeles	1991-1992	205	Interviews with patients at two public hospitals in Los Angeles	34% were covered by Medicaid	Not provided
45	1996	Rains, Do, & Maxfield	Medicaid enrollees with AIDS in California	1980-1994	37,269	California AIDS Registry, Medi-Cal payment files, and Vital Statistics files	46.5% of people with AIDS in California covered by Medicaid	Monthly Medi-Cal costs per patient were $1,575 or $18,900 per year

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
46	1997	Moore & Chaisson	Patients with HIV/AIDS in the Johns Hopkins HIV Service	1992-1995	606	Analysis of data on Medicaid covered patients with HIV in the Johns Hopkins HIV Service in Baltimore	N/A	Mean monthly Medicaid payments were $1,508, or $18,096 per year
47	1998	GAO	N/A	1988	N/A	HCFA Office of the Actuary estimates	Medicaid estimated to cover 55 percent of adult AIDS patients and about 90 percent of pediatric AIDS cases	Not provided
48	1998	GAO	People with AIDS	1997	N/A	HCFA and CDC data	Based on federal estimates of Medicaid coverage of AIDS patients in 1998, estimated number of Medicaid beneficiaries with AIDS is 108,000	Spending by Medicaid on HIV/AIDS drugs estimated at $950 million in 1997
49	1998	Hellinger	Various	Various	Various	Review of estimates	Not provided	Monthly per capita costs, all payers, were $2,764 in 1992; $3,274-$4,084 in 1997
50	1998	OIG	People with AIDS	1997	N/A	Review of estimates	Half of people with AIDS covered by Medicaid	Medicaid spent an estimated $3.3 billion for HIV/AIDS treatments in 1997
51	1998	Bozzette, Berry, Duan, Frankel, Leibowitz, Lefkowitz,… Shapiro	People with HIV/AIDS in care in the United States	1996	4,042	Multistage, national probability study of people with HIV/AIDS receiving medical care	29% were covered by Medicaid	Annual per capita costs, all payers, were $22,200

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
52	2000	Graydon	Not provided	Not provided	Not provided	HFCA Office of the Actuary	HCFA estimates that Medicaid pays for the care of 50 percent of all persons living in the United States with AIDS and for 90 percent of the children living with AIDS.	Not provided
53	2000	Hellinger & Fleishman	Patients with HIV/AIDS	1996	N/A	Health Insurance Association of American and the American Council of Life Insurance HIV survey; State Inpatient Databases (SID)	Not provided	Annual per capita costs, all payers, ranged between $20,000 and $24,700
54	2001	Fleishman & Hellinger	HIV-related hospital admissions in 7 states	1993-1997	484,209 HIV-related inpatient admissions	Hospital discharge data from the Healthcare Cost and Utilization Project (HCUP), State Inpatient Database in 7 states	54% of admissions were covered by Medicaid	Not provided
55	2002	Sherer, Pulvirenti, Stieglitz, Narra, Jasek, Green,… Cohen	Hospital patients with HIV/AIDS at a public hospital in Chicago	1997-1998	2,647	Analysis of clinical and administrative data at a public hospital in Chicago	27% of patients were covered by Medicaid	Not provided
56	2003	Parada, Deloria-Knoll, Chmiel, Arozullah, Phan, Ali, …Bennett	Hospital patients with HIV/AIDS at hospitals in 6 cities	1995-1995	1,395	Medicaid record abstraction from 59 hospitals in 6 cities	53% were covered by Medicaid	Not provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
57	2003	Fleishman & Hellinger	HIV-related hospital admissions in 7 states	1996-2000	286,631 admissions over period	Hospital discharge data from the Healthcare Cost and Utilization Project (HCUP), State Inpatient Database in 7 states	53% of all admissions were covered by Medicaid	Not provided
58	2004	Hellinger	HIV-related hospital admissions in 8 states	1996 and 2000	114,885 admissions in 1996; 77.694 in 2000	Hospital discharge data from the Healthcare Cost and Utilization Project (HCUP), State Inpatient Database in 8 states	51% and 48%, respectively, were covered by Medicaid in 1996 and 2000	Mean cost of hospital stay, all payers, was $15,037
59	2004	Kates	People with HIV/AIDS	Various	N/A	Analysis of data from HCSUS and HCFA	44% of people with HIV/AIDS in care were covered by Medicaid	Federal Medicaid spending was $7.7 billion, including $4.2 in federal spending, in FY 2002
60	2005	IOM	Various	Various	Various	Review of estimates	Range of estimates to date provided	Range of estimates to date provided
61	2005	Gebo, Fleishman, Conviser, Reilly, Korthuis, Moore,… Mathews	Patients with HIV/AIDS in 10 sites	2001	10,905	Medical record abstraction from 10 sites of the HIV Research Network (HIVRN), a consortium of 19 in 14 cities	37.2% were covered by Medicaid	Not provided
62	2005	Fleishman, Gebo, Reilly, Conviser, Mathews, Korthuis,… Moore	Patients with HIV/AIDS in 11 sites	2000-2002	2000 = 13,392; 2001 = 15,211; 2002 = 14,403	Medical record abstraction from 11 sites of the HIV Research Network (HIVRN) a consortium of 19 sites in 14 cities	41.9% of patients were covered by Medicaid in 2000, 35.8% in 2001, 34.3% in 2002; 47.5% of admissions were covered by Medicaid in 2000, 47% in 2001, 44% in 2002	Costs per patient per month, all payers, were $622 in 2000, $571 in 2001, and $525 in 2002 (medication costs not included).

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
63	2005	Goldstein, Rotheram-Borus, Johnson, Weinhardt, Remien, Lightfoot,…. Morin	People with HIV/AIDS at clinics and community agencies in 4 cities	2000-2002	3,818	Interviews with people with HIV/AIDS recruited through clinics and community agencies in 4 cities	69% were publicly insured, primarily by Medicaid	Not provided
64	2006	Roberts, Kampe, Hammerman Scott, Soto, Ciavarella,… Weinstein	Patients with HIV/AIDS at HIV/AIDS care facility in Chicago	1998	280	Review of medical records HIV/AIDS care facility in Chicago	44% were covered by Medicaid	Medicaid cost per patient per year were $24,948
65	2006	Cunningham, Sohler, Tobias, Drainoni, Bradford, Davis,… Wong	People with HIV/AIDS in 16 sites	2001-2003	1,286	Interviews of HIV positive clients at 16 Ryan White funded care sites in 14 cities	50.6% were covered by Medicaid	Not provided
66	2007	Kates & Levi	Various	1996: HCSUS 2002: HIVRN	Various	Analysis of data from the HIV Cost and Services Utilization Study (HCSUS), a nationally representative probability study of people with HIV/AIDs in care and the HIV Research Network (HIVRN), a consortium of 19 sites in 14 cities	44% of people with HIV/AIDS in care were covered by Medicaid; 38% of patients with HIV/AIDS in HIVRN covered by Medicaid	Not provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
67	2007	Hellinger	HIV-related hospital admissions in 6 states	2000 and 2004	91,343 admissions in 2000; 72,829 admissions in 2004	Hospital discharge data from 6 states in the Healthcare Cost and Utilization Project (HCUP), State Inpatient Database in 6 states	52% and 29% of admissions, respectively, in 2000 and 2004, were covered by Medicaid	Average monthly hospital costs per patient, all payers, were $493 and $276, respectively in 2000 and 2004
68	2008	Gilman & Green	CARE Act EIS providers	2002-2003	427	Ryan White CARE Act Data Reports (CADRs) for the Early Intervention Services (EIS) program	34.3% of their patients were covered by Medicaid	Annual per capita costs, all payers, were $2,956
69	2008	Fleishman, Moore, Conviser, Lawrence, Korthuis, & Gebo	Patients with HIV/AIDS in 10 sites	2001-2004	13,942	Medical record abstraction from 10 sites of the HIV Research Network (HIVRIN), a consortium of 17 sites	34% were covered by Medicaid	Not provided
70	2008	Yehia, Gebo, Hicks, Korthuis, Moore, Ridore, & Mathews	Patients with HIV/AIDS in 15 sites	2006	13,833	Medical record abstraction from 15 sites in the HIV Research Network (HIVRN) , a consortium of 21 sites in 14 cities	41% were covered by Medicaid	Not provided
71	2010	Conover, Weaver, Arno, Ang, & Ettner	Patients with HIV/AIDS, chronic mental illness and substance abuse disorders at 8 sites	2000-2002	1,129	Interviews of patients at eight study sites, in 8 different cities	60% of patients were covered by Medicaid	Not provided

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
72	2010	Fleishman, Yehia, Moore, & Gebo	Patients with HIV/AIDS in 10 sites	2000-2007	8,348	Medical record abstraction from 10 sites in the HIV Research Network (HIVRN), a consortium of 21 sites in 14 cities	33.5% were covered by Medicaid	Mean HIV treatment costs, all payers, ranged by number of years in care and CD4 count
73	2010	Gebo, Fleishman, Conviser, Hellinger, Hellinger, Josephs,… Moore	Patients with HIV/AIDS in 10 sites	2006	14,691	Medical record abstraction from 10 sites in the HIV Research Network (HIVRN) consortium, a consortium of 21 sites in 14 cities	Not provided	Annual per capita costs, all payers, were $19 912
74	2011	IOM	Patients with HIV/AIDS in 12 sites	2010	19,235	Analysis of data from 12 sites in the HIV Research Network (HIVRN) consortium, a consortium of 21 sites in 14 cities	42% of patients were covered by Medicaid	Not provided
75	2011	Chesnut, Laufer, Carrascal, & Feldman	Medicaid enrollees with HIV/AIDS in New York State	2007	46,285	Medicaid claims from New York State	Not provided	Medicaid paid for the care of 65% of the state's population with HIV/AIDS; Annual average cost per patient was $39,579
76	2011	Leibowitz, Mendes, & Desmond	Medicaid enrollees with HIV/AIDS in California	2008	33,100	Medical claims from the Centers for Medicare and Medicaid Services	Not provided	Medicaid cost per enrollee was $14,916; Medicaid accounts for 28.4% of public spending on HIV/AIDS treatment

Literature Review: Medicaid Cost and Coverage of HIV/AIDS								
	Year	**Author**	**Population Studied**	**Year(s)**	**Sample Size**	**Data Source(s)**	**Key Findings: Coverage**	**Key Findings: Costs**
77	2011	CDC	People with HIV/AIDS receiving care in 26 sites	2007	3,643	Medical Monitoring Project (MMP), an ongoing, multisite supplemental surveillance project in 26 sites in 19 states and Puerto Rico, which combines medical chart review and interviews.	38% were covered by Medicaid (author's calculations)	Not provided
78	2011	Kates	Medicaid beneficiaries with HIV/AIDS in the United States	2007	212,892	Medicaid Statistical Information System (MSIS) from the Centers for Medicare and Medicaid Services	47% of people estimated to be in regular care in the U.S. covered by Medicaid	Annual per capita costs were $24,867

Appendix B: Literature Review: State Factors & Medicaid Variation

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
1.	1984	Hanson	Medicaid recipients Medicaid payments	Eligibility policy; Unemployment; Population; Range of services Range of Services; Medicaid recipients aged/disabled; State share Medicaid	Liberal eligibility policy+ Population+ Range of services- State share+ Medicaid recipients aged/disabled-	OLS	49	49 States; 1977
2.	1985	McDevitt, Buczko, Mauskopf, Rodgers, & Dobson	Medicaid recipients per 1,000 poor people Medicaid spending per recipient	Aged poor per total poor; AFDC Monthly payment standard; AFDC-related group coverage; Medically needy program; 209B state; Medically needy program and income protection interaction; unemployed parents coverage and state unemployment interaction Optional services; limits on services; local financing; Medically needy program & income protection interaction; physicians/ 1,000; nursing homes/1,000; physician visit charge; ICF per diem	<u>Medicaid recipients per 1,000 poor</u> AFDC-related group coverage+ Medically needy program and income protection interaction+ Unemployed parents coverage and state unemployment interaction+ <u>Medicaid spending per recipient</u> Mandatory services w/limits- Nursing home beds+	OLS	50	50 States; 1981
3.	1986	Holahan & Cohen	Medicaid spending	FMAP; real income/taxpayer; % < age 18; % > age 75; % high school; % nonwhite; % urban; physicians/10,000; hospital beds/ 10,000; nursing home beds/1,000; Region	FMAP+ Per Capita Income+ % high school− Percent nonwhite+ %urban+ Physicians/10,000+ Region (MW Referrant): S-, W-, NE+	Linear and log-linear regression models; Panel data with year fixed effects	Not provided	50 States; 1979-1982

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
4.	1987	GAO	Medicaid spending; Medicaid benefits Medicaid recipients	State income and fiscal measures; political factors; demographics; supply factors	<u>Spending</u> Tax burden- Taxpayer income+ FMAP+ Region (MW Referrant): S-, W-, NE Liberal states+ <u>Benefits</u> Medical care prices+ % poor- <u>Recipients</u> Hospital beds per capita+ Physicians per capita+	Literature review	Not provided	States
5.	1988	Schneider	Medicaid expenditures, 1975-1980 Medicaid expenditures, 1981-1985	Previous year's Medicaid expenditures; recipients; local administration; poverty rate; CPI	<u>First period</u> Previous year+; Local administration+ CPI+ <u>Second period</u> Recipients+ Local administration	Two stage least squares; Panel data	312 208	50 States; 1975-1980; 1981-1985

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
6.	1988	Barrilleaux & Miller	Medicaid recipients; Number of physicians; State Medicaid vendor payments as share of total personal income	Number of physicians; income; State Medicaid vendor payments as share of total personal income; % urban; unemployment; expenses per inpatient hospital day; political ideology liberal; interest group density; spending on Medicaid administration	<u>Medicaid recipients:</u> Number physicians+ Unemployment+ <u>Number of Physicians</u> Income spent on Medicaid+ % urban+ Income+ <u>State Medicaid vendor payments as share of total personal income</u> Political ideology+ Spending on Medicaid admin+ Interest groups+ % urban+	Two-stage least squares	49	49 States; 1982
7.	1989	Pascal, Cvitanic, Bennett, Gorman, & Serrato	Medicaid Eligibility & Services generosity score for HIV; State Medicaid spending per AIDS case	State population; income per capita; South; AIDS cases	<u>Medicaid Score</u> State population+ South- AIDS cases+ Income per capita+ <u>Medicaid spending per AIDS case</u> State population+ South- AIDS cases+ Income per capita+ Medicaid Score-	OLS	50	50 States; 1987-1988

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
8.	1991	Buchanan, Cappelleri, & Ohsfeldt	Medicaid expenditures	Previous Year's Medicaid Expenditures; Personal Income Per Capita; FMAP; Interparty Competition Index; Physicians per capita; Medicaid Recipients; State/ local administration	Medicaid recipients+ Personal income per capita+ Physicians per capita+ Local Medicaid administration+	Least squares; Panel data	517	47 States; 1977-1987
9.	1993	Schneider	AFDC expenditures; Medicaid expenditures	Per capita income; Governor Party; region; AFDC recipients; Unemployment rate; previous year's expenditures; State/local administration; AFDC need standard; AFDC payment standard; Medicaid expenditures	<u>AFDC expenditures</u> Per capita income+ Northeast- Western+ AFDC recipients+ AFDC need standard+ AFDC payment standard+ Medicaid expenditures+ <u>Medicaid expenditures</u> Democratic Governor+ Northeast+ Medicaid recipients+ Local administration+	Two stage least squares	48	48 States; 1986
10	1993	Baumgardner	Medicaid spending per recipient; Medicaid recipient per poor person	State share of Medicaid spending; Median household income; aggregate income; Per capita income; % poverty; population; physicians/1,000; % urban	<u>Medicaid spending per recipient</u> Aggregate money income+ Per capita income+ % poverty- Population+ <u>Medicaid recipient per poor person</u> Median household income- Aggregate money income+ Per capita income- % poverty- Population+ Physicians per capita+	Generalized least squares; Panel data with state and year fixed effects	147	49 States; 1980, 1982, 1984

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
1	1994 (corrected 1996)	Grogan	Medicaid financial eligibility; Medicaid categorical eligibility; Medicaid benefit coverage	State per capita income; low income wage; unemployment rate; migration incentive; race of recipient; political culture more traditionalist; party control less Democratic; interest groups; medical group size; state population health; nursing home beds/1,000	<u>Medicaid financial eligibility</u> low income wage+ Migration incentive+ Political culture- Health- Income+ Interest groups+ <u>Medicaid eligibility of optional groups</u> Low income wage- Migration incentive+ Political culture- Income+ Unemployment+ Interest groups+ <u>Medicaid eligibility of Medically Needy</u> Low income wage+ Migration incentive+ Race of recipient+ Political culture- Unemployment- Interest groups+ <u>Medicaid benefit coverage</u> Wage- Migration+ Race of recipient+ Political culture- Party control- Interest groups+ Unemployment+ Income+	GLS; Panel data with random effects	294	49 States; 1979, 1981, 1983, 1985, 1987, 1989

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
12	1995	Adams	Medicaid coverage of the poor; Medicaid spending per poor person; Medicaid spending per enrollee; Average tax burden imposed on States to finance Medicaid	State-specific medical price index; provider-specific tax and voluntary donation (T&D) programs; mean expenditures; Mandated Medicaid expansions	Mandated eligibility expansions increased coverage; state spending varies significantly, even after medical cost adjustment; T&D programs have led to some increased coverage and reduced state variation .	Descriptive analysis	49	49 states; 1984, 1991, 1992
13	1995	Wade & Berg	Changes in total Medicaid expenditures by enrollment group	Federal policy changes (OBRA, Boren amendment); State tax price of providing Medicaid; voting population; % urban; average weekly wage; median household income; Governor's party; cumulative AIDS cases and deaths; Medicaid enrollment; provider tax and donation programs	<u>Adults</u> Enrollment+ AIDS cases+ Boren Amendment+ Tax price- Provider tax and donation programs+ <u>Children</u> Enrollment+ Boren Amendment+ <u>Blind/Disabled</u> Enrollment+ Boren Amendment+ OBRA+ <u>Aged</u> Republican governor+ Boren Amendment+ OBRA+	Two-stage least squares, State fixed effects; cross-sectional time-series	450	50 States; 1984-1992

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
14	2000	Harrington, Carillo, Wellin, Miller, & LeBlanc	Medicaid waiver participants per 1,000 population Medicaid waiver expenditures per 1,000 population	Income per capita; poverty rate; age>85; % Women in labor force; % nonwhite; % urban; liberal voting record; interest groups; Democratic governor; CON nursing home; CON home health; reimbursement methodology; average home health reimbursement rate; eligibility rules; nursing home beds/1,000; residential beds/1,000; home health agencies/1,000; Medicare home health users/1,000	<u>Waiver participants</u> Income per capita+ Age>85+ CON home health- Nursing home beds- Residential beds+ Medicare home health users+ <u>Waiver expenditures</u> Income per capita+ Democratic governor+ Medicare home health reimb+ Eligibility+ Nursing beds- Home health agencies+ Medicare home health users+	GLS; Panel data with random effects	294	49 States; 1992-1997
15	2001	Adams & Wade	Medicaid expenditures	FMAP; median household income; AIDS prevalence/1,000; predicted enrollment; Boren Amendment decision; Provider tax/donation program; ICF beds by OBRA87; Republican Governor; Non-FMAP components of tax price	FMAP+ Median household income+ AIDS Prevalence+ Provider tax or donation program+ Non-FMAP components of tax price+ Republican Gov- ICF beds+	Panel data with state fixed effects	441	49 States; 1984-1992
16	2001	Ullman & Hill	SCHIP eligibility	FMAP; % low-income uninsured children; per capita income; Governor affiliation; % Democratic legislature	Per capita income+	Multiple regression	51	51 States; 2000

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
17	2002	Holahan	Medicaid spending per capita, federal/state combined $ Medicaid spending per capita, state $ Medicaid spending per poor person, federal/state combined $ Medicaid spending per poor person, federal/state $	Income per capita	<u>Medicaid spending per capita, state $</u> Income per capita + <u>Medicaid spending per poor person, federal/state combined $</u> Income per capita+ <u>Medicaid spending per poor person, state $</u> Income per capita+	OLS	50	50 States
18	2002	Miller, N.A., Harrington, Ramsland, & Goldstein	Medicaid long-term care expenditures Medicaid Nursing facility expenditures	Age ≥ 85; % black; % urban; poverty rate; per capita nursing facility beds; per capita residential care facility beds; % women in labor force; per capita income; home health regulation; CON nursing home; Nursing home moratorium; prospective payment; Medicare home health users; 1915c waiver spending; ideology; AARP membership	<u>Long term care</u> Age ≥ 85+ Per capita income+ CON nursing home+ Nursing home moratorium+ Medicare home health users+ <u>Nursing facility</u> Age ≥ 85+ Per capita income+ Prospective payment- Medicare home users+ AARP membership+	GLS; Panel data with random effects	350	50 States; 1991-1997

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
19	2002	Kousser	Medicaid spending on optional recipients Medicaid total spending	FMAP; per capita income; female head of household; poverty rate; age; % nonwhite; Republican legislature; Republican governor; state ideology; tax effort; line item veto; interest groups; national wealth; Northeast	<u>Optional spending</u> Per capita income+ FMAP+ Female head+ % nonwhite- % young+ Republican control- Tax effort+ Line item veto- National wealth+ Northeast+ <u>Total spending</u> FMAP+ Poverty rate+ % nonwhite- Tax effort+ Interest groups+ National wealth+ Northeast+	Panel data	644	46 States, 1980-1993
20	2003	Barrilleaux & Bernick	Spending on General Welfare Assistance Spending on SSI	Per capita income; % black; % poverty; COLA; citizen liberalism; Democratic party strength; election competition; State/local administration	<u>Spending on General Welfare Assistance</u> Democratic Party- Electoral competition- Per capita income+ Poverty+ COLA+ Black+ <u>Spending on SSI</u> Democratic Party+ Electoral competition+ Poverty+ COLA+ Black- State control-	Panel data	329	47 States; 1990-1996

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
2	2003/ 2004	Kitchener, Carrillo, & Harrington	Medicaid waiver participants per 1,000 population Medicaid waiver expenditures per 1,000 population	age≥85; % women in labor force; % nonwhite; % urban; income per capita; poverty rate; Senators' liberal voting record; Democratic governor; CON nursing homes; CON home health; Medicaid nursing home reimbursement rate; Home health reimbursement method; Medicaid eligibility; nursing home beds/1,000; residential care beds; home health agencies/ 1,000; Medicare home health users/1,000	<u>Waiver participants</u> age≥85+ % urban- Per capita income+ Nursing home beds- Residential care beds+ Home health agencies+ Medicare home users+ <u>Waiver expenditures</u> age≥85+ % women in labor force+ Per capita income+ Medicare home health reimb+ Medicaid eligibility+ Home health agencies+ Medicare home users+	GLS; Panel data with random effects	343	49 States; 1992-1999
2	2004	Lewin Group & Rockefeller Institute	Medicaid Spending	Per capita income; unemployment; poverty; FMAP; population density	Per capita income+ Unemployment+ FMAP+ Population density-	Panel data with state and year fixed effects	Not provided	States, 1977-2000
2	2005	Miller, E.A.	N/A	Socioeconomic; political; programmatic; external predictors	N/A	Literature Review	N/A	N/A

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
24	2005	Miller, N.A., Kitchener, Elder, Kang, Rubin, & Harrington	Medicaid waiver participants per 1,000 (older/ working aged; developmental disabilities) Medicaid waiver expenditures per 1,000 (older/ working aged; developmental disabilities)	Age ≥ 85; Working age SSI/1,000; % black; % urban; poverty rate; nursing home beds/1,000; residential care beds/1,000; Home health agencies/1,000; % women in labor force; per capita income; nursing home bed regulation; home health agency regulation; Medicare home health use	<u>Waiver participants older/working age</u> % urban- Residential care beds+ Home health agencies+ Per capita income+ Medicare home health use- <u>Waiver spending older/working age</u> Poverty rate- Residential care beds+ Home health agencies+ Per capita income+ Medicare home use- <u>Waiver participants developmental disabilities</u> % black+ % urban+ Poverty rate- Women in labor force+ Per capita income+ Medicare home health use+ <u>Waiver spending developmental disabilities</u> % black+ % urban+ Poverty rate- Residential care beds- Home health agencies+ Women in labor force+ Per capita income+ ICF/MR bed regulation+	Panel data with state fixed effects	500	50 States; 1992-2001

Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
25	2008	Miller, N.A., Elder, Kitchener, Kang, & Harrington	Offer of AIDS Waiver	AIDS cases/1,000; FMAP; SSI recipients; % black; % Hispanic; % metro; state population; per capita income; % women in labor force; nursing home beds/1,000; residential care beds/1,000; home health agencies/1,000; Democratic governor; Nursing home bed regulation	State population+ Nursing home beds+ Democratic governor+ FMAP-	Panel data with state fixed effects	600	50 States; 1992-2001
26	2008	Garfield	Change in state per capita Medicaid spending over prior year	FMAP; Year end balances as share of expenditures; balanced budget rules; tax or expenditure limit; governor veto power; physician interest group strength; liberal ideology; Democratic legislature; unemployment rate; poverty rate; female head of household; % nonwhite	FMAP+ Unemployment rate+ Poverty rate+ % Nonwhite- Liberal ideology+	Panel data, first differences model	828	50 States; 1988-2004
27	2008	Garfield	Medicaid eligibility for children Changes in Medicaid eligibility for children	FMAP; per capita fiscal shock; Democratic Governor; physician interest group strength; liberal ideology; Democratic legislature; unemployment rate; poverty rate; female head of household; % nonwhite; % age 0-19	<u>Medicaid eligibility</u>: Liberal ideology+ Democratic control+ <u>Changes in Medicaid eligibility:</u> Democratic Governor+ Poverty rate-	OLS and GLS; Panel data	449	50 States; 1997-2006
28	2008	Rigby & Wright	TANF eligibility SCHIP eligibility	Ideology; % minority; class vote bias; caseload ratio; % uninsured; per capita income; COLA; income inequality; party control; unwed birthrate; infant mortality rate;	<u>TANF</u> Class vote bias+ Per capita income+ Caseload ratio+ <u>SCHIP</u> Ideology+ Uninsured-	GLS; Panel data with random effects	490	49 States; 1997-2005

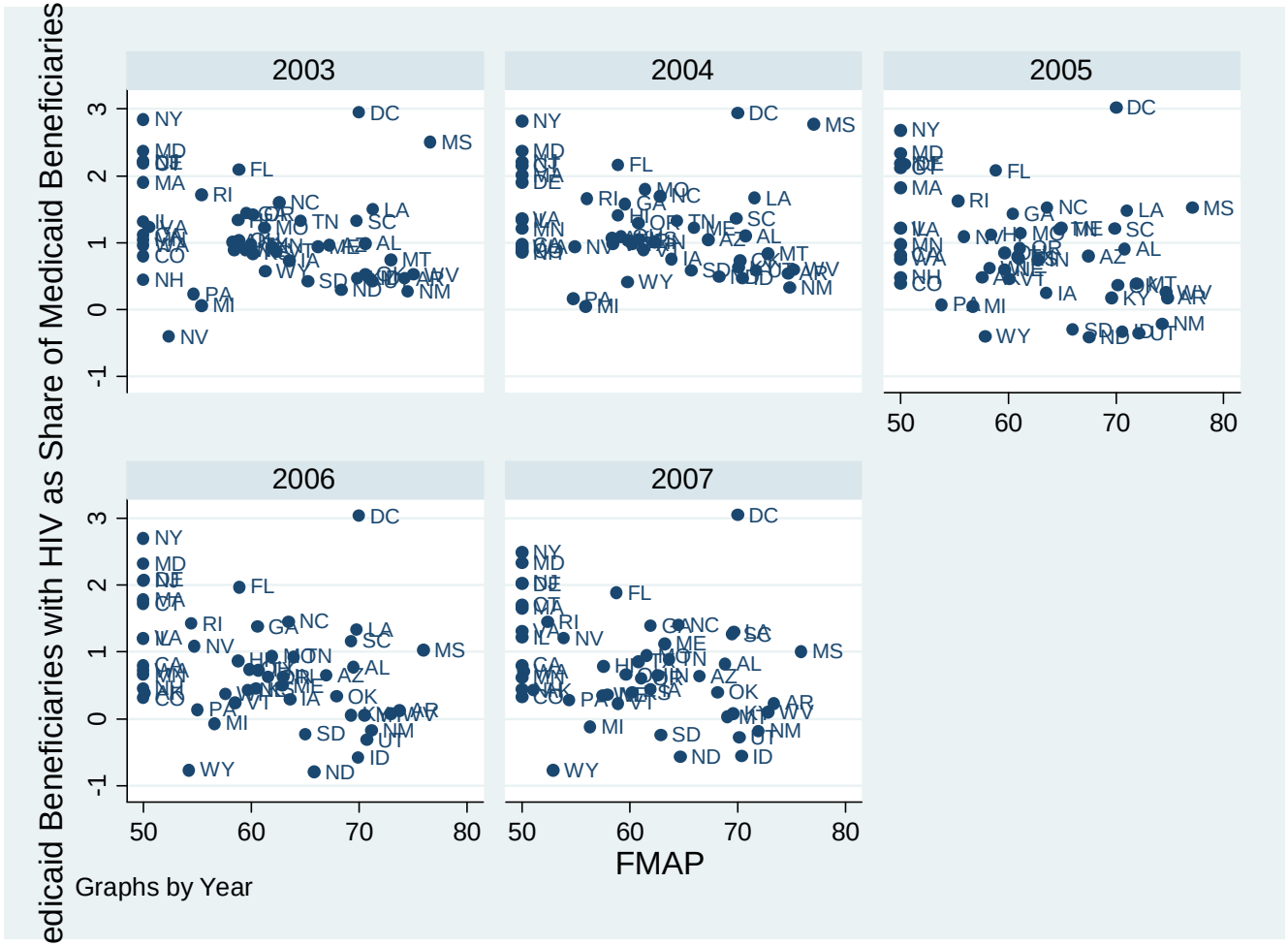
Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
29	2009	Lipson, Colby, Lake, Liu, & Turchin	Medicaid spending	Physicians per capita; local input prices; population health status; local practice patterns; coverage of optional groups; provider reimbursement rates	Not provided	Literature review	N/A	States
30	2009	Baughman & Milyo	Medicaid & SCHIP Eligibility	FMAP; fiscal capacity; % uninsured children; SCHIP program; neighboring state policy; Democratic share of legislature; Party control; voter turnout; term limits; campaign finance regulation; age; % black; educational attainment; % Hispanic; % urban; poverty; per capita income	FMAP- Fiscal capacity- Democratic share of legislature+	Panel data with state and year fixed effects	350	50 States; 1990-2002 in two-year electoral cycles
31	2010	Oyun	Medicaid Waiver expenditure per enrollee Total Waiver expenditure	FMAP; GDP per capita; % minority; % black; % white; %women in labor force; per capita income; population density; poverty; age; number of enrollees; interparty competition; Democratic Governor; % Democratic/ Independent legislature; fiscal decentralization measures; migration	<u>Expenditure per enrollee</u> % minority- %white- Women in labor force+ Enrollees- Pop density+ Poverty+ % local government own revenue- migration- <u>Total expenditure</u> % minority- %white- Women in labor force+ Enrollees+ Pop density+ Poverty+ % local government own revenue- migration-	Panel data with state fixed effects	288	48 States; 1999-2004

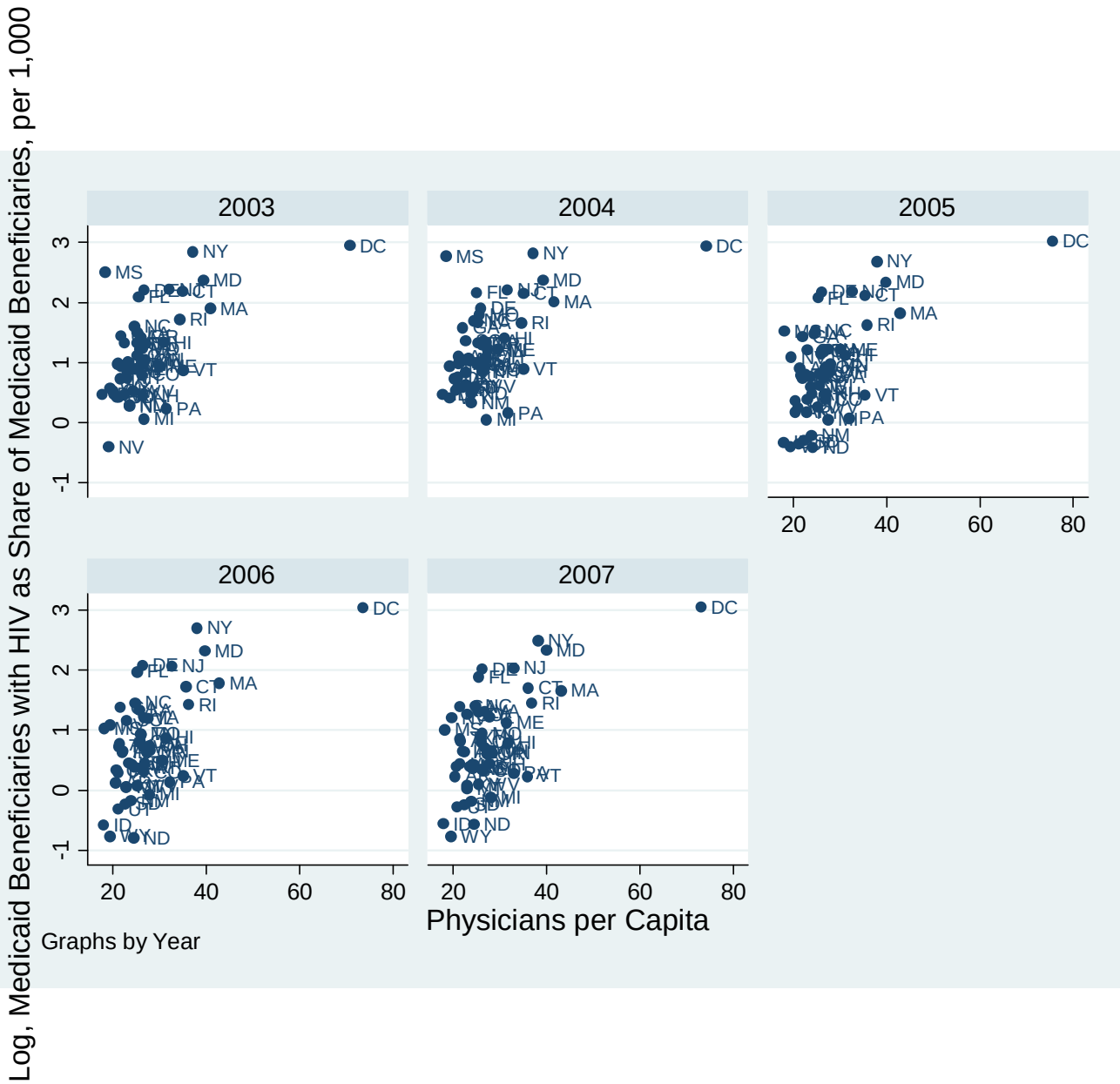
Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
32	2010	Grannemann & Pauly	Medicaid eligibility; Medicaid benefits	FMAP; cost of services; state fiscal resources; income; region; % uninsured	Income+ NE+	Descriptive analysis	51	51 States; 2006
33	2010	Howard	Share of State Medicaid budget on: elderly; disabled; young	FMAP; Medicaid spending per capita; effective price of care for elderly; disabled; young; unemployment rate; age; Democratic legislature; share Democratic legislature; divided government; Democratic governor; Independent governor	<u>Elderly</u> Price of care for elderly+ Price of care young- Unemployment- Pop 15-44 and female+ Pop≤14+ Democratic legislature- Share democratic legislature+ Divided government- <u>Disabled</u> Medicaid spending per capita+ FMAP+ Unemployment+ Pop ≥ 65+ Pop 15-44 and female+ Democratic legislature+ Share democratic legislature- Divided government+ Democratic governor- <u>Young</u> Price of care for elderly- Price of care young+ Medicaid spending per capita- FMAP- Unemployment+ Each age group- Democratic governor+	GMM; Panel data with state and year fixed effects	1368	49 States; 1977-2004

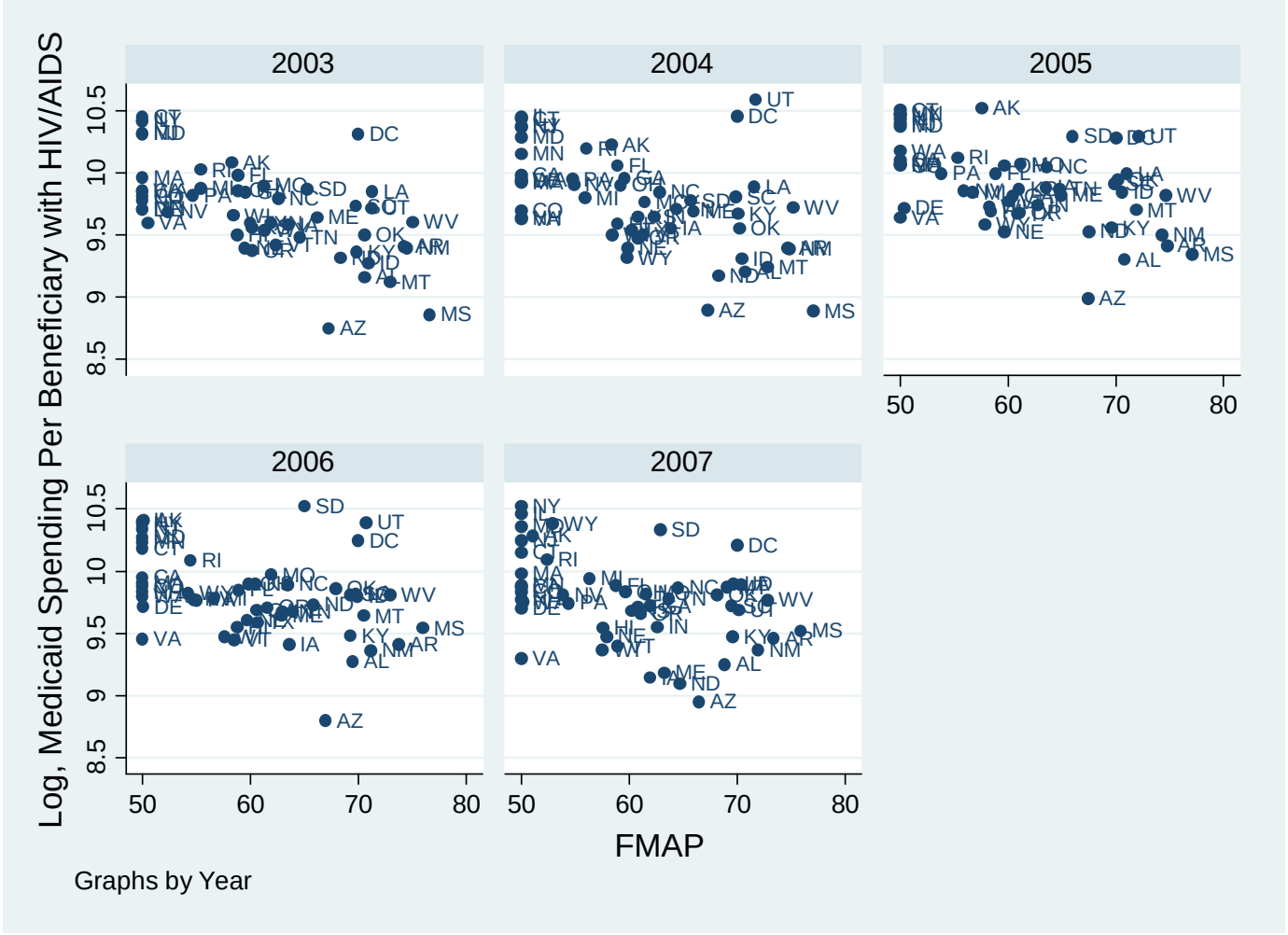
Literature Review: State Factors & Medicaid Variation								
	Year	**Author**	**Dependent Variable(s)**	**Main Independent Variables**	**Key Findings**	**Design, Analysis Method**	**Sample Size**	**Unit of Analysis/ Year(s)**
34	2011	Bernick	Index of Medicaid managed care system diversity	State diversity index; Citizen liberal ideology; political competition; Democratic legislature; private managed care; population density; % poverty; physicians per capita; Medicaid spending per capita	Citizen liberal ideology+ Democratic legislature Political competition+ Physicians per capita-	Panel data	146	50 States; 2004-2006

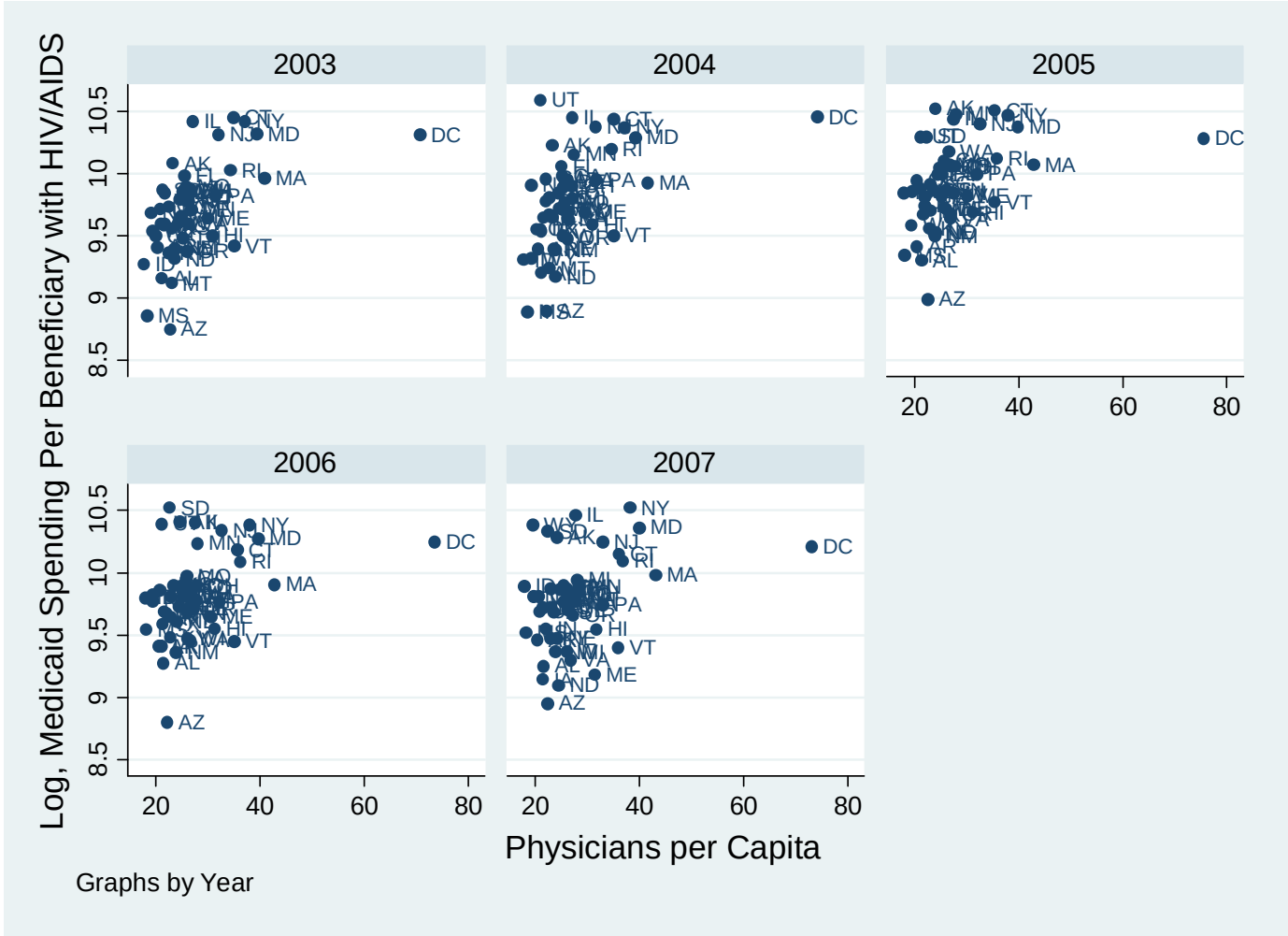
Note: only main dependent variables included in some cases (e.g., if a dependent variable was total recipients, but then broken down into different types of recipients); only main IVs included. Under findings, only significant results shown with sign for direction of relationship.

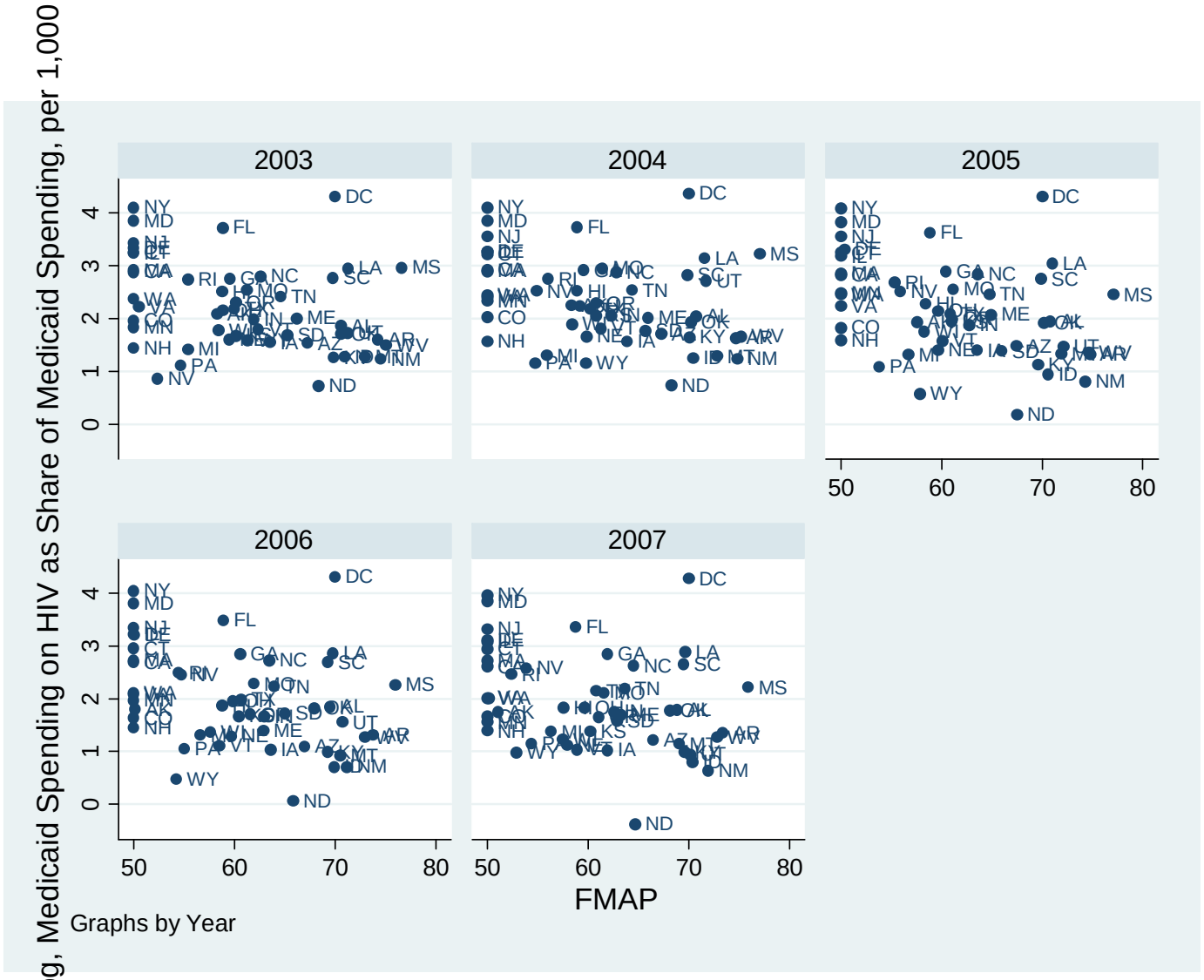
Appendix C: Scatter Plots for Selected Predictors

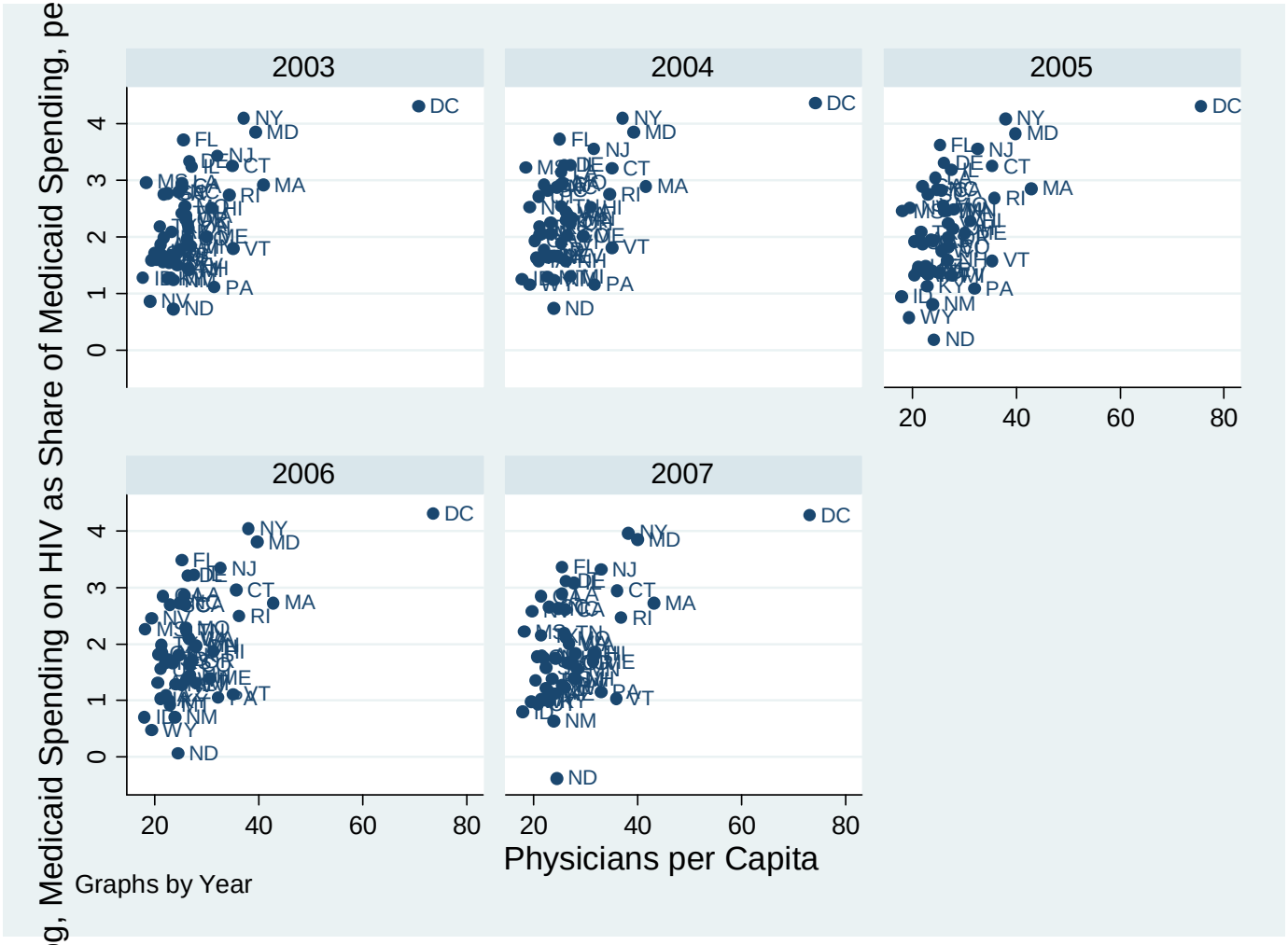


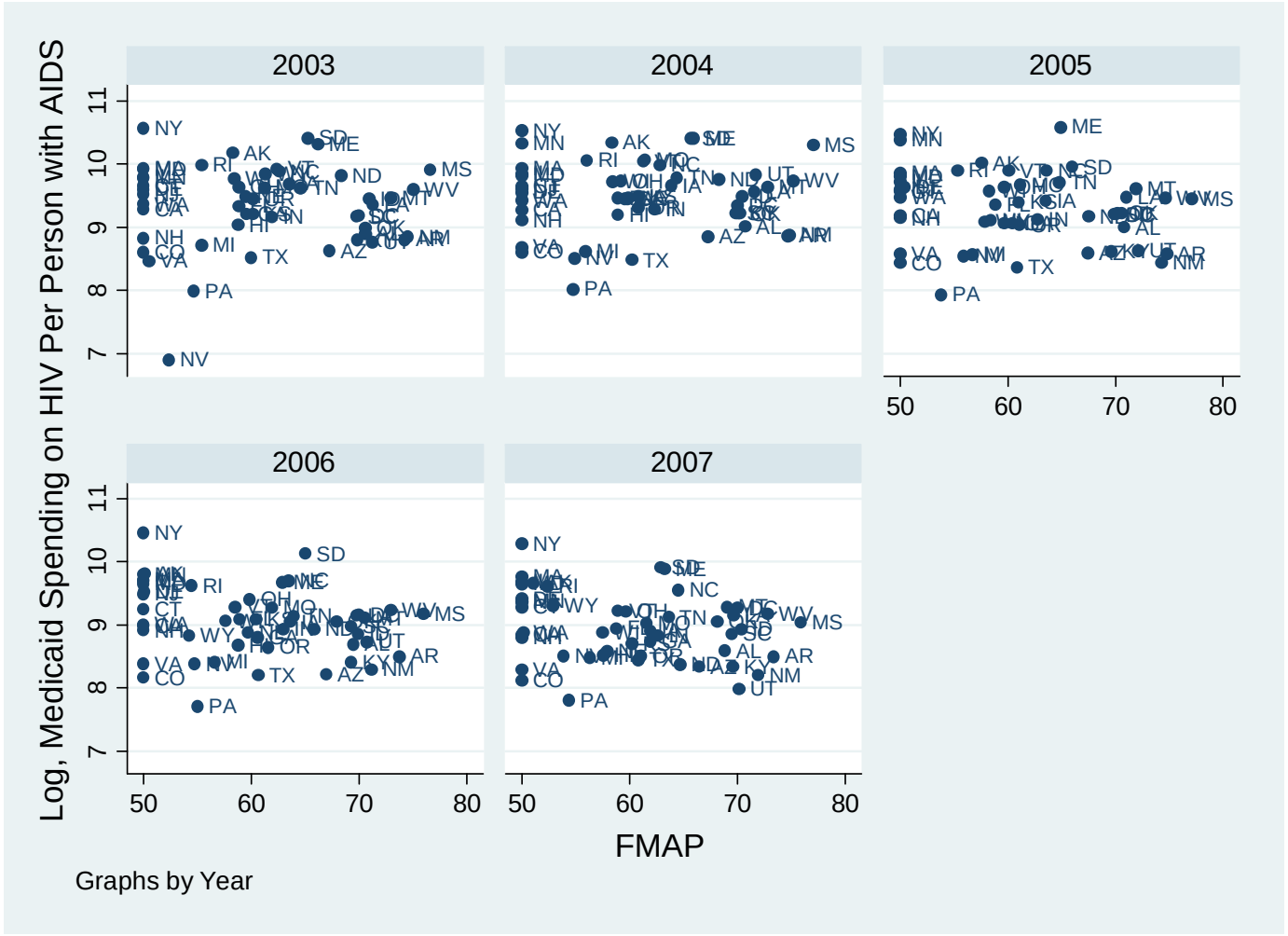

Log, Medicaid Beneficiaries with HIV as Share of Medicaid Beneficiaries, per 1,000
2003
2004
2005
2006
2007
Physicians per Capita
Graphs by Year

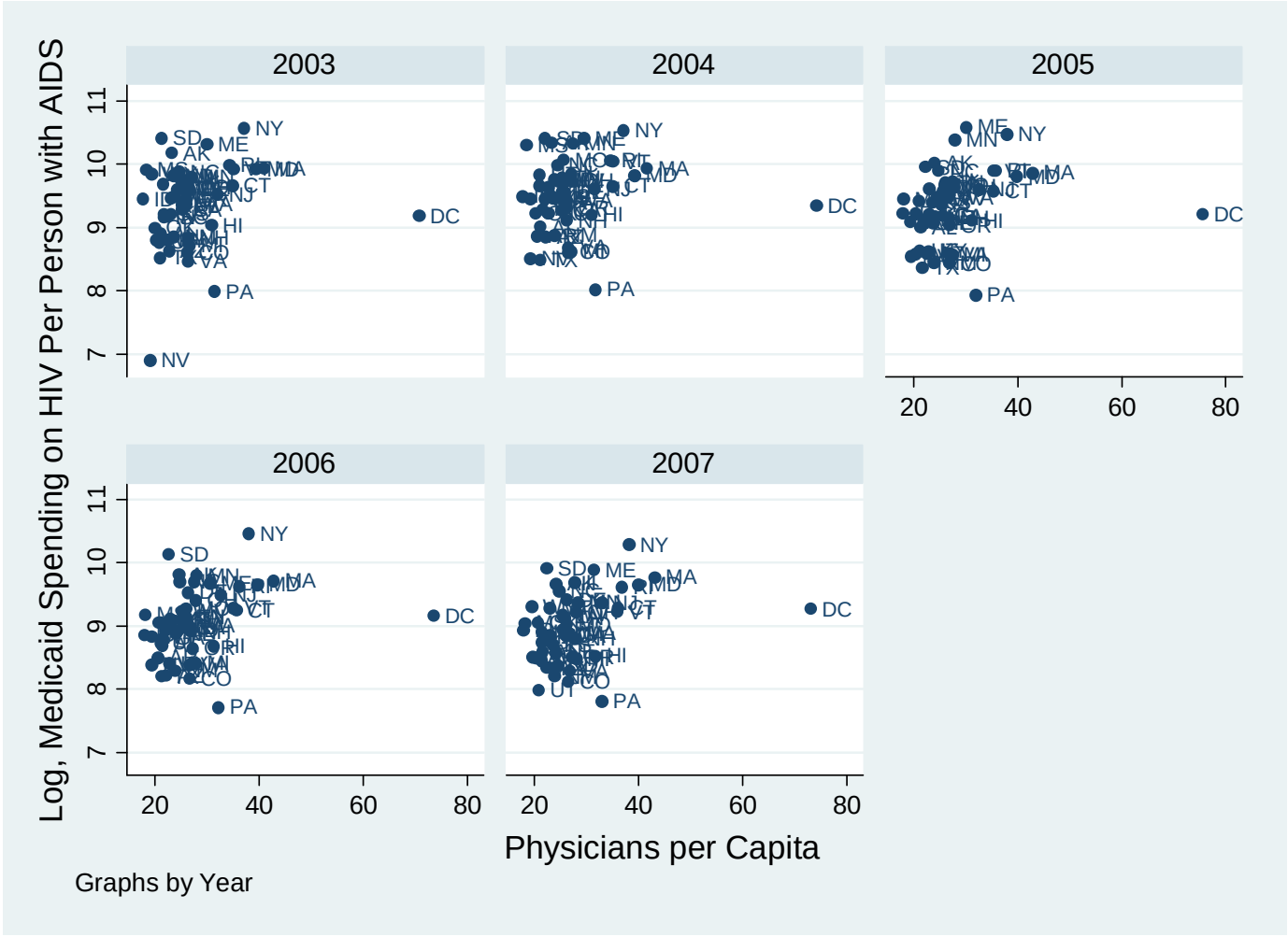

2003
2004
2005
2006
2007
Log, Medicaid Spending Per Beneficiary with HIV/AIDS
8.5
9
9.5
10
10.5
50
60
70
80
FMAP
Graphs by Year


2003
2004
2005
2006
2007
Log, Medicaid Spending Per Beneficiary with HIV/AIDS
Physicians per Capita
Graphs by Year


Log, Medicaid Spending on HIV as Share of Medicaid Spending, per 1,000
2003
2004
2005
2006
2007
0
1
2
3
4
50
60
70
80
FMAP
Graphs by Year


2003
2004
2005
2006
2007
DC
NY
MD
FL
NJ
CT
MA
RI
VT
PA
ND
NM
WY
0
1
2
3
4
20
40
60
80
Log, Medicaid Spending on HIV as Share of Medicaid Spending, per 1,000
Physicians per Capita
Graphs by Year


2003
2004
2005
2006
2007
Log, Medicaid Spending on HIV Per Person with AIDS
FMAP
Graphs by Year


2003
2004
2005
2006
2007
Log, Medicaid Spending on HIV Per Person with AIDS
Physicians per Capita
Graphs by Year
NY
SD
ME
AK
MA
CT
NJ
HI
DC
PA
NV
VA
MN
CO
UT
7
8
9
10
11
20
40
60
80