Health Care Reform in Mexico and Brazil: The Politics of Institutions, Spending, and Performance

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Abstract

Health care reform in Latin America has been a continuous process over recent decades, and several countries have implemented programs of universal care. This dissertation looks at the implementation of universal care programs in Brazil and Mexico, and highlights the politics of implementing these reforms. In the first paper, I evaluate the implementation of infrastructural reforms as part of *Seguro Popular* in Mexico. I conclude that the reforms were partially successful, but that success varied considerably by region. In the second paper, I show that spending on health care in Brazil is strongly related to political partisanship, and that the reform process has not significantly changed this relationship. In the third paper, I suggest that individual characteristics, and not political variables, best explain variations in the quality of care patients receive in Brazil. As a whole, these papers serve to highlight the understudied role of politics in the implementation of health care reform.

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Acknowledgments

This dissertation for me represents the completion of a journey from a small liberal arts college in rural Virginia to the national academic stage. I thought I was coming to Harvard from Washington and Lee to become a political scientist. Instead, I became a confident young professional who thinks she can hold her own just fine alongside (often crazy) New Englanders.

For this confidence as well as many other things, I owe a great deal to my advisors and dissertation committee: Steve Levitsky, Jorge Dominguez, and Gary King. My fondest conversation with Steve is when he told me that part of the difficulty of coming to Harvard from Washington and Lee was shifting from being a big fish in a small pond to being a big fish in a big pond. Only Steve would have thought to make sure to tell me I could still be a big fish at Harvard. Jorge has an uncanny ability to seem unsurprised by anything I tell him. Whether it was an interest in Spanish literature, neuroscience, or bank taxes, Jorge somehow managed to make all my ideas seem far more reasonable than they were, and suggest a plan for executing them. Both Steve and Jorge have been outstanding advisors to me from the moment I arrived on campus. Gary became a wonderful advisor to me as well as I began the data analysis and writing process, and he made me feel throughout the dissertation year that I was his co-author and colleague in academia. His eagerness for updates on medical school applications helped get me through an otherwise trying year.

I sincerely appreciate the support of Harvard, the Government Department, and DRCLAS, as well as the countless friends and strangers who have helped me in my travels and work while at Harvard. Numerous individuals offered insights into social welfare, and specifically health care, in Mexico and Brazil, including, but in no way limited to, Andre

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Part I

Introduction

Although health reform has been a continuous process in the developing world since the mid-twentieth century, most literature addressing the topic comes from either public health professionals or economists. The medical profession has offered increasingly complex and expensive treatments and research agendas, and public health scholars have worked to incorporate these agendas into a system which is both sustainable and fair at the national level, with participants in the system coming from varied socioeconomic backgrounds and with differing insurance schemes. Often, the public health discussion centers around optimal structuring of health systems, cost-efficiency, and resource allocation. Although scholars disagree about the relative values of different approaches, there is broad agreement that approaches to reform which center on using scarce public health resources in an effective way should be the cornerstone of any public health reform agenda.

In the past decade and a half, however, social science has begun to make inroads into the discussion, noting that health reform and health care are inherently political processes, subject to the same kinds of political considerations as other economic decisions. One example of this direction in the developed world has been discussion centered around the lack of a universal health care system in the United States (Hacker, 2001). In the developing world, this conversation has often centered around demands on the state from society (Weyland, 1995) as well as processes such as pharmaceutical policy reform (Reich, 1995). In the developing literature on the politics of health care reform in both the developed and developing world, political scientists have overwhelmingly concluded that even the best-laid and most economically sound health plans do not always get implemented in practice, often because they are not politically feasible in the way that they were designed. As Jonathan Oberlander (2003) puts it, "Bad things indeed do happen to good health reform plans. Yet political calculations are too often a footnote in health care reform proposals" (p. 392).

In their analysis of the politics of the health reform process, political scientists have offered numerous theoretical approaches designed to help explain why structurally sound health plans are not executed in practice. One approach is through collective action (Tarrow, 1994; Beaglehole et al., 2004), in which scholars suggest that reforms are not undertaken because, although there would be an overall benefit to society under reform, the cost to any one individual of her effort in undertaking the reform is greater than the benefits that she might expect to receive in return. As each individual thus makes the calculation not to participate, reform is not undertaken. Another approach to explaining the politics of health reform is the "critical juncture" approach (Pierson, 2000; Markel & Golden, 2005). In this approach, scholars argue that there are particular windows of opportunity, or critical junctures, for change, but after those points there are increasing returns to the chosen path, and change becomes more difficult due to entrenched interests. Thus, in the context of health reform, reformers must seize moments of opportunity to implement change before it becomes more difficult.

Although the list of political science approaches which have been applied to health care is much more extensive than this, political science's broader approach can be characterized as one which frequently focuses on the reform process itself, with less attention to the politics of executing aspects of the care system. For example, political science has offered multiple explanations for the processes of health reform in Brazil and Mexico, with little discussion of how politics affects the performance of implemented changes. Questions concerning the effect of politics on the functioning of the health system have received comparatively little attention.

In the papers that follow, I address three separate issues related to the politics of health care performance in Latin America, and specifically in Brazil and Mexico. The first

paper presented here evaluates the success of the *Seguro Popular* reform process in Mexico. In this paper, I examine the process of health reform in Mexico and undertake a preliminary study of the effectiveness of reforms related to medication distribution. I find that effectiveness differs greatly by state, and suggest that further study from an institutional performance perspective would be useful.

In the second paper, I ask about the impact of political partisanship on health care expenditures, and how that trend may have changed over time. Although questions of partisanship and social spending are by no means new to political science, few studies have focused specifically on health care spending, and I know of no other study which considers health care spending at the subnational level in Brazil. In this paper, I ultimately conclude that political partisanship does seem to be important in explaining health care expenditures at the municipal level in Brazil.

Finally, I take up the question of the quality of health services in Brazil, and ask whether electoral considerations, and specifically alignment of local and state parties, result in better reported quality of services by patients. This paper is motivated by literature on pork barrel spending and partisan politics (Desposato, 2006) which has suggested a link between party alignment at different levels of government and available pork-barrel resources. I also consider the importance of the PT, an often singled out party in Brazil for its grassroots organization and local focus. Ultimately, I conclude that political factors are less helpful to explain variations in quality than are individual level characteristics such as age and socioeconomic status.

In its entirety, I hope this dissertation will serve as a push for political science to take the issue of health care, and not just the reform process itself, very seriously as a

subject of future study. The papers presented here suggest that issues of political partisanship, state strength, and bureaucratic incentives are critical to an understanding of when health systems function effectively, and what incentives should be taken into consideration beyond efficiency and cost-effectiveness. Health care and health care reform is inherently political, and the aim of this dissertation is to solidify this connection as well as propose future research directions.

Part II

Paper I: An Evaluation of Impact on Infrastructure and Medication Supplies under Mexico's *Seguro Popular*

0.1 Introduction

Mexico underwent an unprecedented process of democratization during the 1990s, culminating in the election of Vicente Fox, the first president of Mexico from a party other than the *Partido Revolutionario Institucional*, during the summer of 2000. As elsewhere in Latin America, the process of democratization gave new political space to issues of social welfare and justice. Among the items on the social welfare agenda was the perceived inequity of the health care system, specifically concerning both access to and quality of services. At the onset of democratization, more than half of all Mexicans lacked health insurance, and thus financial protection from catastrophic health expenditures (Knaul & Frenk, 2005). As an indication of the state of Mexico's health system at the time of democratization, the 2000 WHO health system performance assessment ranked Mexico's health system as 144 out of 191 countries on financial fairness (World Health Organization [WHO], 2000).

In 2003, Julio Frenk, Minister of Health of Mexico at the time, unveiled a new health reform program called *Seguro Popular* to address the inequities of the Mexican health system and expand access to uninsured Mexicans, with a particular focus on reducing out of pocket catastrophic health expenditures. *Seguro Popular* was designed as an optional nationwide insurance program available to insure Mexicans without other access to health care, covering 100% of primary health care needs as well as approximately 275 interventions which represent about 95% of diseases, diagnostics, and hospital services (Jaff, 2010). *Seguro Popular* is implemented through the *Sistema de Protección en Salud*, which was created as part of a 2003 General Health Law. The health reforms of the early 2000s have a legal underpinning in Article 4 of the Mexican Constitution, which guarantees that all individuals have a right to protection of their health, and that the nation and states will jointly provide for such services.

Seguro Popular had, at its core, several specific aims for the improvement of health care in Mexico. First, it aimed to increase public spending on health and restructure financing in a way that made basic health services accessible to all Mexicans. Specifically, it aimed to reduce catastrophic health expenditures for families by managing the risk of out-of-pocket health payments. Another aim of *Seguro Popular* was to achieve greater efficiency in allocation of state resources for health care through cost-effective interventions. *Seguro Popular* also aimed to shift health system incentives to the demand side in the hopes of encouraging competition and consequent improvements in the quality of services offered. Finally, *Seguro Popular* aimed to increase the infrastructure and resources of the health system in Mexico, through the construction of additional health facilities, increases in health personnel, and improved availability of medications (Knaul & Frenk, 2005). Although numerous evaluations of *Seguro Popular* have been published (King et al., 2009; Rosa-Rubi et al., 2009; Gakidou et al., 2007), few of these evaluations have focused on *Seguro Popular*'s performance in achieving its aim to improve the infrastructure and resources of the health system in Mexico. Furthermore, this is the first study, to my knowledge, to assess *Seguro Popular*'s impact on medication supplies in participant communities.

In this paper, we undertake an initial evaluation of Seguro Popular's effect on availability of medications as well as changes in medication usage in Mexico. We argue that there is strong evidence of a relationship between a health cluster's rate of enrollment in *Seguro Popular* and increases in medication supplies to that cluster. We further argue that this effect is driven by the treatment clusters, and one observes no such relationship in control areas. This makes sense theoretically, as control clusters were not awarded additional medication supplies contingent on enrollment rates.

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In the second part of the paper, we examine the second step of this chain, the effect of increased medication availability on medication usage rates. We find that medication usage increased significantly over the period of the study, but that this increased usage cannot be tied directly to areas in which *Seguro Popular* medication stock had increased. We offer a discussion on why this may be the case, focusing in particular on the nature of the generic pharmaceuticals market.

0.2 Background

Although the politics of health care reform might seem to be a natural extension of debates about the welfare state, "students of the welfare state... have devoted surprisingly little attention" to these crucial disputes, leaving the field "almost entirely to health policy specialists" (Hacker, 2004, p. 693). As a result, much of the discussion concerning health care reform has centered on the optimal design of health systems, with inadequate attention to the role of politics in creating those institutions. As Lakin (2010) asks in his study of the politics of *Seguro Popular*'s implementation, "how difficult is it to change a country's institutions in the health sector?" (p. 314).

Political science work on institutions and institutional change offers great insight into explaining outcomes of health care reform. For example, Hacker (2004), in a study of outcomes of health care reform in Britain, Canada, Germany, the Netherlands, and the United States, observed a pattern of "reform without change and change without reform". That is, at times policies were undertaken which failed to influence medical structures, while at other times important policy and structural changes seemed to occur without national health reform. While Hacker explains this paradox in terms of centralization, suggesting

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that change is most likely to occur under decentralized systems, one could also consider the outcomes observed through the lens of the institutional change model of Mahoney and Thelen (2010). In Mahoney and Thelen's model, the manner in which institutional change occurs is a function of both the level of discretion in government implementation of policy and the facility which which new laws can be vetoed. In cases with high levels of discretion, one can expect changes to the way rules are implemented either due to changes in the environment or to political opportunism. It should be clear, then, that cases in which the implementation of health policy is done at the subnational level with great discretion, one could expect implementation to be vulnerable to change both over time and over space.

The process by which medications are allocated to public health facilities in Mexico is done at the subnational level, and there is significant discretion across states in determining the formulas and schedules for how medication needs should be met. As a result, the process of medication distribution may be subject to political constraints and trends in ways not addressed previously. Although Lakin (2009, 2010) discusses in detail the politics of the *Seguro Popular* reform process, much of his analysis focuses on the politics of how policies were adopted. In the case of medication distribution to health clusters, the more important aspect of politics which deserves consideration is the extent to which institutions are functioning, and will continue to function, in accordance with the intent of the policies on paper. When law and practice do not accord, literature on institutional change and the development of informal institutions (Helmke & Levitsky, 2006) will be helpful in understanding how such gaps develop.

I now turn to a discussion of the health system in Mexico leading to the *Seguro Popular* reform, as well as a discussion of the medication purchasing and distribution process which highlights the role of state institutions in controlling the implementation of *Seguro*

Popular policies.

0.3 The Implementation of *Seguro Popular* in Mexico

Until 2003, Mexicans were not provided health services through social security programming, which frequently resulted in high out-of pocket expenditures on health and inconsistent availability of services and medications. IMSS covered the health care of private sector workers and their families (40% of the population), and additional insurance programs covered another 10%, but this left approximately half of all Mexicans without prepaid insurance in the period leading up to the *Seguro Popular* reform. Although uninsured individuals were able to access state and federal health facilities in exchange for user fees, facility users were nonetheless exposed to substantial individual costs, and often faced understaffing and medication shortages (Frenk et al., 2006). As discussed above, much of the motivation for the *Seguro Popular* reform program stemmed from hopes to reduce out-of-pocket expenditures at the point of services, as well as increase medical resources to underserved communities.

A key foundational idea of the health reform in Mexico was to move from the national health service system described here to a national insurance model, in which a national health insurance plan would cover a certain defined set of health needs and services, and program participants could be treated by any provider accepting government payment, including private providers. The focus for the government, then, is on the financing of the system rather than a public network of service provision. Furthermore, government subsidization would be determined primarily by demand (patients in need of care) rather than supply (guaranteed funding for certain types of personnel and/or facilities), introducing increased competition for the delivery of health services and, in theory, more efficient service

delivery.

In 2003, Mexico passed the General Health Law which created a System of Social Protection for Health (*Sistema de Protección Social en Salud*, which was designed to administer the national health insurance, *Seguro Popular*. *Seguro Popular* is a voluntary insurance designed to be available, though not required, for all citizens. It was specifically designed for the purpose of making available an insurance program to those who were not already insured through the formal sector. Individuals eligible to affiliate with *Seguro Popular* must meet eligibility requirements based on age, residency, or family affiliation, and demonstrate that they are ineligible for insurance through other programs such as IMSS.

The financing of *Seguro Popular* is through the federal government, state governments, and individuals. Individual contributions are calculated on the basis of income, with income groups divided into deciles and lower income individuals exempt from contributions to *Seguro Popular*. The highest individual contribution level, or annual *cuota*, is the equivalent of less than USD $1000. Although in theory individual level contributions should be an important component of the financing for *Seguro Popular*, scholars (Lakin, 2009) have shown that in practice individual contributions have not been collected at prescribed rates. Federal and state funds have continued to be the principal sources of funding for the program, and investments in the program continue to increase.

Individuals who enroll in *Seguro Popular* receive health coverage for approximately 275 medical operations as well as specific medical and pharmaceutical resources. They are eligible to access these services and medications at any facility affiliated with *Seguro Popular*. From the demand side, then, affiliation with *Seguro Popular* and the distribution of local clinics affiliated with the program are the central determinants of changing health needs as a

result of the health reform in Mexico. To understand the way in which these needs are met (or not), it is also necessary to have an understanding of the supply side of *Seguro Popular*'s resources, and for the purpose of this paper, specifically medications. In the next section, I provide an overview of the distribution and supply process for medications through *Seguro Popular*.

0.4 Distribution and Supply of Medications through Seguro Popular

Medication purchasing and distribution in Mexico for public sector purchases is regulated in several different ways in an effort to minimize the public financial burden as well as promote efficient allocation of pharmaceuticals in accordance with changing demand. First, the process by which medications are able to be purchased is subject to specific requirements laid out in the Law of Acquisitions, Leasing, and Services of the Public Sector. The ways in which purchase quantities are determined are discussed briefly below. Distribution then occurs through the state level to local health clinics. The types of medications which can be purchased for the public sector are regulated by the Cuadro Básico (Basic Formulary) and Catálogo de Insumos (Catalogue of Inputs), lists used by both the Ministry of Health and social security agencies. Finally, pricing is strictly regulated in accordance with health laws in both 1951 and 1984 as well as more recent revisions.

0.4.1 Purchasing Process

Medicines purchased by public sector institutions are required to follow the regulations of the Law of Acquisitions, Leasing, and Services of the Public Sector, which dictates three manners in which pharmaceuticals can be bought: (1) public biddings, (2) invitations to at least 3 people/organizations, and (3) direct negotiations (Moise & Docteur, 2006). The most common of these manners for pharmaceutical purchases in the public sector is public biddings. Most of the biddings involve domestic manufacturers, although under certain circumstances international manufacturers may participate. The direct negotiation process is most appropriate for patent-protected medications with only one producer for which bidding would therefore be unsuitable.

Each individual purchasing institution (IMSS, ISSSTE, SSA, PEMEX, SEDENA) makes its own determinations about purchasing needs, and these determinations are made at the subnational level. There is significant autonomy in both the processes for determining needs and the processes for purchasing, both by institution and by region. The purchasing formulas include inventory information and information about demands on local health facilities in their calculations of medication needs, but formulas can differ a great deal by region, according to officials familiar with the process.[1] Thus, although there are basic catalogues of medications available which offer a general listing of available supplies and prices, as discussed below, the institutions are quite autonomous in their individual drug acquisition process.

IMSS purchases drugs through its 35 state delegations and 25 Medical Units of High Specialty (Tertiary Level Hospitals) (Moise & Docteur, 2006). The purchasing process

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[1]This information was received through email correspondence with Gregorio Sanchez, Subdirector of Seguro Popular in the Federal District of Mexico.

is initiated at the state level, where the purchasing unit calculates the pharmaceutical needs of its medical centers, and compares this calculated need to present inventory to determine purchasing needs. The state purchasing units then solicit bids for medications from manufacturers in a bidding process in accordance with the Law of Acquisitions. The winning bidder eventually signs a contract with the purchasing unit (Moise & Docteur, 2006). Purchasing units are also required to keep detailed records of medication usage and past purchases, many of which are available through CompraNet (Ley de Adquisiciones, Arrendamientos Y Servicios del Sector Público).

It is worth noting that changes to the distribution process had been planned at the time that SP was rolled out. In particular, these planned changes involved moving toward a reimbursement system, in which Mexicans would hold smart cards that stored identifying information as well as specifics about the health products to which they were entitled. By swiping these smart cards at health facilities, they would be able to access products and services, and they would also initiate an automatic process by which national health authorities would be informed about inventory and medication usage (Moise & Docteur, 2006). Notably, these changes to the distribution process had not occurred at the point that our evaluation of SP took place.

0.4.2   Available Medications

The Cuadro Básico (Basic Formulary) and Catálogo de Insumos (Catalogue of Inputs) are the two lists from which the Ministry of Health and social security agencies purchase their pharmaceuticals. Whereas the Basic Formulary is comprised of products appropriate for primary care, the Catalogue of Inputs includes drugs for care at the secondary and tertiary levels. The 2005 editions of the Basic Formulary and the Catalogue of Inputs list a total

of 776 generic names of drugs (Moise & Docteur, 2006). Requests for changes and updates to drug listings in the Catalogue of Inputs and Basic Formulary can be made through the Interinstitutional Commission of the Basic Formulary of Inputs of the Health Sector, which includes representatives from the Ministry of Health and IMSS among other health agencies.

0.4.3 Pricing

Mexico's pharmaceutical industry is one of only two which have price regulations in place, although these regulations have become more flexible in recent years. Both the 1951 Act on Federal Executive Attributions in Economic Matters and the 1984 General Health Law worked to set maximum retail prices for drugs based on calculated supplier costs and profit margins. Although there have been previous attempts to loosen this pricing scheme, the most recent effort occurred in 2004. The Ministry of the Economy now administers this most recent maximum price regulation scheme, under which regulation applies only to patent-protected drugs in the private market, an international reference price (PIR, or Precio Internacional de Referencia) services as a maximum price threshold, and manufacturers can set the price for drugs with no comparable alternative (Moise & Docteur, 2006). In practice, the procurement price for many common drugs is well below the maximum price (Instituto Mexicano del Seguro Social [IMSS], 2004).

0.5 Research Design

When *Seguro Popular* was introduced in 2005, Gary King and a team of researchers in conjunction with the Mexican Health Secretary and the Mexican National Institute of Public Health designed a randomized experiment such that an evaluation of health outcomes and behavior in the program could take place both at the individual and the health facilities

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level. The project (King et al., 2009) was designed as a matched-pair cluster-randomised experiment in which the research team identified 12,284 health clusters. A health cluster was defined as a health clinic or hospital and the population of its catchment area. From among these health clusters, 7078 (5439 rural and 1639 urban) clusters, from 13 out of 32 Mexican states, agreed to join the evaluation experiment of *Seguro Popular*. From among these possible health clusters, King et al. selected 74 pairs of health clusters from among seven states. Figure 1 shows the seven states from which the final health cluster pairs were selected.

Figure 1: States From Which Paired Health Clusters Were Drawn (Figure from King et al., 2009)
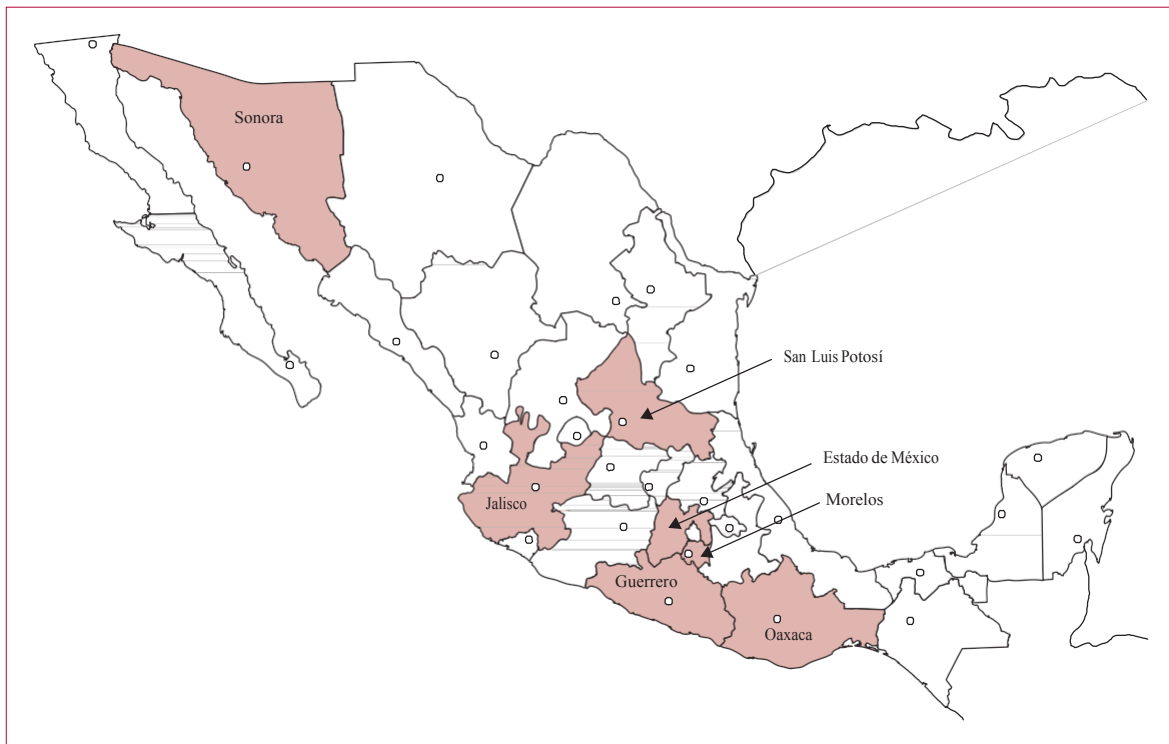
Final clusters were included based on requisite administrative and political features, and cluster pairs were matched on characteristics such as cluster size (King et al., 2009). Within each pair, one health cluster was selected for treatment and and one was chosen as the control. Within treatment clusters, the research team launched a campaign to

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enroll families in *Seguro Popular*, and the state in which the treatment cluster was located implemented efforts to increase medical personnel and drug supplies in the treatment facility. Control health clusters received nothing additional.

0.5.1   Household Survey

Two separate surveys were conducted as part of the evaluation of *Seguro Popular*, a household survey and a health facilities survey. Both the household and facilities survey were conducted at a baseline observation point between August 2005 and September 2005 and again at a follow-up point between July 2006 and August 2006. As part of the household survey, individual households were interviewed in each of 100 of the original 148 clusters. The 100 clusters were selected based on within-pair similarity and expected compliance. The distribution of health clusters in which the household survey was conducted by state is shown in Table 1.

State	Number of Clusters in Household Survey
Guerrero	8
Jalisco	2
Estado do México	54
Morelos	26
Oaxaca	4
San Luis Potosí	4
Sonora	2

Table 1: Distribution of Health Clusters used in Household Survey by State

Initially, a total of 36,181 households selected randomly were contacted as part of the survey, and 32,515 of these were at least partially surveyed at the baseline phase. Of the 32,515 households initially surveyed, 29,897 households were re-surveyed post-treatment.

Multiple imputation techniques were used for missing values and are discussed by King et al (2009). The final household dataset includes 16,259 households from treatment clusters and 16,256 households from control clusters. Appendix A shows King et al. (2009)'s flowchart showing the process of household sampling, response, and attrition rates during the household survey.

0.5.2 Facilities Survey

The second survey that was conducted as part of the evaluation of *Seguro Popular* was a health facilities survey. Whereas analyses drawing on the household survey were previously published as part of the evaluation project, the health facilities data have not been used for scholarly research prior to this project. The facilities survey was conducted for the purposes of collecting data on personnel, clinic operation, and clinic supplies at facilities of interest, which would eventually allow for the evaluation of *Seguro Popular*'s aim to increase supplies and access to health care to those enrolled in the program.

A total of 140 of the 148 health facilities were surveyed at both baseline and treatment periods, where each health facility refers to the health clinic or hospital providing services to the catchment area of a given health cluster. However, only the 100 health clusters chosen for the matched pair design discussed above were used in the data analysis. From these 148 health facilities, 100 were chosen in a matched-pair design, where one facility in each cluster was chosen as a treatment facility, and one was chosen as a control facility. As shown in Table 1, the majority of these clusters came from Mexico State and Morelos, with the remaining 20 facilities chosen from Guerrero, Jalisco, Oaxaca, San Luis Polosí, and Sonora.

The questions posed on the facilities survey fell broadly into three categories: personnel, infrastructure and equipment, and medications. Personnel questions included questions about the physician and nursing staff, professional and technical personnel such as pharmacologists and radiologists, and other personnel such as administrative and maintenance staff. Questions regarding infrastructure and equipment focused on available offices, operating rooms (if applicable), service and transitory beds, and medical equipment such as X-ray machines and respirators. The medications section of the survey reported each medication present in a given health facility at the time of survey, the total number of units of that medication available to all patients, and the number of units available only to *Seguro Popular* patients, if applicable. Due to the design of the survey, at many facilities the data collection team did not distinguish correctly between medications that were available to all patients and those which were available only to *Seguro Popular* patients. Consequently, we have only used data for the total number of medications at each facility in our analysis.

The data that were collected on medications from the facilities survey were coded separately without regard for generic versus name brand distinctions or the primary indication of the data. For example, "Tylenol" and "Acetaminophen" would have been coded as separate medications. We therefore created a variable coded according to the main indication for which one would expect a given medication to be used at a local health facility. The 11 main indications under which every medication was coded are shown in Table 2.

Although of course some medications have multiple indications and could have been categorized under more than one indication, most had a primary or most probable use, particularly in the context of a community health clinic. In a few cases, a medication was either used for an unusual purpose (such as toxicology), or its main indication was so ambiguous that it could not be readily categorized. These medications were coded under

Table 2: Medication Indication Codings

Indication
(1) infection
(2) respiratory
(3) cardiac, blood, cholesterol
(4) pain, allergies, inflammation
(5) GI disorders
(6) glycemic disorders
(7) vitamin/mineral deficiencies
(8) neurological
(9) endocrine and birth control
(10) vaccine
(11) other

"other". All codings were done in consultation with a pharmacologist and physician, and the medications which were categorized under each indication are listed in Appendix B. For each facility in the facilities survey, we calculated the number of medications available at that facility for each indication at both baseline and post-treatment, as well as the total number of medications available. These new facility-level medications totals were merged with the personnel and infrastructure facility-level data into a final health facilities dataset.

In addition to generating the medications data for completion of the facilities data as discussed above, we generated new facility-level variables related to medication usage from the household survey. In the household survey, individuals were asked if they suffer from any one of the following seven chronic conditions: arthritis, chest pain, asthma, depression, diabetes, hypertension, or high cholesterol. They were further asked whether they were receiving medication or treatment for their chronic condition(s). We aggregated these variables to the facility-level by creating a variable for the total number of chronic conditions reported for individuals in a given health cluster at baseline and post-treatment. We also created a variable for 'unmet need', or the difference between reported chronic conditions in

a health cluster and medication usage for treating these conditions. Thus, the final dataset used for this paper included all of the data from the facilities survey as well as variables for chronic conditions, medication usage, and unmet need for medication generated from the household survey.

0.6   Analysis

Descriptive statistics of the treatment and control clusters suggest that the treatment was effective in enrolling residents of treatment areas in *Seguro Popular*. Whereas the control clusters saw an average increase of only a few percent of residents enrolling in the program, treatment clusters saw an average increase of nearly 35% (Table 3). It is worth noting that the enrollment levels for the baseline period in both control and treatment clusters are non-zero because baseline data were being collected as the program was being rolled out, so there were opportunities in some clusters to enroll before initial data collection took place. Furthermore, these rates were higher in treatment districts, since the treatment that was occurring during the collection of baseline data was the promotion of the program. Another important consideration is that the treatment for this study was marketing of the *Seguro Popular* program and assistance with enrollment. However, enrollment was also available to individuals in control clusters for those who sought it. Thus, it is not surprising to see increases in enrollment over the evaluation period in both treatment and control clusters, with larger increases in treatment clusters.

Although the trends in enrollment across states were similar, there were a few noteworthy differences. First, Mexico State was by far the most successful at enrolling individuals in the program, with more than 60% enrollment for treatment health clusters after

Table 3: Changes in *Seguro Popular* Enrollment by State

		Baseline	Post-Treatment
Mexico State	Treatment	17.06%	60.47%
	Control	3.34	6.08
Morelos	Treatment	6.37	26.78
	Control	.36	1.05
All Other States	Treatment	20.05	44.86
	Control	11.77	21.78
Average	Treatment	14.88	48.59
	Control	4.25	7.91

the treatment period (the comparable figure for Morelos was only 26.8%). States also varied a lot in the percentage of individuals in control areas who enrolled in the program during the evaluation period. Whereas nearly a quarter of such individuals in the clusters in Guerrero, Jalisco, Oaxaca, San Luis Potosí, and Sonora had enrolled, only about 1% of those in Morelos had. These large differences between states suggest that there is important state-level variation occurring in the affiliation process of *Seguro Popular*.

The central outcome of interest in this analysis is the change in the total units of medications available at health facilities between the baseline and post-treatment period. In particular, we were interested in knowing whether changes in enrollment rates were associated with changes in the medication supplies available at health clinics. To determine this, we simply looked at the total units of medication available for all indications at both control and treatment facilities at baseline and post-treatment. Following Imai (2008), the sample average treatment effect (SATE) in a matched-pair experiment design such as the one conducted on *Seguro Popular* can be estimated by the following equation

$$\hat{\tau}_m \equiv \frac{1}{2n} \sum_{j=1}^{n} \sum_{i=1}^{2} (Y_{ij}(1) - Y_{ij}(0)) \tag{1}$$

in which τ_m denotes the SATE, n is the number of matched pairs, and Y is the outcome of interest. Observed pairs are indexed by i. The variance for this estimator can be found using the following equation

$$\hat{\sigma} \equiv \frac{1}{n(n-1)} \sum_{j=1}^{n} \{Z_j(Y_{1j} - Y_{2j}) + (1 - Z_j)(Y_{2j} - Y_{1j}) - \hat{\tau}_m\}^2 \tag{2}$$

in which $\hat{\sigma}$ denotes the standard variance estimator, Z denotes the binary treatment assignment, and n matched pairs are indexed by j, with $\hat{\tau}_m$ as the SATE from Equation (1). A visual of our results are shown in Figure 2. On average, we observe a noticeable increase in the availability of total medication units for health facilities in both control and treatment clusters. Appendix C shows the breakdown of medications by indications, suggesting this increase was similar across different types of medication. Unfortunately, however, because of the relatively high rates of missing medications data post-treatment, as well as high variability between clusters, the effect is not statistically significant.

As with enrollment data, there were significant differences in medication availability changes by state. In Mexico State, treatment clusters experienced much larger increases in medication availability, on average, than did those in control clusters. The average difference between the change in medication available at treatment facilities and the change available at control facilities was nearly 1000 units, equivalent to more than a third of the total stock at control facilities. These data are shown in Table 4 and graphically in Figure

Figure 2: Medication Units at Baseline and Treatment

Mean Number of Total Units of Medication in Health Facilities
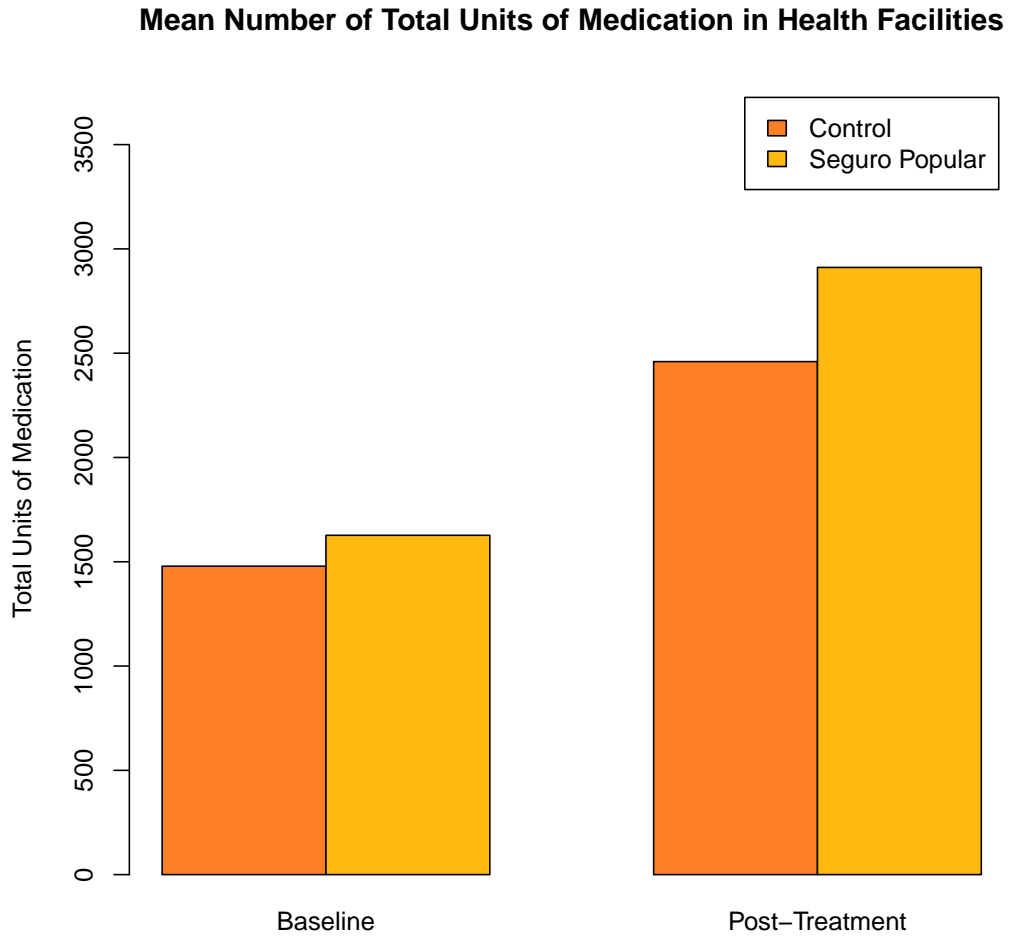
3.

Morelos also experienced greater increases to stock at treatment facilities than at control facilities, although the difference in units was only about half that of Mexico State. In contrast, the five other states in our study experienced, on average, greater increases to stock at control facilities. There are two explanations for why this is the case. First, there were only ten matched clusters among these five states, making data interpretation less reliable.

Table 4: Changes in Medication Units by State

	Baseline	Post-Treatment	Difference
Mexico State			
Treatment	1921	4075	
Control	1550	2714	
Difference	**371**	**1361**	**990**
Morelos			
Treatment	1409	1139	
Control	1380	598	
Difference	**29**	**541**	**512**
All Other States			
Treatment	1116	2074	
Control	1415	4194	
Difference	**-301**	**-2120**	**-1819**
Average			
Treatment	1627	2911	
Control	1479	2460	
Difference	**148**	**452**	**304**

Second, there were significant outliers from among these clusters, where an individual control facility had accumulated an unusually large amount of medication over the treatment period.

The substantial difference between medication stock changes in Morelos and Mexico State, on one hand, and the other five states in the study, on the other, is particularly interesting because the cluster matches from Morelos and Mexico State composed 80% of the observations in the study, and thus had the most resources geared toward implementation of the *Seguro Popular* program. The data suggest, at least preliminarily, that implementation may have been more effective in areas where enrollment was taking place at higher rates, and perhaps economies of scale benefitted some components of the implementation process. The data on enrollment changes and medications strongly suggest that there was important

Figure 3: DID States

Difference in Differences for Total Medications by State
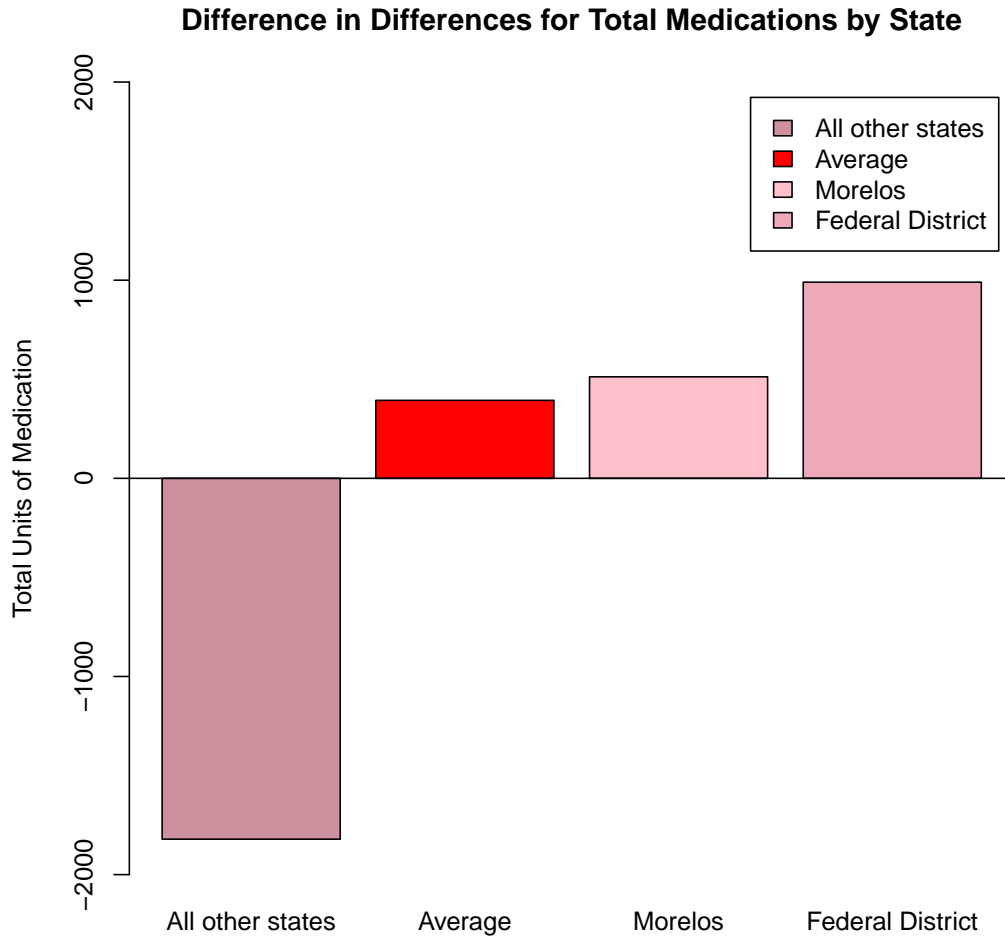
regional variation in how effective the *Seguro Popular* program affiliation was.

As is clear from the enrollment data and medication availability data, the states in which there were the greatest differences in *Seguro Popular* enrollment between treatment and control clusters were also the states in which the change in medication availability between treatment and control clusters was the greatest. Consequently, we performed a simple regression analysis to determine whether this relationship was statistically significant. In-

terestingly, we found that there is a statistically significant relationship between the percent change in *Seguro Popular* enrollment and medication availability for treatment clusters, but this relationship does not exist for control clusters. For all clusters, an increase in enrollment in *Seguro Popular* of one percent was associated with an increase in medication availability of approximately 30 units, and this relationship was significant only at the $p < .1$ level. However, in disaggregating the data it becomes clear that this relationship is being driven by the treatment clusters. In treatment clusters, an increase in enrollment in *Seguro Popular* of one percent was associated with an increase in medication availability of about 60 units during the evaluation period, significant at $p < .01$. On the other hand, there was no significant relationship between *Seguro Popular* enrollment in control clusters and increased availability of medication.

The interesting relationship between enrollment and medication availability suggests that, at least in treatment clusters, enrollment in *Seguro Popular* was associated with greater distribution of medication to health clusters. Thus, the distribution formulas for pharmaceutical needs discussed earlier seem to have been at least partially effective in distributing SP medications based on changing demand. The failure of this relationship to hold in control clusters also accords with expectations based on how the program was implemented. Specifically, control clusters did not provide a *Seguro Popular* facility which received medications through the state to be distributed to SP patients.[2] While individuals in control clusters were able to affiliate with the SP program, they would need to travel to treatment clusters to take advantage of SP services (Gakidou et al., 2006). Therefore, it is unsurprising that there was no relationship between SP affiliation in control clusters and changes to medication stock in those clusters.

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[2]The ability of a facility to affiliate with *Seguro Popular* and thus receive pubic funding hinged on its initial upgrading of the health facility (Knox, 2008).

The second type of outcome in which we are interested is whether increased medication supplies in clinics translated to higher rates of medication usage in the population. To examine this relationship, we used data from the household survey on medication usage by cluster to determine whether clusters in which medication availability had increased were also experiencing increased rates of medication usage among residents of that health cluster. In performing the regression analysis, we calculated cluster-robust standard errors using the *experiment* package in R Version 2.15.0. We found no significant relationship between the change in medication availability, as measured, in a given health cluster, and the change in medication usage in that cluster.

Table 5: Percent Individuals In Household Survey Taking At Least One Medication for a Chronic Condition

Cluster	Baseline	Post-Treatment	Difference (95% CI)
Treatment	13.62%	17.50%	3.88 (3.09,4.67)
Control	14.04	17.74	3.70 (2.91,4.50)
Difference	-.42	-.24	.18

We also performed t-tests to compare directly the changes in medication usage between treatment and control clusters. As shown in Table 5 and graphically in Figure 4 below, there were statistically significant increases in medication usage between the baseline and post-treatment periods ($p < .001$) across both treatment and control clusters, but we found no significant differences in medication usage between treatment and control clusters either at baseline or post-treatment. In other words, reported medication usage did increase significantly over the period of the study, but our data do not suggest that this increase

Figure 4: Increases in Medication Usage for Individuals with Chronic Conditions

Percent Increase in Number of Individuals Taking at Least One Medication for a
Chronic Condition Over Period of Experiment (with 95% Confidence Interval)
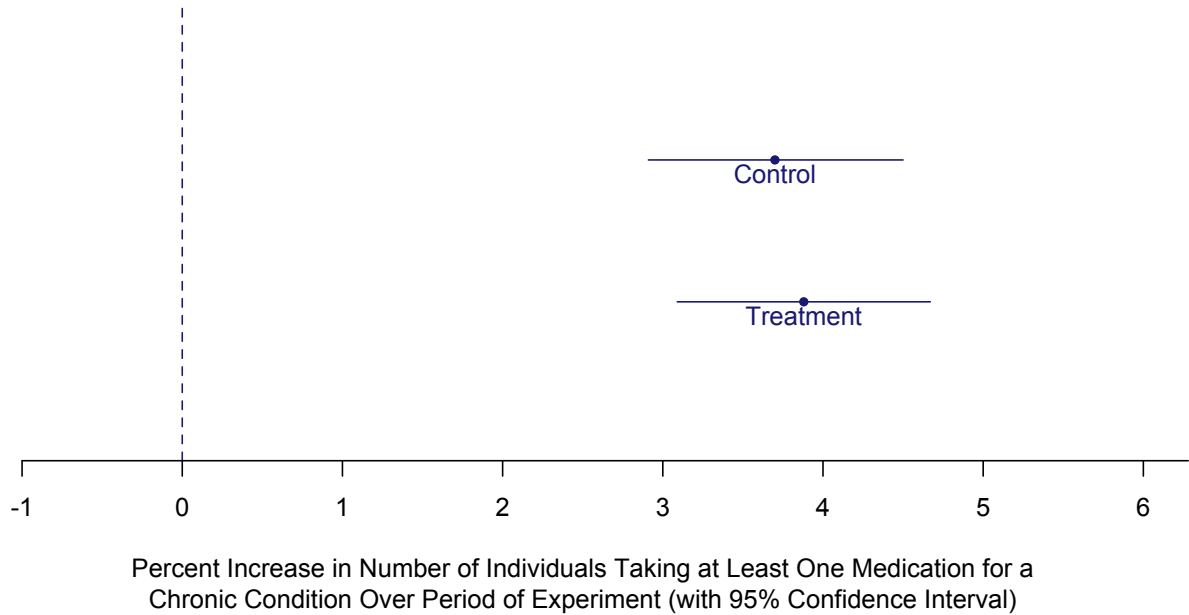
occurred as a result of *Seguro Popular*. In the following section, we discuss some possible
explanations for this, as well as our other findings.

0.7   Discussion

In the beginning of this paper, we noted that one of the core aims of *Seguro Popular* was
to improve the availability of medications to individuals who previously had not been able
to access or afford them, often due to a lack in formal insurance. Meeting this need hinged
on a process of state institutions' purchasing and distribution of medications and other
supplies. The idea behind *Seguro Popular* in this regard was, in theory, quite simple. Infor-
mation from the demand side regarding medication needs had to be transmitted effectively
to the level at which supply decisions would be made (in this case, the state and national

level). A process of pharmaceutical procurement would unfold, and then medications would be distributed back to local health clinics, where they would be made available to the public.

The system of indicating needs under *Seguro Popular* was the enrollment of residents of a health cluster in the program. Eligible individuals could affiliate with *Seguro Popular*, and in turn their affiliation made the health cluster eligible for additional medications and other resources, as long as that cluster's facility was SP affiliated. Needs were to be evaluated at the state level, and states could purchase pharmaceuticals through the process laid out previously, subject to the constraints of the Law of Acquisitions, Leasing, and Services of the Public Sector. The pharmaceuticals would then be sent to individual local health facilities, where affiliated members of *Seguro Popular* would have access to the medications at no out-of-pocket cost. In theory, then, enrolling residents in a health cluster, or demonstrating demands to be met, should have resulted in additional medication availability at corresponding health facilities. In turn, we would expect an increase in medication usage in the areas with high enrollment rates and increased availability of medication.

In practice, though, our data call into question the extent to which this process actually unfolded. The first step of the process does seem to have been at least partially successful, as enrollment rates in SP-affiliated clusters were highly correlated with increases in medication stocks to those clusters. As noted earlier, this relationship was not observed in control clusters because they were not eligible for SP-funded medications.

The second key relationship we considered was that between changes in medication availability and changes in medication usage among residents of a health cluster. Our analysis resulted in two key findings. First, there were highly significant increases in medication usage over the period of observation for both treatment and control clusters.

Second, there were not statistically significant differences in rates of medication usage between treatment and control clusters either at baseline or post-treatment. So, significant increases in medication usage did occur, but they occurred at approximately the same rate in both control and treatment clusters. This finding is contrary to our expectation that increased medication availability would correlate positively with increased medication usage in a health cluster.

Our findings concerning the relationship between enrollment rates and medication availability should be considered with an important caveat, which is whether a one-time observation of medication stock is a strong enough indicator of the availability of medication to that health cluster. One could argue, on one hand, that because not all facilities were surveyed on the same day of the week or the same time of the month, they could have been surveyed at different points in the medication distribution cycle. Nonetheless, such a critique is dissatisfying, because there was no particular bias in the order in which the medication supplies were evaluated. Thus, although surveying at different phases of the distribution cycle may have contributed to volatility of data, and thus made our error margins larger than they would have been otherwise, there is not a reason to believe that this surveying process altered the observed effect.

The second major finding in this study was that medication usage did increase significantly over the period of the study, but these increases occurred at very similar rates in control and treatment facilities, and were not significantly associated with changes in medication availability. In explaining this finding, two considerations seem important. First, because individuals in control clusters who chose to affiliate with *Seguro Popular* were forced to travel to treatment clusters to receive SP medications, these individuals, when surveyed at the household level, would result in reports of increased medication usage in control clusters,

even though the medications were actually coming from treatment facilities. Thus, the way in which the program was implemented encouraged the dispersion of medications across clusters and thus the muting of any correlation between medication stock and usage. Because the percent increases to medication stock were very high, this could reasonably explain the increase in usage in treatment and control clusters.

A second factor could also provide leverage into significant usage increases over the period of study. In reference to medication shortages and costs in Mexico, there have been intense political and regulatory battles over the past 15 years in which pharmaceutical companies fought for the rights to distribute cheap generic alternatives to prescription drugs (Hayden, 2007). Although the specifics of this debate, as well as its implications concerning the role of the public sector in health provision, are beyond the scope of the paper, it is important to make note of it nonetheless, because the proliferation of low-cost pharmacies which distribute generic brands of many of the same types of medications available through *Seguro Popular* was peaking just as our evaluation of the program was taking place. A clear example of this type of chain would be Dr. Simi's *Farmacias Similares*, which were increasing significantly in reach and popularity during the mid-2000s. With a slogan of "The Same But Cheaper!" in the face of medication shortages and escalating costs, it is easy to understand the draw to such a pharmaceutical chain and its products. When individuals in need of care have no certain expectation of a *Seguro Popular* facility being staffed, stocked, or conveniently located, many turn to local pharmacies which provide a quick and inexpensive alternative.

In light of our findings and the caveats discussed here, it is important to revisit how our study fits within a framework of institutional analysis. As demonstrated in the data on enrollment rates, there were significant differences in rates of enrollment even across

treatment clusters in the study. Some states, most notably Mexico State, were far more effective in enrolling individuals in *Seguro Popular* than were other states. As a result of these differences in enrollment rates, some states received more publicly funded medication than did others.

We also noted in our discussion of the medication purchasing process that states had significant discretion in calculating medication needs, purchasing, and distributing medication needs to health facilities. In practice, many Mexicans report being denied medication at public facilities because of shortages or because health workers decided to ration their medications to patients they felt had more urgent needs. Thus, both at the stage of the enrollment process in which effective marketing campaigns and/or pressure could be used to enroll individuals in SP for the purpose of obtaining additional funding, and in the process of medication purchasing and distribution, during which state purchasing units and eventually health facilities have significant discretion in what types of medications are sent where and to whom they are given, there is room for individuals or groups to execute SP rules in accordance with their own goals. In other words, it should be unsurprising that we see differences in execution among states, since there is significant room for flexibility in the implementation of SP policy.

In the Background section of this paper we noted that political science and welfare state scholarship has largely left the topic of health reform to economists and public policy specialists. But the findings here should make very clear that the way in which health policies are executed hinges on the performance of state institutions and the implementation decisions of those running them. For this reason political science scholars would do well to consider not just the politics of health policy implementation but also the politics of health policy execution in future work. Mexico's *Seguro Popular*, as well as universal health

programs in Latin America and elsewhere, offer valuable material as of yet understudied by political scientists.

Part III

Paper II: Social Spending in Brazil

The role of political partisanship is at the heart of government and policy and, consequently, of great importance to political science. To what extent are government policies a result of exogenous and often uncontrollable factors, and to what extent are they a result of the beliefs and biases of the individuals and coalitions which govern? Even within the narrowed scope of questions related to political economy, this question has been asked to investigate the motivations for government policies on items such as trade, regulatory policy, and social spending. Whether the preferences of governments have a meaningful impact on the economic policy direction of their countries offers insight into the extent to which development outcomes can be explained by structural changes which occur independently from shifts in governance.

In this paper, the question of partisanship is raised with regard to social spending, and, more specifically, spending on health care. Do some governments choose to allocate more of their budget to meeting health care needs? Or can health care spending be better explained by factors such as level of economic development and urbanization? The case study presented here looks at Brazil during the late 1990s and 2000s in an effort to understand the determinants of health care spending in Brazilian municipalities.

While the primary question of this study is the role of partisanship in health spending, a second and related question concerns the potential mitigating effect of health reforms which occurred in Brazil during this period. During the 1990s and 2000s, Brazil underwent a piecemeal process of fiscal centralization. Concurrent with the process of centralization was a process of decentralization for administering health services. In order to facilitate this administration of services, a series of laws was passed mandating automatic transfers of funds specifically marked for health expenditures. Part of the motivation for the health reform process was a desire to reduce inequities in social welfare spending across mu-

nicipalities. By incentivizing levels and types of expenditures, reformers hoped to generate a system in which municipalities chose to spend allocated health funds from the government rather than establish their own funding systems. Their hope was that such a system of automatic transfers would generate greater equality and standardization in health spending across municipalities.

The change in funding structure for health has potentially important implications for the role of political partisanship in social welfare spending. Because the reform process created incentives for certain levels of health spending and certain types of expenditures, as well as automatic mechanisms for funding transfers from the national to municipal levels, there was potential for differences in the nature of expenditures across municipalities to be muted over time. If partisanship effects on health spending at the subnational level in Brazil were significant prior to the reform period, they would be expected to decrease between the first serious attempts at integrating municipalities into the new fiscal system in the mid-1990s and the approximate end of integration in the mid-2000s.

In examining both the role of partisanship and the potentially mitigating effect of the health reform process, we find that there does appear to be a significant partisanship effect by which left-leaning governments spend more of their budget on health than others. This effect is present prior to the reform process unfolding, and there is not clear evidence that it dissipates over the period of the study. In other words, to the extent that one of the goals of the reform process was to depoliticize social welfare spending, it appears to have been unsuccessful. Notably, though, there is strong evidence that health spending did increase significantly over the period of the reform, which was another aim of the process.

The role of partisanship in health spending in Brazilian municipalities, and the

failure of the reform process to mitigate this effect, has important implications both for health in Brazil and for the potential of similar reform processes elsewhere. Scholars on political partisanship, as will be discussed below, have often come to the conclusion that partisanship does not have an important effect on policy outcomes. The evidence in this paper strongly refutes this idea in the realm of health spending. Furthermore, while the success of the reform in increasing expenditure level is clear, the success in muting differences between municipalities is less obvious. If partisan effects on health spending did not change as a result of the reform process, then the successful achievement of the aims of the reform process seems, at the very least, ambiguous. If politics does indeed have an important role in health care spending, and Brazil's reform process was unable to change that role significantly, future reformers will need to re-evaluate strategies for ensuring quality public service provision independent of government ideology.

0.1 Background

The relationship between partisanship and policy outcomes has received consideration in numerous aspects of political economy, with very different conclusions. Scholars have studied the role of partisanship on policies such as trade (Milner and Judkins, 2004), regulatory policy (Murillo, 2002), the welfare state (Iversen, 2001; Piersen, 1996; Allan & Scruggs, 2004), and inequality (Rueda, 2008), among other topics. Some scholars have theorized that partisanship should play an important role in determining economic policy preferences. For example, Boix (1998) argues that left-wing and conservative parties have different preferences for policies to increase efficiency in economic markets. Studies of OECD countries (Hall 1989, eg.) suggested that partisanship was an important determinant of Keynesian economic policies, with left-leaning governments preferring increased state intervention in the economy.

Notably, many accounts of the role of partisanship on the welfare state focus on the importance of left-leaning parties for the expansion of the welfare state (Hicks, 1999; Garrett, 1998; Korpi, 1989) but since the 1970s numerous studies have found little evidence for this effect (Huber & Stephens, 2001; Ross, 2000). An important question, raised by Pierson and Murillo among others, is whether economic pressures such as capital crises and globalization, might lead to economic policy convergence between left parties and parties of right or centrist ideologies. Kingstone and Young (2009) looked at the question of economic policy convergence in the face of rising left governments in Latin America, and concluded that there were not discernible differences in policies between these governments and others. On the other hand, studies such as Milner and Judkins (2004) and Allan and Scruggs (2004) suggest that partisanship does continue to be an important determinant of policy outcomes. Finally, studies such as Murillo (2002) suggest that while there may be policy convergence, partisanship matters in aspects of the implementation of widely accepted policies such as privatization.

This study focuses in on one particular aspect of the welfare state, which is spending allocated to public health. Whereas the role of partisanship on the overall welfare state has gotten significant scholarly attention, there is very little literature which evaluates the role of partisanship on health spending in particular. One exception to this is Huber, Mustillo, and Stephens (2008) a cross-national study in Latin America which suggests that regime type, partisanship, economic pressures, and civil society may play a role in determining levels of both health and education spending. However, to my knowledge, all studies of the determinants of health spending (Newhouse, 1977; Hitiris & Posnett, 1992; Potrafke, 2010, eg.) have been performed at the cross-national level, and most do not test political partisanship as a spending determinant.

The question of political partisanship and health spending has important implications for both political science and public health. If partisanship matters in health spending, then theories of policy convergence on welfare state preferences are called into question. Particularly with the recent focus on left governments in Latin America, as well as the continued importances of meeting basic health needs in an efficient way, the relationship between political beliefs and health spending is crucial and understudied, particularly at the subnational level. This question matters in the field of public health as well, because the basic design of efficient health systems must consider the political constraints of service delivery. If governments have different preferences and/or execute different health policies, this must be taken into consideration in designing a health system.

This paper approaches the question of partisanship and health spending at the municipal level with data from Brazilian municipalities in the late 1990s and early 2000s. This was a period of major reforms to the health care system, in which one of the primary goals of reform was to mitigate health inequities across municipalities. To this end, it is helpful to understand a bit more about the reform process.

0.1.1 Origins of Health Reform

Much of the impetus for change to the structure of the health system in Brazil came from a civil society movement which began under Brazil's military regime (1964-85) and pushed for expanded health coverage. During the military regime, Brazil experienced growth rates reaching 10% GDP growth per year, earning the period the title of "The Brazilian Miracle". However, this growth occurred in tandem with rising levels of inequality, creating a foundation for progressive civil society movements focused on social services reform. Progres-

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sive movements for both health and education reform strengthened support during this time.

The civil society movement focused on health reform was known as the *sanitarista* movement. Although it did not establish a core group of proponents until the late 1970s, when it increasingly gained the support of medical professionals, local health authorities, and left-wing health experts, the *sanitarista* movement had initially begun under the left-leaning presidency of João Goulart, a government which ultimately fell prey to military rule in 1964. At its core, the *sanitarista* movement aimed to redress some of the social inequities that had become increasingly apparent during the period of military rule. The movement wanted greater health spending on preventative care, a less significant role for the private sector in health care, and increased attention and resources to be directed toward urban and rural poor. The movement also wanted a greater role for municipalities in the implementation of health care, believing that this would contribute to better care in remote rural areas (Ministério da Saúde, 1992 [1963]; Conselho Nacional de Secretários de Saúde [CONASS], 2007; Falleti, 2010). Much of the drive for these reforms was rooted in the structure of the health system in Brazil prior to the 1980s, as well as changes to services and fiscal resources in the 1970s and 1980s.

0.1.2 The Brazilian Health Care System Under Military Governance

The health care system in Brazil during the military period consisted of three distinct components: a public contracting system, a public integrated system, and a voluntary contracting system (Fleury, 2000). The public contracting system, or social security component of the health system, was financed by salary-based contributions from formal sector

employers and employees. Formal sector workers could then receive health services either at designated social security hospitals or through private providers with whom the social security administration contracted. Prior to 1977, the health and pension sectors of social security were integrated into one institute, the National Institute of Social Insurance (INPS, Instituto Nacional de Previdência Social). In 1977, the health and pension sectors were separated into distinct bodies, and the National Institute of Medical Care and Social Security (INAMPS, or Instituto Nacional de Assistência Médica da Previdência Social), took over health functions of social security and became the primary agency of the public contracting system (Fleury, 2000).

In many ways, the functioning of INAMPS and the resulting inefficiencies mirror current debates on health care structuring. INAMPS was based on a fee-for-service model in which the administration paid providers to offer health care to social security beneficiaries. Because there were no limits on service provision and little supervision or clarity about health objectives, health care provision was often costly and inefficient. There were also mutually beneficial "special" relationships between INAMPS and the association of private hospitals, Brazilian Federation of Hospitals (FBH, or Federação Brasileira de Hospitais), to provide specialty services (Fleury, 2000). Relative to for-profit private providers, state and municipal facilities, public universities, and nonprofit institutions were not significant health services providers for INAMPS.

The second component of the health system during this time, the public integrated system, was surprisingly distinct from the social security component. Whereas the public contracting system was financed by formal employment sector contributions, the public integrated system was financed through general taxation. The Ministry of Health was specifically responsible for services provided through this part of the system. Although the

aim of the public integrated system was to provide quality preventative care for those unin-
sured through the formal sector, the Ministry of Health faced serious fiscal and organizational
constraints.

The final component of the health system, the voluntary contracting system, was
small relative to the other two. It involved medical groups contracted privately by businesses
to provide services to their employees and was based on a fee-for-service model to outpatient
providers. Figure 5 outlines the relationships between providers, payers, and government in
the Brazilian health system during the 1970s.

There were two important shifts during the 1970s and 1980s that strained the
Brazilian health system and made its inequitable structuring a more salient issue. The first
was the extension of health coverage to new individuals, which increased demands on the
health system. In particular, in 1974, emergency care was extended to the whole population.
As elsewhere, Brazilians in need of health care services who only had emergency coverage
used curative hospital services rather than primary preventative care. The new demand
resulting from the extension of emergency care to the entire population was covered mainly
by private hospitals, thus deepening the divide between the share of services provided by the
public and private sectors.

The second important change that occurred during this period was the debt crisis.
The large expenditure cuts associated with the debt crisis forced INAMPS to reduce the fee
schedule for contracted providers providing services to formal sector workers. In addition, tax
revenue declined, resulting in increasingly scarce resources for the Ministry of Health. This
particular combination was problematic, because one of the ways that the private providers
with which INAMPS contracted tried to maintain revenue levels was by becoming increas-

Figure 5: Structure of the Brazilian Health Care System in the 1970s (Figure from Fleury (2000))
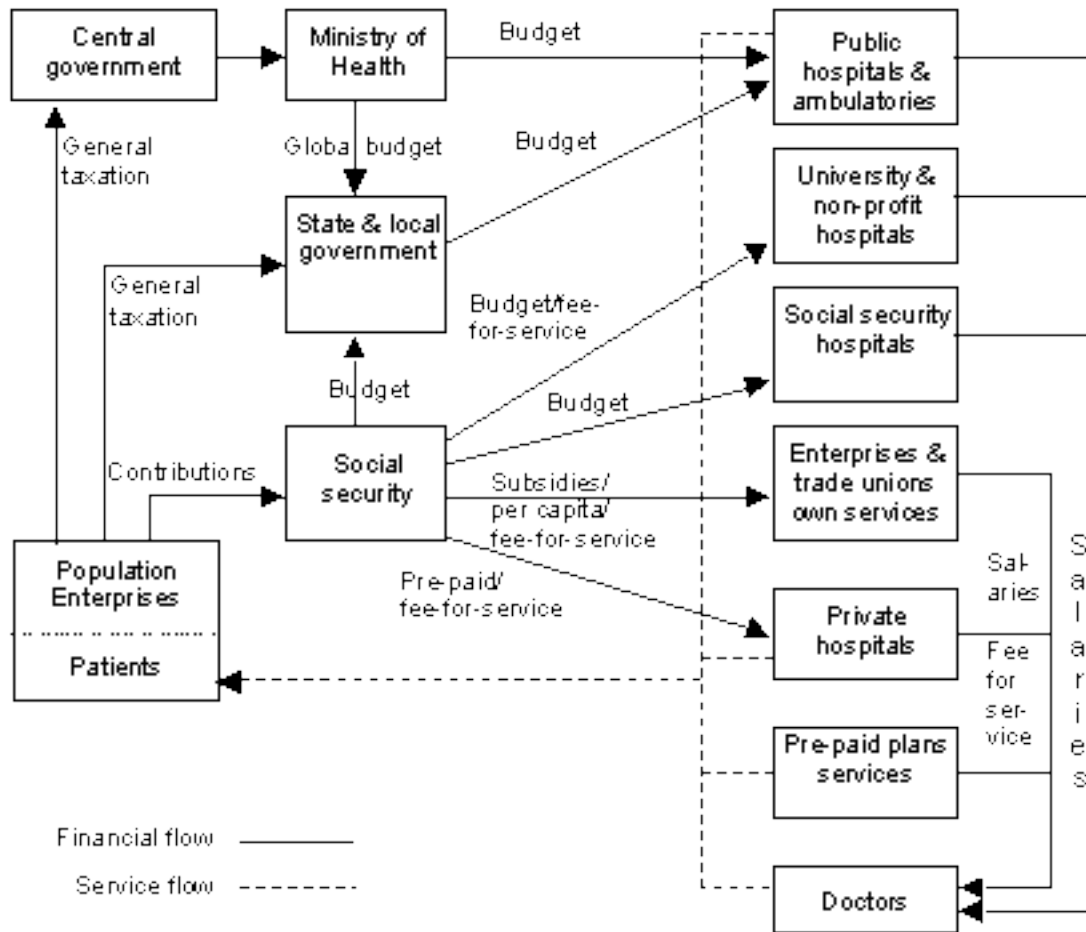
ingly selective about the patients, and cases, that they treated. Thus, although in theory new individuals were gaining emergency coverage through private providers, in practice many of these new patients were rerouted to public sector providers. Given declining tax revenues and the fiscal strain faced by the Ministry of Health, many of the individuals who were supposed to receive emergency care ended up with either low-quality or non-existent care in practice.

0.1.3 The *Sanitarista* Movement

The organization of the Brazilian health care system under the military regime, as well as the abovementioned changes in the 1970s and 1980s, helped to generate broader support for reform of the health care system and, in turn, the *sanitarista* movement. The *sanitarista* movement took issue with several aspects of the structure of the health system in Brazil under the military regime. First, the *sanitarista* movement felt that the separation of the health care system into a Ministry of Social Security (INAMPS) and a Ministry of Health favored private medical associations and business interests at the expense of the general population. It thus sought an integration of the social security system with the preventative health services of the Ministry of Health. The *sanitarista* movement's pursuit of a united health system focused on public services was based on the calculation that redistributing resources from private contractors to the public health system would result in a better quality of services available to the general population.

More generally, but relatedly, the *sanitarista* movement hoped to unite the role of preventative and curative care, and shift the focus of public resources in the direction of preventative care. The military's increasingly strong relationship with private providers, and particularly with Brazil's association of private hospitals, had led to abuse of the fee-for-service model, and primary care resources had suffered as a result. One of the important steps in the direction of preventative care occurred in 1976, when a group of *sanitaristas* from the government thinktank IPEA (Instituto de Planejamento Econômico e Social) and the MOH designed an action plan, the Program of Internalization of Health and Sanitary Actions (PIASS, or Programa de Interiorização das Ações de Saúde e Saneamento) that would put in place a network of sanitary stations in low density areas (Tanaka et al., 1992).

These services required an integration of health provision at the local level, and also funding that would be channeled from INAMPS. In addition to increasing resources for preventative care to poor municipalities PIASS was an important milestone for the *sanitarista* movement in shifting health care decision-making and execution to the municipal level.

The decentralization of responsibilities for the execution of health care to the municipal level was an important goal of the *sanitaristas*. Under the previous system, much of the policymaking and planning had occurred at the national level. For the *sanitaristas*, this centralization was problematic because national and state level offices often did not reach remote municipalities, making delivery at the municipal level difficult. Furthermore, the centralization of the health care decision-making process often favored more urban and affluent areas at the expense of poorer rural municipalities (Ministério da Saúde, 1992 [1963]; CONASS, 2007). As a result, municipalities in the Northeast and in Minas Gerais often received fewer and inadequate resources for public health services.

0.1.4   Health Reform Institutionalized: The 1988 Constitution

After Brazil democratized in 1985, health reformers had an opportunity to incorporate many of the structural changes to the health system that they had been seeking into the country's new constitution. Brazil's 1988 Constitution made great advances in both the definition of health care as a right and as an obligation of the state as well as providing a legal grounds for the restructuring of the health care system. Conceptually, the Constitution recognized health as a universal right of citizenship, and it gave the government a responsibility for providing "universal and equal access to actions and services for its promotion, protection, and recovery" (1988 Constitution, Chapter 2, Article 196). This was the strongest statement of the government's obligation for providing health care services to the population to that

point. Beyond the recognition of the government's role in health care, the 1988 Constitution also set forth a series of rules for the creation of a unified system, thus merging the previously distinct social security system and Ministry of Health. In merging the components of the health system, the government was required to give priority to preventative care measures, and prioritization decisions were to be based on the epidemiological profile of the population.

The 1988 Constitution also redistributed responsibilities for health care between the levels of government. Whereas fiscal responsibilities were primarily the role of the national government, provision of services was to become primarily the responsibility of municipalities, thus achieving one of the principal aims of the *sanitarista* movement. Furthermore, to increase social participation in the health system, health councils would be created at the federal, state, and municipal levels. These health councils, composed of system users, professionals, and managers, were to play an essential role in both developing and implementing policies (Fleury, 2000). The redistribution of responsibilities between levels of government and the creation of health councils were critical steps toward achieving decentralization.

Financing for the system would come from tax collection, social contributions, and employer and employee payroll contributions. Article 198 set aside the specific tax revenue to be used for the new integrated health system, and established that there would be minimum percentages of proceeds and revenue required to be used toward public health services. This was a very important step toward meeting the aims of the reform movement, as it both set a minimum threshold for expenditures, and, in so doing, created the potential for closing the gap between higher-spending municipalities and lower-spending municipalities.

The 1988 Constitution also set the foundation for future laws in the 1990s which would establish both specific percentages to be used toward health spending and the exact

levels of contributions from national, state, and local government. Table 6 shows the percentages of health funding being spent at each level of government. There is a clear shift over the period of study toward spending occurring at the municipal level. It is important to keep in mind that although these expenditures were *occurring* at the municipal level, the fiscal centralization of the process meant that most of the revenue was being collected at the national level.

Table 6: Public Spending on Health (Percent at each Level, Data from Ipea)

Year	Federal	State	Municipal
1985	67.0	23.4	9.6
1986	60.9	26.3	12.8
1987	63.9	24.6	11.5
1988	50.8	35.0	14.2
1989	54.1	33.5	12.4
1990	52.5	32.8	14.6
1991	52.3	29.8	18.1
1992	70.1	17.0	12.9
1993	—	—	—
1994	56.5	24.8	18.7
1995	57.2	21.5	21.3
1996	45.7	19.5	34.8

0.1.5 Reform Implementation: The Brazilian Health Care System During the 1990s

The implementation of health reform provisions included in the 1988 Constitution required additional health laws which needed to be passed through ordinary legislation. Both the drafting of the 1988 constitutional health reforms and subsequent health laws were facilitated politically by the importance of center-left politicians to Sarney (1985-9)'s governing coalition (Arretche, 2004). In the final year of the Sarney administration the Health Ministry

drafted a National Health Law, which was eventually implemented in 1990 as two separate laws, 8080/90 and 8142/90. There were two critical victories for health reformers embedded in these laws. First, a deadline for the closure of INAMPS was established. The Ministry of Health would take over full responsibility for preventative and curative health services, and these services would be provided through the Unified National Health System (SUS, or Sistema Único de Saúde). This was an important victory for reformers with respect to the aim of equalizing services across groups and regions. Because previous service provision between INAMPS and the MOH had differed significantly, the integration of these institutions had the potential to decrease differences in access and quality across municipalities.

The second important achievement of the National Health Laws was the establishment of obligatory transfers from the MOH to municipalities. In this way, municipalities gained control over the management of local health services provision, but they would receive regular, automatic funding from the national level. This was an important achievement because automatic transfers from the national level meant that, at least in theory, minimum expenditure thresholds would be established, and municipalities which had spent less in the past due to partisanship, resource constraints, or other considerations would now be expected to meet a standardized minimum. Although the automatic transfers were themselves a victory for reformers, the specifics of the transfers were less clear, particularly on the issue of to whom specifically the transfers would be made, acceptable uses, and evaluation of transfer fund use (Arretche, 2004).

0.1.6 Current Structure of the Health Care System

In many ways, the present structure of the the Brazilian health care system is a reflection of the goals of the *sanitarista* movement and the subsequent reform process stemming

from the 1988 Constitution. The Brazilian health system can be divided into two components: the Unified Health System (SUS, or Sistema Único de Saúde) and the supplemental medical system. According to the 1988 Constitution, the SUS comprises all services provided either public health personnel or private personnel under public contract. The SUS also covers services under all three levels of government.

Figure 6: Structure of the Brazilian Health Care System in the 1990s (Figure from Fleury (2000))
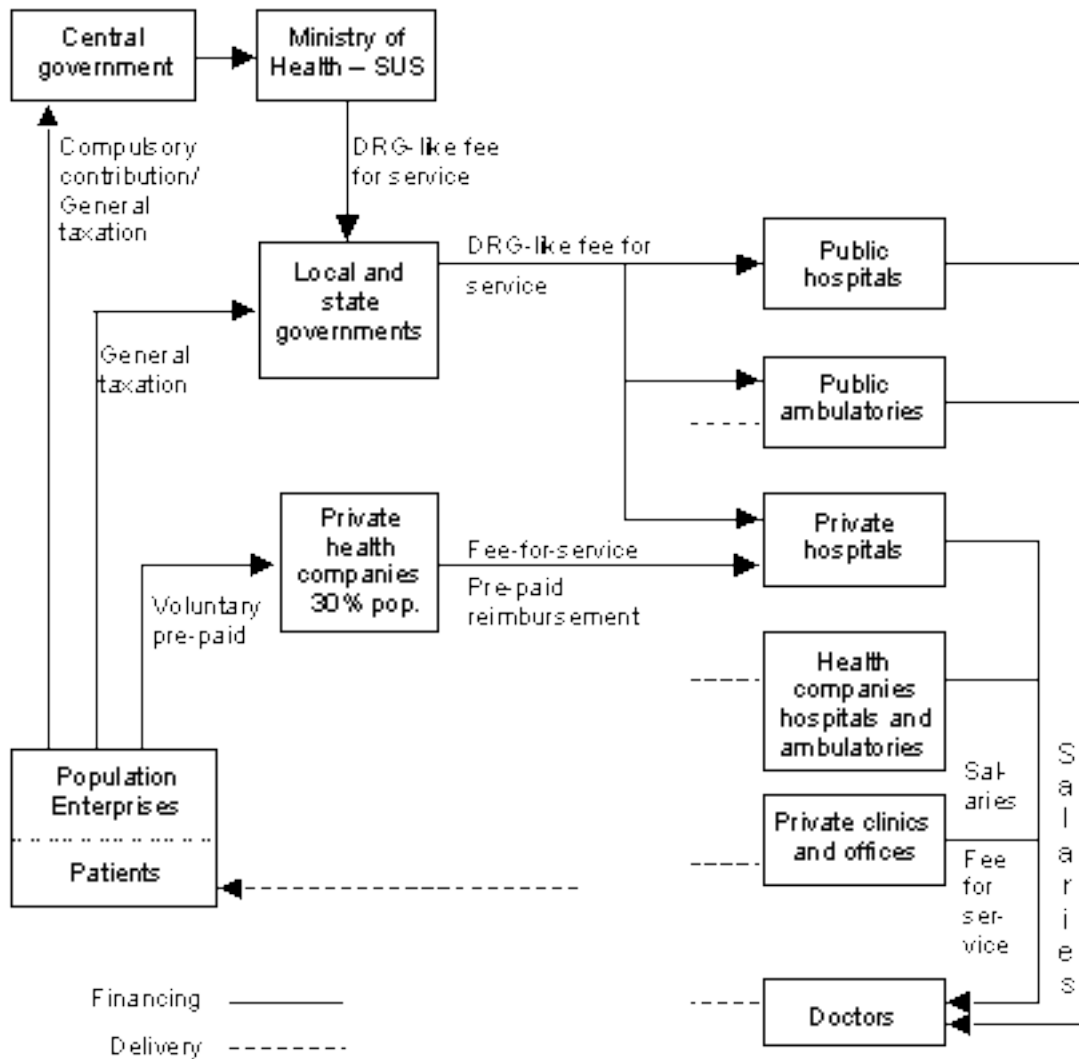
The financing of the system has changed quite substantially, both through the Constitution and Basic Operational Norms and through subsequent reforms. One method of financing is the direct automatic transfers discussed earlier. These transfers were authorized at an amount of approximately US $1.15 per year for each resident of a municipality from the federal government to the municipal government in December 1997 (Lobato, 2000). This automatic level of funding was designed to redistribute resources between municipalities based on need rather than socioeconomic or other factors. The other method of financing is through transfers to providers for services. This second method, a fee-for-service model, more closely resembles the previous system, whereas the direct municipal transfers, with accordant flexibility in expenditure decisions, reflects the motivations of the reform process.

The reforms and financing changes originally proposed in the Constitution and later clarified as part of the Health Laws and Operational Norms continued to be implemented in stages throughout the late 1990s and early 2000s, with the process largely complete by 2005. Our expectation, then, would be that any effects of the reform process on health spending should be observable with data through the mid-2000s.

0.2   Hypotheses

In this paper, we have two primary hypotheses related to the effect of partisanship on health spending. Our first hypothesis is that left parties will spend more on health when controlling for relevant factors. We define a left party as a party that has, broadly, a commitment to poverty alleviation and social welfare spending, as well as to some degree of income redistribution. In particular, parties which aim to improve basic public services and guarantee a minimum threshold of social security and career opportunity to citizens regardless

of background or socioeconomic status are generally considered to be left-leaning parties. Our specific codings for parties in Brazil are included in the Data section of this paper. Because we have characterized left parties as parties which advocate for social spending and some level of wealth redistribution, we anticipate greater public spending on health services in districts with either a mayor from a left party or a left majority in the municipal legislature.

Although there has not been research on the determinants of health care spending at the municipal level, a significant number of cross-national studies have been done (Newhouse, 1977; Hitiris & Posnett, 1992; Herwartz & Theilen, 2000; Potrafke, 2010). These studies have pointed to the importance of GDP per capita, public expenditure levels, and the age structure of a population as important determinants of health spending. Other general studies (Huber, Mustillo, & Stephens, 2008) on social welfare spending, particularly in Latin America, have suggested that regime type, partisanship, economic pressures, and civil society may play a role in determining levels of social spending.

Beginning with Newhouse (1977) and Kleinman (1974), scholars have found a consistent relationship between national GDP per capita and health care expenditure, a finding which suggests that health care consumption might be thought of as a luxury good, though others have disagreed (Parkin et al., 1987), calling it a necessary good, and still others have found it to be some combination of the two (Getzen, 2000). Public health research has moved in the direction of treating health spending as a combination of the two, with a focus on how to optimize the quantity and quality of services provided by measures of cost-effectiveness.

The age structure has also been an important determinant of health spending in previous studies, with an increase in the percentage of the population aged 65 or older correlating with increased health spending (Di Matteo & Di Matteo, 1998). This spending

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is related both to acute and to long term care (de Meijer et al., 2011); seniors are expected to have developed more chronic conditions as they age, many of which require ongoing treatment and medication, and the danger of an acute health crisis for an older individual is higher as well. In considering the effect of age on health spending it is particularly important to control for socioeconomic status, as wealthier populations tend also to have an older population structure due to demographic and epidemiological transitions.

The second hypothesis related to partisanship and health spending is that the partisanship effect of left mayors and parties in the legislature should decrease over time. The fiscal centralization process in Brazil was begun in the hopes of reducing inequities in spending across regions and municipalities and guaranteeing that a certain minimum percentage of the municipal budget would be spent on health. Because the latter stages of the reform process involved municipalities receiving automatic earmarked transfers for health spending from the central government, two possible effects might be observed.

First, health spending could be expected to become less dependent on the governments in power at the municipal level. Because funds are automatically transferred to them and cannot be used for purposes other than health care, minimum health spending levels should be protected. Although one might argue, and rightfully so, that municipalities could choose to raise revenue for health care to supplement national funds, there have been significant practical and political obstacles to doing so. From a practical standpoint, setting up additional administrative oversight to allocate health funds which are relatively less important given the federal contributions imposes a heavy cost at the municipal level. From a political perspective, attempting to generate additional revenue for health in the presence of very public earmarked transfers from the federal government is challenging. Thus, although there are potential ways for differences to persist in the face of reform, there is reason to believe

that partisanship should become less important through the reform process. We therefore anticipate that a partisanship effect will be strongest at the early stages of implementing reform in the 1990s, and will weaken toward the end of the reform period in the mid-2000s.

The second possible effect of the automatic transfer system relates to the system's emphasis on redistribution, or reallocating funds to poorer areas. Because part of the motivation for the reform was to ensure adequate health service provision across regions, and redistributive mechanisms were set up accordingly, we might expect that over the period of reform municipalities with lower economic output spend disproportionately high amounts of their budget on health care.

0.3 Data

Because the fiscal centralization of health funding occurred during the latter years of the 1990s and into the early 2000s, we chose to look at data from 1997-2005 in an effort to capture changing partisan effects throughout the centralization process. Municipal level spending on health is available through the Brazilian government's database Ipeadata. Our dependent variable was municipal spending on health and sanitation as a percentage of total budget spending.

Our primary independent variable of interest was partisanship. We obtained data on municipal electoral outcomes from the Tribunal Superior Eleitoral. We relied on three different sources (Mainwaring, 1999; Hagopian, 2010; Hagopian & Power, 2011) for classifying partisan orientation of political parties in Brazil in an effort to capture shifts in orientation over time as well as account for differences between classification systems. Whereas Main-

waring (1999) uses a five-bin coding system, Hagopian (2010) and Hagopian & Power (2011) use three bins. Figures 7 and 8 show the codings to which we adhered for each model.

Figure 7: Codings from Mainwaring (1999)

Left	Center Left	Center	Center Right	Right
PC do B	PDT	PMDB	PTB	PL
PT	PSDB		PDC	PRN
PCB			PP	PFL
PSB				PDS
PPS				PPR
				PPB
				PRONA

Figure 8: Codings from *Comparative Politics Today*: Hagopian (2010) and Hagopian and Power (2011)

	Left	Center	Right
Hagopian (9e)	PSB	MD	PFL
	PT	PMDB	PTB
	PDT	PSDB	PP
	PC do B	PR	PTC
	PV	PSC	PRB
	PSOL	PRTB	
Hagopian and Power (10e)	PSB	PMDB	PTB
	PT	PSDB	PP
	PDT		PTC
	PC do B		PRB
	PV		PSC
	PSOL		PR
	PPS		DEM
			PRTB
			PMN
			PT do B
			PRP
			PHS
			PSL

We chose three different ways to measure partisanship in a municipality. Two of these were related to the partisan orientation of the legislature, and one concerned the partisan orientation of the mayor. First, we created a variable coded for the partisan orientation held by the majority in the legislature. If more than 50% of municipal legislative seats were held by legislators from parties classified as either left or center left, we coded the majority variable as -1. If the majority was held by right or center right parties, we coded the majority variable as 1. If there was no partisan majority, or a majority was held by center parties, the majority variable was coded as 0.

The second partisan variable that we created aggregated the partisan orientations of all individual legislators. In the models using Mainwaring (1999)'s partisan codings, this variable was created by multiplying -2 by the percentage of left parties in the legislature, -1 by the percentage of center left parties, 1 by percentage of center right parties, and 2 by percentage of right parties, and adding these values. In general, we found that the variables for the majority in the legislature correlated strongly with the variable created by aggregating the partisan position of individual legislatures. Finally, the third partisan variable simply represented the partisan coding of the mayor.

We incorporated several control variables into our model. First, level of development is widely considered (Anderson et al., 2000; Huber et al., 2004) to be an important determinant of social spending. We considered two possible measures for development: Human Development Index, a development indicator designed by the UN Development Program, and GDP per capita of municipalities (measured in 2000 *reais* per capita). Both of these measures were available through Ipeadata.

Another control variable that we incorporated was the percentage of the popula-

tion in a municipality under the age of 15. We controlled for the percentage under age 15 because scholars have shown health care costs to be higher for populations with large numbers of children and adolescents in developing countries (Huber et al., 2004). This is primarily due to health costs such as immunizations specific to children as well as the higher prevalence of infectious diseases associated with early stages of the demographic and epidemiological transition in which youths comprise a greater percentage of the population. In contrast, older populations are associated with higher expenditures on health in industrialized societies, as non-communicable disease expenditures are relatively more important. Because percentages of the population over the age of 64 and under the age of 15 are so highly correlated, we have included only a variable for under 15 in accordance with previous work (Huber et al., 2004). Our hypothesis was that a higher percentage of individuals under the age of 15 would correlate with higher health care expenditures, as Brazil is still in the process of development.

We also hypothesized that scope of the health system would be an important determinant of health spending. Specifically, we hypothesized that the number of health professionals in a municipality would affect health spending. We therefore incorporated a control variable for the number of physicians per 1000 inhabitants into one of the models. Finally, scholars have shown the level of industrialization to be an important determinant of social spending. Thus, in accordance with Huber et al. (2008), we incorporated a control variable for the percentage of individuals in a municipality living in an area classified as urban, based on data from Ipea.

0.4   Analysis

An important initial glance at the data show that there is a clear trend in increased municipal spending on health care. As shown in Figure 9, municipal health spending as a percentage of budget spending shows consistent increase over the period of reform from 1997-2005. This trend suggests that the reform process was successful in increasing expenditure on health care, as well as decentralizing the expenditures to occur at the municipal level. Thus, in at least one important aspect, Brazil's health reform must be considered a success.

Figure 9: Municipal Spending over Time
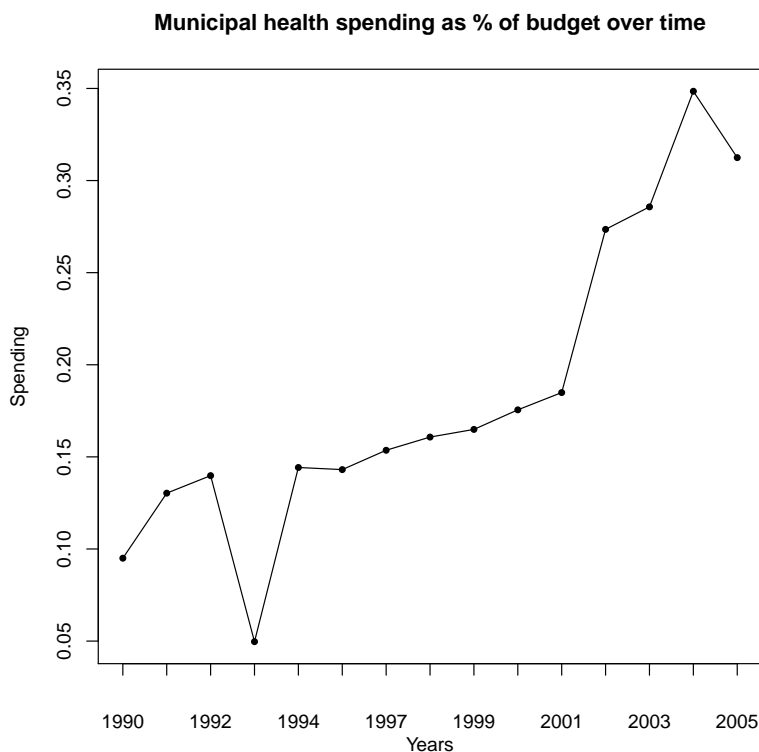
Beyond increasing expenditure levels, we were also interested in the relationship between partisanship and expenditure. We decided to consider two primary models, one

which used Human Development Index and the number of physicians per 1000 inhabitants, and the second which used urbanization, percentage of the population under 15, and GDP per capita as control variables, in accordance with Huber et al. (2008). We ran each model with the primary independent variable as the partisan orientation of the legislature (majority and aggregated partisan orientation), on one hand, and the partisan orientation of the mayor, on the other. Our dependent variable was municipal health spending as a percent of total municipal budget spending, with the original spending figures in Brazilian *reais*.

We tried each model with the party codings presented by Mainwaring (1999), as well as those presented by *Comparative Politics Today.* Because there was no significant difference in the results derived from using Mainwaring (1999)'s codings and the *Comparative Politics Today* codings, we have presented only the Mainwaring codings here for the sake of simplicity. There was also no significant difference in results for different measures of partisanship, so we have presented only the results for the majority variable here.

We ran regressions for our variables of interest for each of the years during our period of observation, which correlated roughly with the period of implementation of health spending reforms (1997-2005). As stated earlier, our expectation was that there would be a partisan effect early on, but this effect would dissipate over time. We anticipated static effects of urbanization, age, GDP, HDI, and physicians per 1000 residents.

In looking at the results in Tables 7 and 8, the first important observation to note is that there does seem to be a strong partisan effect for much of the period of observation, and this effect is in the direction that we would expect. That is, when the majority shifts toward the left (more negative), health spending as a percentage of total budget spending increases. These results are significant for most years in the study, and they are very simi-

lar in both models. This is consistent with the hypothesis that left-leaning parties tend to allocate more resources to health and sanitation when controlling for other factors.

Because the Worker's Party (PT) is large and left-leaning, there was the potential for these results to reflect the influence of one party. For this reason, we decided to run the same analysis in which we removed the PT from the dataset and reported majorities and aggregated partisan scores as though the governments were functioning without any PT members. Doing so did not change the observed effect, and it rarely changed the significance level. Thus, we concluded that our result could not be explained only in terms of the presence of the PT.

Concerning the second part of our hypothesis regarding partisanship, that partisan effects should dissipate over time, the evidence is much less clear. The partisan effect that we observe appears to be consistent in both models for the years 1997-2004, indicating that there is no clear mitigation of partisanship effects on spending as the health care reform process unfolds. Because there is no observed partisanship effect in either model in 2005, it is possible that a study continuing into the post-2005 period would observe a decrease in partisanship. If this decrease in partisanship were to be observed, it would accord with our hypothesis that partisan effects should decrease over time. Theoretically, though, such a study is not consistent with the reform period, since much of the reform program was complete by 2005.

Table 7: Health Spending at the Municipal Level Model 1 (Urbanization, Age, and GDP as Controls)

	1997	1998	1999	2000	2001	2002	2003	2004	2005
maj	-5.74e-3***	-5.85e-3***	-7.10e-3***	-7.99e-3***	-7.25e-3***	-8.19e-3***	-5.60e-3***	-5.21e-3*	1.17e-3
	(8.50e-3)	(1.59e-3)	(1.51e-3)	(1.31e-3)	(1.12e-3)	(1.71e-3)	(1.61e-3)	(2.35e-3)	(1.82e-3)
urban	3.67e-4***	6.99e-4***	7.06e-4***	5.82e-4***	4.97e-4***	6.78e-4***	8.30e-4***	9.16e-4***	8.08e-4***
	(4.78e-5)	(4.89e-5)	(4.63e-5)	(4.11e-5)	(3.96e-5)	(6.05e-5)	(5.73)	(8.30e-5)	(5.91e-5)
u15	8.73e-4***	9.18e-4***	1.01e-3***	9.41e-4***	2.30e-4	5.88e-4*	2.41e-4	9.45e-4*	-1.46e-4
	(2.25e-4)	(2.39e-4)	(2.25e-3)	(1.89e-4)	(1.74e-7)	(2.96e-7)	(2.53e-4)	(3.69e-4)	(2.65e-4)
gdp	-8.14e-7***	-5.69e-7*	-7.45e-7***	-9.08e-7***	-1.01e-6***	-1.31e-6***	-1.90e-6***	-1.21e-6**	-1.62e-6***
	(2.32e-7)	(2.67e-7)	(2.31e-7)	(2.02e-7)	(1.94e-7)	(2.96e-7)	(2.98e-7)	(4.05e-7)	(3.10e-7)

Table 8: Health Spending at the Municipal Level Model 2 (HDI and Doctors as Controls)

	1997	1998	1999	2000	2001	2002	2003	2004	2005
maj	-.0064***	-.0057***	-.0069***	-.0078***	-.0080***	-.0092***	-.0066***	-.0064**	.000637
	(.0015)	(.0016)	(.0015)	(.0013)	(.0011)	(.0017)	(.0016)	(.0023)	(.0018)
HDI	-.070***	-.0065	-.032**	-.0337***	-.0089	-.0832***	-.0526***	-.0678***	-.054***
	(-.070)	(.0122)	(.011)	(.0097)	(.0091)	(.0138)	(.0131)	(.019)	(.0137)
doctors	.0063**	.0134***	.017***	.016***	.014***	.0333***	.0325***	.0405***	.035***
	(.0022)	(.0022)	(.002)	(.0019)	(.0018)	(.0028)	(.0026)	(.00379)	(.0027)

As expected, urbanization correlates strongly with increased percentages of budget spending on health, and this effect appears to be relatively consistent and significant over the years of the study. This is also the case with the variables for physicians per 1000 residents in the second model. Larger percentages of the population under age 15 also generally correlate with relatively greater health spending, although this effect does seem to drop off in the 2000s. In general, however, all of these independent variables corresponded to our theoretical expectations.

Also expected was the negative correlation between HDI and GDP, on one hand, and the percentage of budget income spent on health and sanitation, on the other. The negative coefficients in front of these variables suggest that as municipalities' GDP or HDI goes up, health spending becomes a smaller percentage of budget spending. As discussed in the Hypotheses section, this result makes sense, because there was a redistributive element to the health reform process by which some of the funds collected from wealthier municipalities were reallocated to poorer regions.

In brief, our results support the hypothesis that partisanship plays an important role in determining health care expenditure. We find that municipalities with left majorities appear to spend a significantly larger portion of their budget revenue on health and sanitation than do other municipalities. A number of our other hypotheses are also borne out by the data: urbanization, age structure, and scope of the health system all appear to be important factors in determining health spending. The negative coefficients on HDI and GDP are likely due to the measurement of health spending as a percentage of total budget expenditure rather than as an absolute value in Brazilian *reais*.

0.5   Conclusion

The health reform process which unfolded in Brazil in the 1990s and 2000s was the culmination of a reform effort which began as early as the 1960s under military rule. Reformers observed the curative-focused, divided, high-cost health system and advocated for a series of comprehensive reforms which eventually got incorporated into the 1988 Constitution and upon which the National Health Laws of the 1990s were based. One of the central principles of these reforms was to reduce regional inequities and redistribute funds between municipalities such that external factors such as partisanship would not significantly affect the quality of health care available at the municipal level.

In this paper, we have undertaken the first study of health care spending in Brazil at the municipal level in an effort to evaluate how successful these reforms were in mitigating the role of partisanship in health care spending. In order to do so, we have examined municipal level data on health and sanitation spending over the period of reform (1997-2005), as well as data on level of development, age structure, and the scope of the health system. Our major finding concerning partisanship is that municipalities with left-leaning majorities in the legislature do appear to spend a larger percentage of their budget revenue on health and sanitation than do other municipalities. Although we might have expected this effect to become diluted over time due to the increasing incorporation of municipalities into the SUS and the consequent redistribution of resources, this dilution is not evident from the data in this study. Any conclusion regarding this hypothesis would require additional study.

Ultimately, the results presented here are important both to literature on politics and social spending and to literature on health care reform. Previous studies relating politics and partisanship to social spending have often focused on cross-national studies, necessarily

relying on control variables for trade policy and regime type to allow for valid comparisons. There have been significantly fewer studies done at the subnational level, and we know of no other study which examines health care spending at the municipal level in Brazil. Particularly given the recent reform process, such a study is needed. Whereas previous studies have often suggested that partisanship is most important in determining the nature of expenditure and not the overall level of expenditure, our findings suggest that partisanship may also be important in explaining the portion of the budget allocated to health care.

This study is also useful for the literature on reform, because it suggests that the reform process in Brazil probably did not achieve its aims completely, at least in terms of mitigating subnational inequities. It also suggests, both qualitatively and quantitatively, that reform processes unfold over long periods of time, and some of their effects may not be observed until years after the theoretical completion of the process. In Brazil, reforms were not made official until 3 decades after the impetus for change. After the official reforms, change actually occurred in a very piecemeal, messy process over the 1990s and 2000s. As shown in the discussion of different levels of municipal responsibility, the process continues to unfold. Thus, future attempts at health care reform, in Brazil or elsewhere, should bear in mind that the arc of reform is long, and likely much longer than anticipated.

In spite of the reservations expressed here regarding outcomes of the health reform process in Brazil, it is important to note that this is often considered to be an exemplary case of the implementation of universal health care in a developing country. Although questions and concerns remain, particularly regarding funding and the quality of services, many more Brazilians have access to health care than previously, and the system providing these services has undergone a massive restructuring in order to address health needs across the country more equitably. This in itself is an important achievement, and a worthy aim for

other countries considering reform.

Part IV

Paper III: Quality of Health Care in Brazil

0.1 Introduction

As one of the world's largest countries and with one of the most rapidly expanding economies, Brazil features prominently, and rightfully so, in discussions of the direction of the world economy. Although Brazil's economic potential draws significant international attention, less focus has been placed on its innovations in social service provision. Over the past 30 years, Brazil has made impressive and wide-ranging changes to both education and health care, with dramatic improvements in literacy, life expectancy, and mortality rates. In this paper, I take a closer look at the development of Brazil's health care system over the past three decades.

In considering Brazil's health care system, I am most interested in assessing the quality of care the system provides, as perceived by patients themselves. I am defining quality as patients' perceptions of the extent to which health care personnel and facilities meet their needs and expectations. This definition of quality is focused on the patient's experience itself, rather than long-term health care outcome indicators such as mortality, or infrastructural variables such as the number of personnel or institutions. As discussed below, I believe that this perceived experience component to health care is an important intermediate variable between health system inputs, such as funding and personnel, and health system outputs, such as mortality rates and disease prevalence.

This paper is organized as follows: first, I provide some background on the Brazilian health system and relevant periods of reform. Second, I discuss the theoretical underpinnings for my measurement of quality. Third, I present theoretical justification for the individual and municipal level variables that I expect might be important in explaining differentiation in quality across Brazilian municipalities. I then present my research design,

followed by my results and analysis. In this section, I show that individual demographic characteristics explain more variation in self-reported quality of care in Brazil than do municipal level factors, and I discuss why this may be the case. The conclusion offers final thoughts and suggestions for how this research agenda might move forward.

0.2 The Brazilian Health Care System

The impetus for much of the current structure of the Brazilian health care system began in the mid-1970s under military governance. Brazil was experiencing impressive levels of economic growth (around 10% per year), but also rising levels of inequality. During this time, a social movement which would come to be known as the *movimento sanitária* emerged. The movement coincided with and reinforced broader societal pressure for democratization, but the *sanitaristas* were focused specifically on health sector concerns. One concern was that the federal division of health programs into a Ministry of Social Security (INAMPS) and a Ministry of Health (MOH) provided unequal health care access to workers who were not formal sector employees, as workers in this group were ineligible to receive services through INAMPS. Another concern of the *sanitaristas* was that health financing and delivery was highly centralized. The federal system was seen as corrupt and ill-managed, and the methods of financing under INAMPS (direct payment and cost reimbursement to physicians), were difficult to administer under a centralized system, particularly in a country as large and as diffuse as Brazil (Lewis & Medici, 1998). Finally, the proximate source of support for the *sanitaristas* was the recession of 1982 and associated reductions in expenditures. In the face of recession, INAMPS spending declined by more than 20% between 1980 and 1983, leading to further worsening in service provision (Vianna et al., 1991). In short, by the early 1980s, the problems of fragmented, centralized, and inequitable health care had come to a head,

and *sanitaristas* had substantial support from diverse sections in society including middle class populations, progressive professors, and trade unions.

The increasingly powerful *movimento sanitária* was able to forge important ties with government officials and municipal officers during the early 1980s. In 1980, both the National Council of State Health Secretaries (CONASS) and the Council for the Administration of Preventative Medicine (CONASP), were formed (Paim et al., 2011; Lewis & Medici, 1998). The new health task forces were charged with the creation of a unified health system and the expansion of services to previously underserved populations. The creation of the unified health system was to occur in three phases. First, under the Integrated Health Activities (AIS) beginning in 1984, there were shifts toward increased outpatient care, more efficient use of INAMPS facilities, and some decentralization. Second, INAMPS was converted from a dual financer/provider role to solely a financing agency, access to INAMPS funding was universalized, and INAMPS staff and facilities were transferred to state health secretariats. These changes occurred during the 1988-89 period under the Unified and Decentralized Health System (SUDS). The final stage of the unified health system would occur through the creation of the Single Health System, or SUS. In this stage, public responsibility for health care would be transferred to the municipal level (Lewis & Medici, 1998).

Concurrent with these reforms were new conceptualizations of health as a universal right and a public responsibility. In 1986, the National Health Conference approved health as a citizen's right. In Article 6 and Article 196 of the new democracy's 1988 Constitution, health was formally recognized as a fundamental right and duty of the state. Many of the changes of the 1988 Constitution had been in place in practice prior to its ratification, but the 1988 Constitution formalized the evolution of health care in Brazil. Through the reforms of the 1980s and additional regulation in the 1990s, permanent health councils were

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developed and currently exist at all three levels (national, state, municipal) of government, with bodies addressing policy design, implementation and analysis. Councils have broad representation from system users, providers, and workers, and strong connections to policymakers. The *movimento sanitária* was thus highly successful in transforming grassroots support into policy and institutional change.

In addition to health provision reform, the structure of health financing also underwent substantial change during the 1980s and 1990s. A few broad trends can be noted. First, in accordance with efforts at decentralization, federal funds for health spending were re-allocated away from the federal level and toward the state and particularly the municipal levels. Second, private financing of health care increased during the 1980s and 1990s, and by 1994 about one-fifth of Brazilians held some form of private insurance (World Bank, 1994). Finally, the public payment system underwent substantial change. In 1980, a commission of experts introduced a prospective payment plan, known then as the Physician-Hospital Service System of Social Security, or SAMHPS, and eventually as the Hospital Information System of SUS, or SIH/SUS. The prospective payment plan provided fixed reimbursement for specific treatments based on a fee schedule set by the Ministry of Health, and based on average hospital costs. One important aspect of the Brazilian health care system is that the public and private sectors are highly integrated, and the public sector subcontracts to the private sector frequently for the provision of services. This public subcontractor model is unique in Latin America (Inter-American Development Bank [IADB], 1996) and raises the expected issues of provision of unnecessary services and rising health costs. It further complicates analyses of public and private provision of services, as will be discussed below.

0.3   Quality of Health Care in Brazil

In the discussion of changes to health institutions and financing it is easy to lose sight of the quality of care. Indeed, the "forgotten component" (World Bank, 1994) of health care in Brazil is crucial both to patient experience and outcomes as well as efficient allocation of human and financial resources. One of the best-known past approaches to quality of health care is that of Donadebian (1980), which disaggregates quality of care into three dimensions: structure, process, and outcome. The structural dimension refers broadly to health personnel and facilities available for care, the process dimension refers to the actual execution of care by the provider, and the outcome dimension refers to patients' changes in physical or mental well-being, and could be measured by something such as a mortality rate. In this paper, I am interested in the process dimension of quality in Brazil rather than the structure or outcome. In part, this is because I want to distinguish between health system inputs and health system outputs. I consider Donabedian's structural quality variables, such as size and education of health care personnel, to be health system inputs. I am interested in explaining variation in the outputs of the Brazilian health care system.

Given a focus on outputs, one could choose to focus on the process aspect of quality or on the health outcome component. I am choosing to focus on the process dimension, which I refine below into what I will call an 'experience' dimension, for two reasons. First, the process dimension gives us a unique insight into how effective patients believe their health care to be. If individuals go to the physician and feel that their needs are not met and their questions are not answered, we could reasonably expect them to change their health care usage pattern and insurance decisions. Thus, a focus on the process dimension of health care allows us insight into health decision-making that an outcomes measure cannot. The second reason that I focus on process and not on outcomes is that there is greater theoretical

space between health system inputs and health outcomes than there is between inputs and process. We could see a great impact on outcomes such as mortality rate in a municipality in a given period due to a natural disaster or other similar occurrence which was not a direct result of the health system. By narrowing the theoretical space between variables, we are better able to understand the way in which effects unfold.

Though the case for measuring the process dimension of health care is strong, I choose to refine it somewhat from Donabedian's definition. In Donabedian (1988), another distinction, that between technical performance of the practitioner and interpersonal performance of the practitioner, is suggested. Logically, one could interpret these as subdivisions of the process dimension of health care. In this paper, I draw from Donabedian's work in focusing on the interpersonal component of health care. That is, I am interested in the process dimension of quality, but specifically as it relates to the way in which a health care provider interacts with a patient, and the patient's resulting perception of his or her experience. Because I am interested in the patient's overall experience, though, I am interested in aspects of a clinic visit beyond just the interpersonal component of health care. For example, I am interested in knowing how patients feel about the cleanliness and space of the facilities in which they are treated. As my understanding of quality is more nuanced than merely a measure of the 'interpersonal' dimension of care, I will refer to it as the 'experience' component of health care here.

0.4 Theoretical Predictions

In this section, I draw on political science and public health literature to formulate hypotheses about the source of variation in patients' self-reported quality of health care in

Brazil.

0.4.1 Demographic Characteristics: Inequality in Health Care for Different Populations

Numerous studies published in recent years have suggested the importance of demographic characteristics of individual patients for their self-reported quality of care and their satisfaction with their physicians (Saha et al., 2003; Campbell et al., 2001; Feinstein, 1993). In particular, these studies have analyzed the importance of socioeconomic status, race, age, and gender in reporting of the quality of health care.

The relationship between socioeconomic status and health care has been studied extensively over the past several decades, with scholars addressing the relationship between income levels, on the one hand, and both health care outcomes (such as mortality rates and prevalence of disease) and health care quality (often through patient self-reporting) on the other. Kitagawa and Hauser (1973) and Silver (1973) demonstrated a strong correlation between household income and mortality rate for individuals in most age categories. Other studies, such as Campbell et al. (2001), have found that socioeconomic status of individuals affects their self-reported quality of care. In the study performed by Campbell et al., individuals of lower socioeconomic status reported a lower quality of care on 2 of 13 dimensions considered, although overall socioeconomic status accounted for a relatively small amount of variability in the self-reported health care quality results.

Scholars (Kahn et al., 1999; Schneider et al., 2002; Virnig et al., 2002) have also shown a consistent correlation between race and health care quality. In a London study,

Campbell et al. (2001) found that Black, South Asian, and Chinese respondents reported less favorable assessments of their primary health care services while controlling for relevant other factors. In an effort to understand what about the health care experience was contributing to racial inequalities, Saha et al. (2003) examined specific aspects of the physician-patient relationship through questions related to the clarity of communication and time spent interacting. The authors concluded that non-White racial groups reported a lower quality of interaction with physicians, and that this difference in quality of interactions accounted in some instances for the patients' overall satisfaction with their health care (Saha et al., 2003). This literature suggests that minority racial groups may report lower quality of health care services than individuals who are members of the predominant racial group. Unfortunately, much of the literature on race and quality of health care relies on self-reported data without correcting for individual bias in reporting. In the present study, I will consider the effects of race while simultaneously controlling for individual reporting bias, as described in the Research Design section of this paper.

Older patients have consistently reported more favorable assessments of health care in prior studies (Phillips & Brooks, 1998; Baker, 1996; Cartwright & Anderson, 1981; Campbell et al., 2001). Nonetheless, without correcting for individual reporting bias, it is difficult to discern whether such results indicate that older patients are likely to receive higher quality health services or whether older patients are less comfortable reporting unfavorable outcomes. That is, elderly patients may have lower expectations for their health care interactions.

Gender has been a less consistent predictor of primary health care quality assessments than the other demographic characteristics discussed here. Campbell et al. (2001) find no significant difference between gender groups for assessment of primary care, for exam-

ple. Nonetheless, other studies have clearly indicated the importance of gender differences in quality of health care received. Bierman et al. (2007) finds that women are at an increased risk of being prescribed potentially inappropriate medications, and Kaul et al. (2007) finds that women presenting at emergency departments with coronary symptoms are less likely to be admitted to the hospital than are men with similar symptoms. A prediction for the role of gender in quality of health care assessments is complicated by potentially different subjective rating systems for quality of care across genders. As with the studies relating race and health care quality, this potential bias has largely been ignored in the literature.

Literature on demographic characteristics of patients indicates clearly the importance of these factors in health care quality reporting, as well as suggests the need to control for individual reporting bias.

0.4.2 Party Affiliations: Pork Barrel and Coordinated Government

Political scientists have regularly defined the interests of politicians in terms of their careers: as rational actors, politicians will act in ways which maximize their chances of re-election (Geddes, 1994). In a democratic government, politicians earn re-election through the electoral support of their constituents. Consequently, politicians have an incentive to provide goods and services to their district which will generate constituents' electoral support. Depending on the nature of the political system, politicians will maximize their resources and support in different ways. For example, federalist systems such as Brazil allocate more resources to state and other sub-national governments than do non-federalist systems. As a result, governors and mayors exercise greater control over resources in a federalist system

than a non-federalist system (Samuels, 2000; Samuels, 2003). This insight into federalism is relevant to the political science literature on presidential coattails. Whereas a centralized system may allow lower-level politicians to benefit electorally when a member of their party is elected to the presidency, this effect may be seen more readily at the state level in a federalist system. That is to say, we might expect that governors' coattails will be more beneficial to local governors' electoral results than would be presidential coattails (Samuels 2000).

The relationship between the party affiliation of the governor and a mayor in a federalist system is important in at least two ways. The first way in which it may be important is through increased access to resources, which I will refer to as the pork barrel hypothesis. As numerous scholars have indicated (Scheiner 2005, Desposato 2006), lower-level politicians can benefit from increased access to state resources when their political party affiliation is the same as the governor's. As Desposato (2006) argues, this access is important enough in Brazil that legislators will switch parties frequently and on short notice in order to gain it.

A second hypothesis is that an alignment of party affiliations between the mayor and governor will result in better governance, regardless of increased access to resources. This might be the case if same party affiliation results in better coordination between government at the state and municipal level. For instance, if a state governor knows that a particular municipality is controlled by another legislator from his party, he may try to reduce the bureaucratic obstacles to local projects. There may also be fewer jurisdictional disputes, allowing a more straightforward and cohesive approach to local government. Both of these considerations would lead us to believe that matching party affiliations between mayors and governors may result in better quality of state health care services, as perceived by patients.

0.4.3 Electoral Competitiveness: Better Institutional Performance

Treating politicians as rational actors who will respond to incentives also implies that the strength of the opposition should matter for state performance. If politicians face external competition or pressure, their re-election is more likely to depend on their ability to meet public sector needs through institutional performance. Both Geddes (1994) and Grzymala-Busse (2007) find that a robust opposition is likely to generate better state performance, with Geddes (1994)'s results specifically derived from Brazil. Other studies (Padovano & Ricciuti 2009) have made similar claims about the level of political competition and economic performance.

0.4.4 Fiscal Capacity: Institutional Performance

In addition to the political characteristics of the municipalities in which the state health facilities are located, it is useful to consider fiscal capabilities. Although the fiscal capacity of a local government- that is to say, its ability to generate revenue as evidenced by the percentage of GDP collected as taxes- can provide information about funding levels, I am more interested in using fiscal capacity as a measure of institutional effectiveness.

Numerous scholars have argued for the role of strong states and stable institutions in promoting development (Naim, 1994; Popov, 2001). In Latin America, however, political scientists have consistently lamented the problem of weak states (Centeno, 1997; O'Donnell, 1993; Geddes, 1994). One explanation for the persistence of weak states is based on extension of Charles Tilly's fiscal-military model to Latin America. Tilly (1985) argues that strong states in Europe resulted from the revenue-generating necessities of interstate warfare. Centeno applies this logic to Latin America, noting that a relative lack of interstate warfare did not allow for creation of strong states in Latin America in the same way

that they were created in Europe. Furthermore, the availability of foreign credit to Latin American states alleviated pressures to generate revenue through internal taxation. Thus, in contrast to their European counterparts, many Latin American countries arrived to the twentieth century lacking strong institutional foundations.

The failure to develop strong institutions early on may affect institutional performance at a much later period. In path-dependent explanations of political institutions, such as Pierson (2000) and Mahoney (2000), the failure to develop strong institutions at an initial period implies increasing difficulty in developing those strong institutions at later points in time due to the increasing returns to retaining institutional infrastructure. This argument finds empirical support in Latin America. With few exceptions, Latin American countries still lack state capacity sufficient to execute many basic civil tasks-legal rule, tax collection, and adequate public services such as security. Often, there is great variation in institutional performance across subnational regions. Because poor quality of institutions might be expected to influence social performance outcomes such as the quality of health care, it is useful to use a measurement of institutional performance as an explanatory variable for health care outcomes.

Lieberman (2003) discusses tax collection in Brazil from a historical institutional perspective in emphasizing the stickiness of institutions over time and the way in which this institutional durability influences the actors who become involved in politics and the way in which they define their interests. He compares the historical development of tax institutions in Brazil to those in South Africa. While both countries have undergone trajectories of economic development and racial relations, Brazil has failed to develop effective fiscal institutions on the level of South Africa. Lieberman points to the previously overlooked idea of National Political Community (NPC), suggesting that the way in which groups of

individuals, and specifically groups of individuals among the upper classes, identify their relationships with other groups and with the state, dictates the extent to which fiscal institutions will be implemented at a critical juncture. These fiscal institutions, if implemented, can be expected to endure over time. The quality of these extractive fiscal institutions, or fiscal capacity, is a reflection of past cohesiveness and coordination of elite interests, and influences the future ability of governments to generate revenue. Thus, it is useful to think of fiscal capacity of a measure of the state's ability to undertake actions effectively in the public realm. To this end, we should expect that a region with high fiscal capacity will also have higher quality of health care services, as perceived by patients.

0.4.5 Governance under the Workers' Party: Political Organizations and Ideology

In addition to considering alignment of parties at the municipal and state level, the particular party in power at the municipal level may be important for perceived health care quality outcomes. In particular, there are at least two reasons to believe that municipalities governed by the left-leaning *Partido dos Trabalhadores* (PT), or Workers' Party, should produce better health outcomes than municipalities governed by other parties.

The first reason one might expect strong health care performance under the PT is that the PT is noted for its grassroots organization and governance at the municipal level. Numerous scholars (Samuels, 2006; Hunter, 2010; Abers, 2000; Branford & Kucinski 2003) have noted the PT's roots in mass-based movements such as Christian base communities (*Comunidades eclesiales de base*, or CEBs) and trade union activists in the 1970s. The PT's birth out of labor strikes in the late 1970s, in the midst of harsh repression under military governance, indicated the emergence of a practical party with strong ties to community and

mass-based societal movements. As noted by Sader and Silverstein (1991),"the PT is far more than an average political party, and in many ways more closely resembles a social movement...[It is] deeply involved with organizations fighting for social change throughout the country...in many rural areas, there is literally no line between these social movements and the party itself" (3).

In his analysis of Brazilian party systems, Scott Mainwaring (1999) notes that a party's roots in society are an important component of the party's institutionalization. Party roots in society lead voters to support a party consistently in a given election and over time, decreasing the volatility of that party's electoral support. In a country notorious for having weakly institutionalized catch-all parties without strong societal roots, the PT stands out for its strong organizational structures, consistent supporters, and focus on municipal governance. Given the decentralization of Brazil's health care system written into the 1988 Constitution which transferred many responsibilities for health care to the local level, one might expect that the PT would outperform other parties in the perceptions of quality of health care services provided.

The second reason that the PT may perform well in health care outcomes is its ideological bent toward social sector reform, particularly with respect to education and health care. Scholars (Castles, 1982; Hicks & Swank, 1982) have demonstrated that greater control by left-leaning parties leads to greater social spending. The PT has been consistently involved with social reform movements, and specifically health reform movements, in Brazil. As early as 1981, the PT was involved with a movement for improved health care which eventually influenced the creation of the SUS (Branford 2003). In the late 80s and early 90s, PT mayors in Santos and Porto Alegre also introduced proposals for improved sanitation and public health. Indeed, the PT's "outstanding success" in health care improvements was

a central source of support for Santos mayor Telma de Souza (Branford & Kucinski, 1995). Under Telma, health centers known as *policlínicas* were set up to provide route health services such as vaccinations.

As will be discussed in the following section, there is not a consensus that greater health spending results in a higher quality of care, but the theoretical prediction that parties such as the PT will emphasize aspects of social welfare such as health care, perhaps resulting in higher quality ratings, is certainly worth considering.

0.4.6 Municipal Resources: Health Spending and Municipal Wealth

There is little consensus on the role of public financing in improving health care outcomes. Studies such as Anderson et al. (2000) and Cooper (2009) suggest that increased health care spending may improve the quality of health care delivered. On the other hand, studies such as Baicker and Chandra (2004) and Skinner et al. (2009) suggest that health spending may be negatively correlated with quality outcomes, at least for Medicare patients. These latter studies indicate that improvement in efficiency of services is more important than increasing spending for quality outcomes. Finally, some studies, such as a 1999 World Bank assessment of spending and child mortality rates in the developing world, find little effect of public spending on health (measured by mortality rates) when controlling for other factors. Or (2000) notes that such "contradictory results" in assessing the impact of health expenditure on health outcomes can be attributed, at least in part, to variations in models and indicators, as well as sparse research due to the difficulty of obtaining comparable data across regions or countries. It is also worth noting that many of these studies measure health care quality through outcome indicators such as mortality, but do not provide a means of assessing the quality of a patient's experience at a health care facility.

Additional studies (Or 2000) suggest that the level of wealth of the region in which health care is delivered is important to health care outcomes, even beyond health spending. This effect is difficult to separate from the effect of health spending, given the high collinearity of GDP per capita of a region and health care spending per capita on constituents. Nonetheless, the effect is important to consider, as it may capture indirect community resources which are valuable to the quality of health care. Thus, wealth of a region could be expected to have a positive effect on health care quality.

0.5   Research Design

0.5.1   Data

To test the importance of the political, financial, and institutional variables on the quality of health services in Brazil as outlined above, I use data from the World Health Organization (WHO)'s 2003 World Health Survey in Brazil. The sampling frame for the 2003 WHO survey in Brazil was all male and female adults (18 and over) who were in Brazil at the time of the survey. The sample size was 5000. Specifics regarding the sampling design of the WHO survey are available from the WHO and Vasconcellos et al. (2005). The survey team recorded the longitude and latitude of each of the survey respondents, as well as demographic information and a variety of responses to health-specific questions.

In order to construct a dataset from which I could test my hypotheses, I subset the original dataset to look only at respondents who had provided information about a primary care health visit in the past six months. I then mapped the longitude and latitude data for these respondents onto political territories at the municipal level using pattern mapping in ArcGIS. All but twenty observations fell within defined political boundaries or close enough

to locate them within a specific municipality. The twenty observations for which it was not possible to determine the municipality of the respondent were dropped from the dataset.

Having mapped each of the WHO respondents onto a municipality, I was able to match the WHO survey data with data specific to the Brazilian municipalities. Total revenue, tax revenue, spending, and health spending data at the municipal level were obtained through the Ministério da Fazenda. All electoral data was obtained from the Tribunal Superior Eleitoral (TSE).

After I had aggregated my raw data, I performed multiple imputation using the *Amelia* package in R (King et al., 2001) to fill in missing data. I then created a second data set in which observations were not at the individual level but at the municipal level. In this dataset, I converted the individual level characteristics from the original dataset into proportions at the municipal level. For example, the municipal level dataset included variables for average age, gender ratio, average socioeconomic status, and percentage of different racial groups in the municipality.

0.5.2 Independent Variables

Demographic Variables

Age (*age*), gender (*sex*), and race (*racial.background*) were all included in the 2003 survey. For racial background, I constructed separate binary variables for each of the major racial categories in the survey: white, black, mulatto, and indigenous. In order to account for socioeconomic status, I performed an exploratory factor analysis on survey items related to household standard of living. An analysis of Eigenvalues and a scree plot suggested that one factor was reasonable for SES. Based on this EFA, I created a factor for socioeconomic

status which incorporated the survey items which had loaded onto the factor in the EFA at .30 or better. These items, as well as their loadings, are included in Table 9 below. The final variable for socioeconomic status of a respondent is coded as SESfactor.

Table 9: Factor Loadings for Socioeconomic Status Variable

Item	SESfactor loading
Do you have a washing machine for clothes (yes/no)?	.462
Do you have a dishwasher?	.395
Do you have a vacuum cleaner?	.347
Do you have a refrigerator?	.523
Do you have a fixed line telephone?	.550
Do you have a computer?	.696
Do you have internet access?	.684
Do you have a music box?	.321
Do you have a microwave?	.590
Is anyone employed in the home?	.528

Electoral Variables

In order to test my hypothesis regarding clientelistic spending, I used electoral data from the TSE to create a binary variable (*same*) for each two-year period from 1996 to 2004 which was coded as 1 if the mayor and governor came from the same party during that two-year period and as 0 if they were from different parties. I also created a binary variable (*pt*) for whether the mayor came from the Workers' Party (PT) in the periods 1996-2000 and 2000-2004. Finally, I created a measure of electoral competitiveness (*perc.valid*) by recording the percentage of valid votes a given mayor had won in the election. In both elections which went to a run-off and those which did not, the percentage of valid votes was taken from the first round.

Municipal Financial Variables

Using data from the Brazilian Finance Ministry, I created three separate variables related to a given municipality's revenue and spending. The first (*health.percap*) was simply health spending per capita in a given year leading up to the survey. The second (*current.rev.per.cap*) was an indicator of the wealth of the municipality, measured as current revenue per capita. Finally, I measured fiscal capacity (*tax.of.current*) by taking tax revenue as a percentage of total current revenue in the municipality.

0.5.3 Dependent Variable: Quality of Health Care Services

Because the survey responses provided only self-reported perceptions of quality of care, the survey results could have been biased by differential item functioning (DIF), or individuals' different subjective rating systems for external stimuli. In order to correct for this bias, I used respondents' ratings of health care vignettes in the survey to adjust their self-reported data for their own subjective biases using the anchoring method discussed in Wand, King, and Lau (2011). Though the method is discussed in detail elsewhere, I offer brief comments here on the application of the anchoring method to this particular research design.

The WHO survey offered five vignettes related to each self-reported variable of interest. For example, the vignette set related to the clarity of the doctor's communication included, among others, the following vignettes:

```
R-Vignette - Set B Q-1: "[Jen] had time to ask the doctor some questions,
which the doctor answered until [Jen] understood almost everything. How
would you rate the experience of how clearly health care providers explained
things to her?"
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R-Vignette - Set B Q-13: "[Rose] cannot write or read. She went to the doctor because she was feeling dizzy. The doctor didn't have time to answer her questions or to explain anything. He sent her away with a piece of paper without telling her what is said. How would you rate her experience of how clearly health care providers explained things to her?"

Respondents were asked to rate the vignettes on a scale of 1-5. In order to use vignette responses properly to correct for DIF, it is necessary to develop a 'consensus' ordering of the vignettes; that is, there must be a single ideal way in which the respondents would rank the vignettes from best to worst care. I used the *anchors* package in R to determine the most commonly assigned ordering of vignettes by respondents, and treated this as the ideal ordering. For respondents who ranked the vignettes according to the consensus ordering, direct adjustment of self-reported experiences was possible. For respondents who ranked the vignettes in a way other than the consensus ordering, adjusted self-reported experience variables took into account the distribution of all possible ratings. This is discussed in-depth in King and Wand (2007).

To account for the potential multiple dimensions of the quality of health care services, I performed an EFA on questions from the WHO survey related to the respondent's perception of the health care he or she received. I performed the factor analysis both for the respondents' rating prior to and after adjustment for DIF through anchoring vignettes. That is, I created two vectors of dependent variables: one for unadjusted quality ratings, and one for adjusted quality ratings, and used an EFA to determine factor loadings for the survey items under each model.

I considered a model which would attempt to disaggregate dimensions of quality into more specific variables (quality of communication, quality of facility, etc.), and used Eigenvalues and a scree plot to compare the merit of different factor models. Ultimately, I found that seemingly different aspects of the quality of care loaded well onto the same factor, which corresponds to the experience dimension of quality discussed above. Included in this one factor are survey items which had a factor loading of .30 or higher. The questions included, and the factor loadings for both the unadjusted and adjusted quality variables, can all be found in Table 10 below.

Table 10: Quality Items and Loadings

Item	Loadings	
	Unadjusted Quality	Adjusted Quality
Rate the amount of time you waited before being attended to	.70	.52
Rate the experience of being greeted respectfully	.80	.75
Rate the experience of how clearly health care providers communicated	.85	.84
Rate the experience of getting enough time to ask questions	.55	.84
Rate your experience of being involved in making decisions about your health care or treatment	.51	.61
Rate the way the health services ensured you could talk privately to health care providers	.66	.55
Rate the amount of space in waiting and examination rooms	.84	.68
Rate the cleanliness of rooms inside the facility, including toilets	.78	.81
Rate the experience of getting information about other types of treatment or tests	.49	.78

0.6   Results and Analysis

I performed two different types of analysis in order to determine which, if any, of my theoretical predictions would be helpful in explaining variance in self-reported quality of health care services. First, I performed an individual-level analysis in which the independent variables consisted of age, sex, a factor variable for socioeconomic status and different dummy variables for self-reported race of white, black, mulatto, or indigenous. I performed this analysis twice, once with the dependent variable as a factor for health care quality unadjusted for individual bias (as demonstrated by the anchoring vignettes), and once with the dependent variable adjusted for individual bias.

The second analysis that I performed was at the municipal level, using the municipal dataset described in the Data section above. I performed four different regressions at the municipal level. Two of the regressions used unadjusted quality ratings as the dependent variable, and two of them used adjusted quality ratings. I performed two separate analyses for each dependent variable. In both analyses I included variables for average or proportional demographic characteristics, electoral variables, fiscal capacity, and wealth of the municipality. In one of the regressions with the dependent variable of adjusted quality rating and one with the dependent variable of unadjusted quality rating, I included a variable for health spending; in the other two, I did not. The exclusion of a health spending variable in one set of regressions allowed me to evaluate the potential impact of PT governance and alignment in parties between the municipal and state levels without introducing post-treatment bias (King 2010).

The results at the individual and at the municipal level suggest a very similar story. Age and socioeconomic status of respondents are important determinants of the qual-

ity of health care that individuals report receiving, but no other variables show consistent significance. Regression results are included below. I have included only the individual level results for the unadjusted quality ratings. I also ran regressions for the adjusted ratings and found no significant differences between the models.

The socioeconomic status finding is not surprising. As discussed above, numerous studies have shown that less well-off individuals may report receiving lower quality of care. The finding is particularly unsurprising in the context of Brazil's unique health model. Given that Brazil has a public subcontractor model, with many publicly-funded health services being provided by private personnel and facilities, it was not reasonable to remove individuals whose treatments had occurred at private facilities from the dataset. However, by including private facilities in the analysis, I have allowed survey respondents who may have paid out-of-pocket for expensive, high-quality private care to be included in the analysis. That said, given that the majority of health care services provided at private facilities are actually financed through public insurance and fall within the SUS health system, as well as the level of significance that the SESfactor achieves in this analysis ($p < .001$), it seems likely that much of the disparity in self-reported care is occurring within the public system.

Although I had intuitively expected that older patients might not be cared for as well as younger patients, the finding that they in fact report higher quality of care agrees with previous research as discussed earlier. The present analysis contributes meaningfully to these past studies, as past work has not accounted for the possibility that older patients might report better care because their expectations were simply lower. Indeed, both a college student and a retired person might objectively receive the same quality of care, but if the retired person had been expecting to receive poor care, he or she might rate it more highly than the younger patient. Because I ran my model with both the dependent variable

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of unadjusted quality and that for adjusted quality, I have taken into account individual bias (DIF) in reporting, and used the WHO vignettes to correct for this bias. Because the results in the unadjusted and adjusted quality models do not differ significantly, I conclude that older patients did receive a higher standard of care than their younger counterparts.

While I was disappointed with the lack of significant results at the municipal level, and particularly with regard to political variables, there are a couple of reasons that these results may not be significant. The first reason relates to the issue of preventative care versus curative care. To create my datasets from the WHO survey data with individual responses about their health care experiences in the last six months, it was necessary to subset the data, as discussed previously, to consider only the respondents in the survey sample who reported having visited a health facility in the six months prior to the survey. If certain individuals were receiving good, or improved, preventative care, and consequently had not visited a health facility in recent months, they would not have been included in my survey. Although I had expected that there might be an effect of either PT governance or coordinated municipal and state governance on health care quality reports, it is possible that these political considerations affected aspects of the health system associated primarily with preventative care. If PT municipal governance focused on getting individuals who had previously been forced to see the doctor regularly on an appropriate preventative medical regimen, rather than making sure that the individuals' health visits were of high quality, then the PT would still be having an important positive effect on municipal health, but it would not be demonstrated by my analysis.

I was initially surprised by the failure of health spending per capita to explain differences in quality reporting across municipalities, but this may be a function of the broad category of health spending, and the more narrowly defined category of quality of health care

experience that I have created. One would expect that certain types of health expenditures (such as personnel training or facilities management) might impact the quality of experience a patient had. On the other hand, the construction of a new facility in a different part of the municipality might detract resources and training from a health clinic that was seeing patients. Thus, broad conclusions about the effect of health spending might require more disaggregated fiscal data.

With respect to the measure of fiscal capacity, it may be the case that a broader measure of institutional performance would be a better predictor than the measure I am currently using. Such a measure of institutional performance at the municipal level would be extremely useful for research work beyond just health care analyses, and the development of such an instrument should be treated as a high priority on the agenda of comparative politics research.

Ultimately, although the municipal level results are disappointing, the individual level results do accord well with past scholarship and expectations. With the careful caveats mentioned above, specifically regarding the nature of the public subcontractor model, I find that these results give substantial cause for concern that, in spite of greatly improved access to health care since 1988, many Brazilians, and particularly those from lower socioeconomic classes, do not feel as though the health care system is responding to their needs and expectations in a satisfactory manner.

0.7 Conclusion

Health care in Brazil has made impressive strides over the past three decades, and the universal care reform model offers valuable lessons to other countries in the region. More Brazilians have access to health care than ever before, and many health outcome indicators, such as mortality rates, are at all time lows. The *movimento sanitária*'s vision of universal care has become increasingly close to a reality in the years since it was institutionalized in the 1988 Constitution.

And yet despite increased access to care, great variation in the quality of health care services remains. In this paper, I attempted to demonstrate that Brazilians of different regions and different individual characteristics have significantly different experiences in their interaction with the health system. The most important findings were that age and socioeconomic class were strong predictors of the quality of experience that individuals report. Older patients have more positive experiences, even when controlling for individual biases, whereas poorer individuals report much more negative experiences. I suggested that the public/private subcontractor model may play into these results, but that it is probably not sufficient as a unique explanation. My broad conclusion is that individual characteristics matter a lot in the type of experience individuals have at health clinics, and these characteristics matter even when individuals are coming from the same region and municipality.

On the other hand, political and fiscal characteristics of municipalities were not helpful predictors of health care quality reports in my analysis. This may be because municipal variables matter less than anticipated, or it may be because municipal variables matter for aspects of preventative care, which would fall outside the scope of this analysis. Furthermore, as discussed above, it could be the case that some variables, such as funding and party

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alignment at the municipal and state level, matter for things such as health infrastructure, but matter less for the experience that individuals have at clinics which have already been constructed and with personnel who have already been trained.

Ultimately, for Brazil to move in the direction of more equitable care for individuals of different backgrounds, the variation in individual health care experiences must be addressed. To this end, it will be important to determine the driving force for lower quality experiences among less well-off patients. Is it the case that these patients attend the same clinics as middle and upper class patients, but are treated differently once there? Do these clinics have less-trained personnel and fewer resources available to patients funded through public insurance than to those insured privately? Or are patients of lower socioeconomic classes visiting different clinics entirely, with more desirable clinics located in areas of municipalities that are less accessible to poor families? Answers to these questions would provide valuable insight into the mechanism through which socioeconomic status correlates with less favorable patient experiences.

In many ways, the path of universal health care in Brazil seems to be following a trajectory not dissimilar to that of democracy in much of the region. With its implementation secure, the focus must shift to variation in quality and effectiveness of performance. My hope is that this paper offers an initial step in this direction.

Part V

Conclusion

In the introduction to this dissertation, I noted that health reform had been a continuous process for much of the twentieth century, and that the politics of reform and reform implementation deserve considerably more attention from political scientists than they have received to this point. In the papers I presented here, I have indicated three different aspects of health care and health reform into which political scientists should consider inserting their frameworks more frequently. First, I evaluated the impact of reforms to the medication distribution process under *Seguro Popular* in Mexico, and noted that the differences in implementation across states should raise questions of institutional performance. Second, I looked at determinants of health care spending at the subnational level in Brazil and found that left governance consistently correlates with higher levels of municipal spending. Finally, I proposed a new survey-based approach to thinking about the quality of health services in Brazil, and the relationship of politics to quality.

The broad purpose of these papers was to indicate a role for political science in the health care reform process which goes beyond the politics of policy decisions. Indeed, funding, execution of policy, and quality of output in health care should be at least as important as the policies on paper for subjects of study. When Hacker wrote that health care reforms in the US and Europe seemed to result in "reform without change and change without reform", he indicated clearly that changes to health care structures occur in the absence of formal policy change. And yet, most of the sparse literature on the politics of health reform has focused solely on the politics of the reform process itself and the ultimate policy outcomes. To move beyond this step, political scientists must look at implementation of policies as well as the policies themselves.

I hope this dissertation will serve as a first step in linking the frameworks of political science to the priorities and outcomes of health reform. While I offer my own perspective

on some of the links throughout the dissertation (institutional analysis and change, political partisanship and the welfare state), further research might consider issues such as state capacity. Political science can offer valuable insights into discussions of health reform such that political considerations are no longer merely a "footnote" in otherwise well-intentioned reform plans.

Part VI

Appendices

0.8 Appendix A: *Flowchart of Sampling and Attrition in the Household Survey from King et al (2009)*
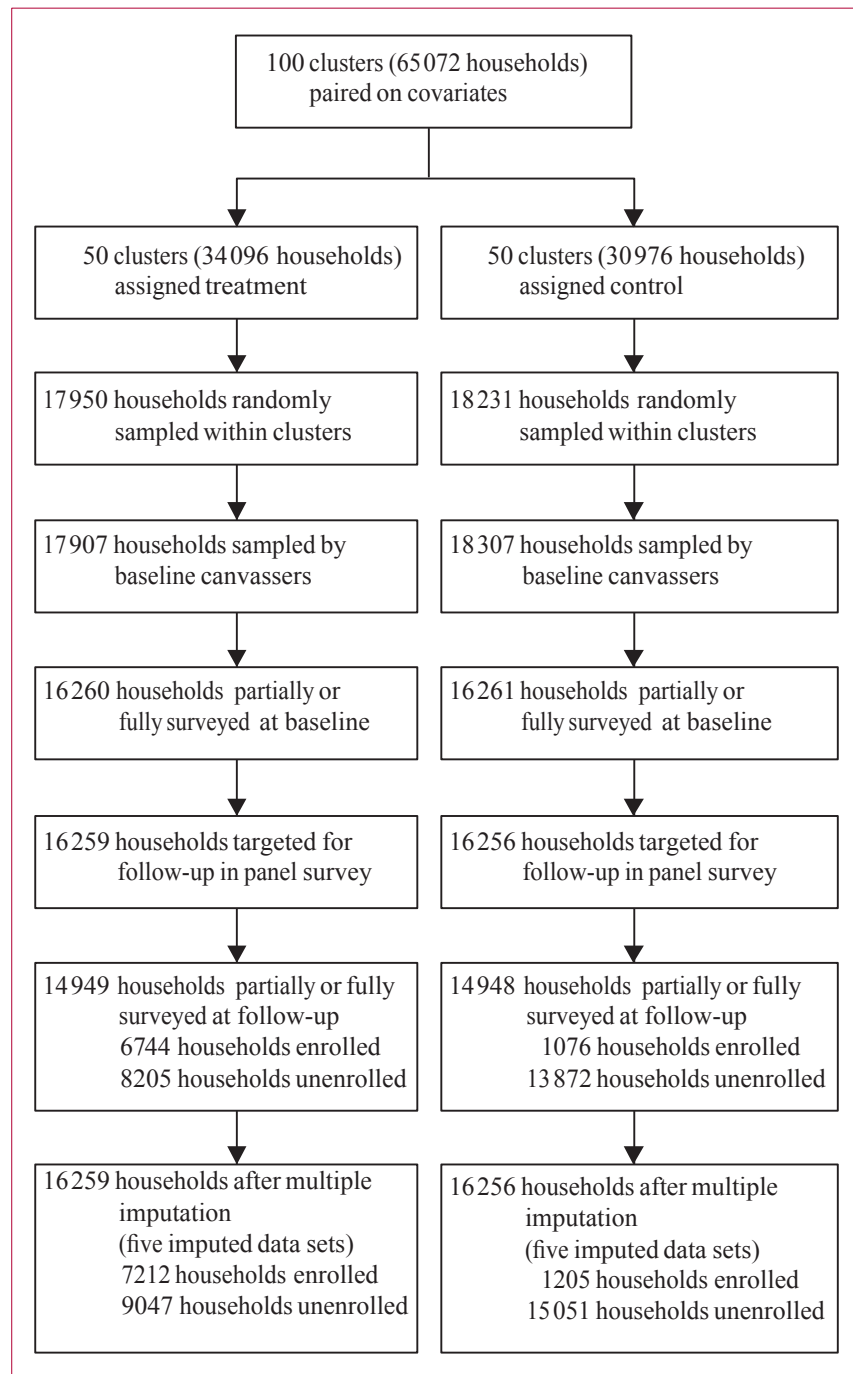
0.9   Appendix B: *Medication Codings*

(1) INFECTION

Aciclover
Albendazole
Amikacin
Amoxicillin
Ampicillin
Bactrim
Benzyl Benzoate Dermic Emulsion
Cefotaxime
Cephalexin
Chloramphenicol
Chloramphenicol Opthalmic
Ciprofloxacin
Clarithromycin
Clavulanic Acid
Clindamycin
Clioquinol cream
Dehydroemetine
Dicloxacillin
Doxycycline
Erythromycin
Ethambutol
Furoxone
Gentamicin
Isoconazole
Isoniazid
Itraconazole
Ketoconazole
Lindane
Mebendazole
Metronidazole
Miconazole
Neomycin
Neomycin, Polymyxin B, Gramacidin
Nitazoxanide
Nitazoxanide
Nitrofurantoin
Nitrofurazone
Nystatin
Penicillin
Pyrantel Pamoate
Rifampicin, Isoniazid, Pyrazinamide
Silver Sulfadiazine
Streptomycin
Tetracycline
Trimethoprim
Vancomycin

(2) RESPIRATORY

Ambroxol
Aminophylline
Benzonatate
Cromolyn sodium
Dextromethorphan
Ipratropium
Ipratropium Bromide
Ketotifen
Montelukast
Safirlukast
Salbutamol
Theophylline
Zafirlukast

(3) CARDIAC, BLOOD, CHOLESTEROL

Alphamethyldopa
Bezafibrate
Candesartan
Captopril
Chlorothiazide
Chlorthalidone
Cilexetil/HCT
Digoxin
Dipyridamole
Enalapril
Furosemide
Glyceryl Trinitrate
Glyceryl trinitrate patches
HCT
Hydralazine
Irbesartan
Isosorbide
Licinopril
Losartan
Metoprolol
Nicardipine
Nifedipine
Potassium/HCT
Pravastatin
Prazosin
Propranolol
Telmisartan
Verapamil

(4) PAIN, ALLERGIES, INFLAMMATION

Acetaminophen
Allopurinol
Aspirin
Astemizole
Avapena
Azathioprine
Azathioprine
Beclomethasone
Benadryl
Betamethasone
Capsaicin
Celecoxib
Chlorpheniramine
Colchicine
Cortisone
Dexamethasone
Diclofenac
Dihexazin (Viternum)
Diphenhydramine
Dipyrone
Hydrocortisone
Indomethacin
Ketorolac
Lidocaine
Loratadine
Metamizole
Naproxen
Paracetamol (INN)
Phenazopyridine
Piroxicam
Prednisone
Prednisone Opthalmic Solution
Probenecid
Rofecoxib
Sodium Cromoglycate
Xylocaine

(5) GI DISORDERS

Aluminum and Magnesium Hydroxide
Bismuth Subsaliscylate
Butylscopolamine
Cisapride
Diphenidol
Hiosultrina
Metoclopramide
Omeprazole
Pinaverium Bromide
Psyllium
Ranitidine
sennosides
Sodium Bicarbonate
Spasmopriv
Sucralfate
Esomeprazole
Loperamide

(6) GLYCEMIC DISORDERS

Acarbose Glibenclamide
Glucose
Insulin
Metformin
Pioglitazone
Rosiglitazone
Tolbutamide

(7) VITAMIN/MINERAL DEFICIENCIES

Aluminum and Magnesium
B Complex
Calcium
Crystalline Sodium
Ferrous Sulfate Oral Solution
Folic Acid
Hartmann's Solution
Iron
Micronutrientes
Multivitamin
Nutrisano
Nutrivida
Oral Electrolytes
Sodium Chloride
Suero Oral Life
Thiamin
Vitamin A and C
Vitamin C
Vitamin D
Vitamin K
Water, injectable
Zinc

0.10 Appendix B (continued): *Medication Codings*

(8) NEUROLOGICAL	(11) OTHER
Carbamazepine	Adrenaline/Epinephrine
Diazepam	Alacramyn
Diphenylhydantoin	Anti-scorpion serum
Imipramine	Anti-venom serum
Magnesium Valproate	Atropine Injectable Solution
Phenobarbital	Benzyl
Phenytoin	Caliderm Cream
	Finasteride
(9) ENDOCRINE AND	Fluocinolone
BIRTH CONTROL	
Chlormadinone	Lassar paste
Condoms	Naphazoline
Contraceptives	Papilla
Desogestrel and Ethinyl Estradiol	Sweet Almond Oil
Ergometrine	Tamsulosin
Estrogen	Timolol Opthalmic Solution
Finasteride	Vero cells
IUD	Zinc Oxide Paste
Levonorgestrel	
Levothyroxine	
Medroxyprogesterone	
Methimazole	
Methylergometrine	
Norethisterone	
Oxytocin	
Thyroxine	
(10) VACCINE	
BCG	
Diptheria	
DPT+HB+Hib	
MMR	
Polio	
Tetanus	

0.11 Appendix C: *Units of Medication at Treatment and Control Facilities by Indication*

	Baseline	Post-Treatment
Infection		
Treatment	711.02	1671.65
Control	835.07	1132.75
Difference	**-135.07**	**538.90**
Respiratory		
Treatment	76.56	115.94
Control	71.83	49.34
Difference	**4.73**	**66.60**
Cardiac, Blood, Cholesterol		
Treatment	87.25	195.79
Control	86.00	90.89
Difference	**1.25**	**104.90**
Pain, Allergies, Inflammation		
Treatment	341.15	664.46
Control	332.20	462.74
Difference	**8.95**	**201.72**
GI Disorders		
Treatment	69.02	265.11
Control	65.25	191.17
Difference	**3.77**	**73.94**
Glycemic Disorders		
Treatment	65.84	128.92
Control	75.07	108.72
Difference	**-9.23**	**20.20**
Vitamin/Mineral Deficiencies		
Treatment	98.84	371.46
Control	148.14	289.00
Difference	**-49.30**	**82.46**
Neurological		
Treatment	4.52	31.14
Control	7.44	11.20
Difference	**-2.92**	**19.94**
Endocrine and Birth Control		
Treatment	26.84	36.03
Control	44.20	37.52
Difference	**-17.36**	**-1.49**
Vaccine		
Treatment	52.51	52.51
Control	48.46	48.46
Difference	**4.05**	**4.05**
Other		
Treatment	38.69	35.08
Control	33.02	33.58
Difference	**5.67**	**1.50**

0.12 Appendix D: *Units of Medication at Treatment and Control Facilities by Indication*

Control Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
GRSSA000046	Post-Treatment	1145	0	2	346	214	180	360	0	35	390	7	2679
	Baseline	1596	70	40	245	174	47	0	0	0	0	18	2190
	Difference	-451	-70	-38	101	40	133	360	0	35	390	-11	**489**
GRSSA000051	Post-Treatment	50	0	0	0	0	0	20	0	0	0	0	70
	Baseline	383	26	15	79	19	0	96	0	0	0	33	651
	Difference	-333	-26	-15	-79	-19	0	-76	0	0	0	-33	**-581**
GRSSA000104	Post-Treatment	946	2	39	527	234	480	0	0	27	299	114	2668
	Baseline	472	81	70	298	26	0	0	0	0	0	50	997
	Difference	474	-79	-31	229	208	480	0	0	27	299	64	**1671**
GRSSA000886	Post-Treatment	971	0	112	699	193	132	543	0	0	0	54	2704
	Baseline	270	40	63	0	0	155	42	0	0	0	0	570
	Difference	701	-40	49	699	193	-23	501	0	0	0	54	**2134**
GRSSA003044	Post-Treatment	258	0	0	25	30	25	40	0	0	48	9	435
	Baseline	242	0	0	10	0	0	0	0	0	0	0	252
	Difference	16	0	0	15	30	25	40	0	0	48	9	**183**
GRSSA004526	Post-Treatment	3016	5	23	222	458	73	183	0	286	20	57	4343
	Baseline	2063	9	0	315	143	276	1	0	0	0	223	3030
	Difference	953	-4	23	-93	315	-203	182	0	286	20	-166	**1313**
MCSSA000026	Post-Treatment	37	0	15	104	64	4	7	0	0	0	16	247
	Baseline	83	28	100	595	200	60	0	0	0	0	34	1100
	Difference	-46	-28	-85	-491	-136	-56	7	0	0	0	-18	**-853**
MCSSA000183	Post-Treatment	659	11	54	358	201	90	100	0	3	262	32	1770
	Baseline	735	54	88	393	136	110	0	0	5	0	0	1521
	Difference	-76	-43	-34	-35	65	-20	100	0	-2	262	32	**249**
MCSSA000306	Post-Treatment	3702	181	15	1381	836	131	29	0	13	0	58	6346
	Baseline	585	27	32	114	0	3	0	0	1	0	22	784
	Difference	3117	154	-17	1267	836	128	29	0	12	0	36	**5562**
MCSSA000352	Post-Treatment	798	65	230	1735	296	38	665	32	13	0	22	3894
	Baseline	935	104	110	477	140	150	0	0	0	0	0	1916
	Difference	-137	-39	120	1258	156	-112	665	32	13	0	22	**1978**
MCSSA000504	Post-Treatment	4807	226	285	1509	700	76	600	0	142	0	102	8447
	Baseline	2136	197	152	1019	71	104	1072	0	251	0	121	5123
	Difference	2671	29	133	490	629	-28	-472	0	-109	0	-19	**3324**
MCSSA000702	Post-Treatment	1534	18	0	493	15	46	264	45	29	209	4	2657
	Baseline	609	17	384	531	46	18	50	0	0	0	44	1699
	Difference	925	1	-384	-38	-31	28	214	45	29	209	-40	**958**
MCSSA000731	Post-Treatment	0	0	0	0	0	0	0	0	0	0	0	0
	Baseline	449	0	82	130	39	0	60	0	52	0	25	837
	Difference	-449	0	-82	-130	-39	0	-60	0	-52	0	-25	**-837**
MCSSA001513	Post-Treatment	1048	9	76	160	58	94	148	0	28	8	17	1646
	Baseline	383	26	15	79	19	0	96	0	0	0	33	651
	Difference	665	-17	61	81	39	94	52	0	28	8	-16	**995**
MCSSA001525	Post-Treatment	978	0	43	40	53	22	133	20	70	7	0	1366
	Baseline	605	0	111	303	62	162	16	0	91	0	23	1373
	Difference	373	0	-68	-263	-9	-140	117	20	-21	7	-23	**-7**

Units of Medication at Treatment and Control Facilities by Indication

Control Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MCSSA002954	Post-Treatment	89	3	17	30	15	13	45	8	12	65	1	298
	Baseline	711	0	0	0	0	0	16	0	0	0	0	727
	Difference	-622	3	17	30	15	13	29	8	12	65	1	**-429**
MCSSA002971	Post-Treatment	2900	160	56	1919	1663	220	1571	84	50	27	0	8650
	Baseline	520	0	135	250	27	45	121	0	0	0	146	1244
	Difference	2380	160	-79	1669	1636	175	1450	84	50	27	-146	**7406**
MCSSA003024	Post-Treatment	3260	75	98	2699	1501	137	398	17	91	25	42	8343
	Baseline	2445	81	134	586	0	8	16	0	0	0	0	3270
	Difference	815	-6	-36	2113	1501	129	382	17	91	25	42	**5073**
MCSSA003386	Post-Treatment	1322	0	97	670	260	140	238	30	20	203	59	3039
	Baseline	1082	63	50	290	1	51	448	7	4	0	44	2040
	Difference	240	-63	47	380	259	89	-210	23	16	203	15	**999**
MCSSA003461	Post-Treatment	0	0	0	0	0	0	0	0	0	0	0	0
	Baseline	1804	69	97	255	18	166	170	0	1155	0	20	3754
	Difference	-1804	-69	-97	-255	-18	-166	-170	0	-1155	0	-20	**-3754**
MCSSA004704	Post-Treatment	606	65	0	176	303	96	159	0	9	39	39	1492
	Baseline	494	0	0	0	0	30	0	0	0	0	0	524
	Difference	112	65	0	176	303	66	159	0	9	39	39	**968**
MCSSA005223	Post-Treatment	1934	206	4	1253	74	2	449	4	0	0	70	3996
	Baseline	2340	120	297	1278	212	60	70	0	158	0	186	4721
	Difference	-406	86	-293	-25	-138	-58	379	4	-158	0	-116	**-725**
MCSSA005235	Post-Treatment	4525	130	176	1227	361	37	437	0	518	0	2	7413
	Baseline	2928	250	169	1241	77	86	281	0	496	0	58	5586
	Difference	1597	-120	7	-14	284	-49	156	0	22	0	-56	**1827**
MCSSA005800	Post-Treatment	239	0	49	128	27	49	419	0	13	0	6	930
	Baseline	331	20	19	90	5	10	62	0	0	0	10	547
	Difference	-92	-20	30	38	22	39	357	0	13	0	-4	**383**
MCSSA005841	Post-Treatment	579	17	62	115	41	3	631	0	11	0	6	1465
	Baseline	0	0	0	0	0	0	0	0	0	0	0	0
	Difference	579	17	62	115	41	3	631	0	11	0	6	**1465**
MCSSA006034	Post-Treatment	645	0	30	301	130	82	95	0	20	0	3	1306
	Baseline	810	0	0	250	200	0	100	0	0	0	100	1460
	Difference	-165	0	30	51	-70	82	-5	0	20	0	-97	**-154**
MCSSA006133	Post-Treatment	373	17	0	1287	1114	0	0	0	0	12	6	2809
	Baseline	833	110	310	1023	80	50	150	0	0	0	0	2556
	Difference	-460	-93	-310	264	1034	-50	-150	0	0	12	6	**253**
MCSSA008180	Post-Treatment	1400	40	31	255	130	13	112	0	100	28	0	2109
	Baseline	411	65	0	200	25	0	90	0	0	0	0	791
	Difference	989	-25	31	55	105	13	22	0	100	28	0	**1318**
MCSSA008204	Post-Treatment	1152	63	170	718	72	77	166	149	21	0	11	2599
	Baseline	1027	166	0	760	140	5	33	0	0	0	36	2167
	Difference	125	-103	170	-42	-68	72	133	149	21	0	-25	**432**
MCSSA000594	Post-Treatment	352	15	40	200	10	62	725	20	0	19	17	1460
	Baseline	202	12	131	417	2	13	135	2	1	0	0	915
	Difference	150	3	-91	-217	8	49	590	18	-1	19	17	**545**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Control Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MSSSA000640	Post-Treatment	430	10	80	75	0	1	130	10	0	20	20	776
	Baseline	69	50	69	63	0	20	30	45	0	0	7	353
	Difference	361	-40	11	12	0	-19	100	-35	0	20	13	**423**
MSSSA000775	Post-Treatment	441	28	0	8	25	63	454	0	0	5	40	1064
	Baseline	439	111	0	104	16	0	207	0	0	0	54	931
	Difference	2	-83	0	-96	9	63	247	0	0	5	-14	**133**
MSSSA000780	Post-Treatment	332	52	29	105	94	40	71	0	0	72	10	805
	Baseline	159	63	0	40	0	30	51	3	0	0	7	353
	Difference	173	-11	29	65	94	10	20	-3	0	72	3	**452**
MSSSA000816	Post-Treatment	141	500	80	240	0	0	124	0	0	34	307	1426
	Baseline	467	139	80	179	0	140	60	0	0	0	75	1140
	Difference	-326	361	0	61	0	-140	64	0	0	34	232	**286**
MSSSA000833	Post-Treatment	389	40	110	114	29	98	250	0	60	191	28	1309
	Baseline	2282	102	46	326	111	37	353	0	0	0	85	3342
	Difference	-1893	-62	64	-212	-82	61	-103	0	60	191	-57	**-2033**
MSSSA000903	Post-Treatment	371	85	30	5	9	21	136	0	48	128	22	855
	Baseline	69	56	0	94	0	29	247	6	7	0	7	515
	Difference	302	29	30	-89	9	-8	-111	-6	41	128	15	**340**
MSSSA000932	Post-Treatment	1186	156	193	1278	94	0	668	7	140	16	107	3845
	Baseline	1169	111	72	471	73	45	225	0	0	0	55	2221
	Difference	17	45	121	807	21	-45	443	7	140	16	52	**1624**
MSSSA000944	Post-Treatment	503	50	95	40	4	350	155	0	0	29	12	1238
	Baseline	859	0	222	222	66	158	268	10	0	0	0	1805
	Difference	-356	50	-127	-182	-62	192	-113	-10	0	29	12	**-567**
MSSSA001376	Post-Treatment	218	67	56	123	31	53	50	11	6	18	39	672
	Baseline	359	90	40	290	20	0	0	0	0	0	60	859
	Difference	-141	-23	16	-167	11	53	50	11	6	18	-21	**-187**
MSSSA001393	Post-Treatment	79	0	20	11	2	32	48	0	0	6	10	208
	Baseline	576	4	0	145	20	0	78	0	0	0	117	940
	Difference	-497	-4	20	-134	-18	32	-30	0	0	6	-107	**-732**
MSSSA001434	Post-Treatment	436	20	70	509	70	120	1228	0	0	0	60	2513
	Baseline	430	165	0	148	62	0	0	0	0	0	0	805
	Difference	6	-145	70	361	8	120	1228	0	0	0	60	**1708**
MSSSA001912	Post-Treatment	86	0	5	22	5	24	330	5	30	28	21	556
	Baseline	71	32	0	47	0	11	23	10	0	0	3	197
	Difference	15	-32	5	-25	5	13	307	-5	30	28	18	**359**
MSSSA001924	Post-Treatment	147	200	153	637	30	447	828	47	230	20	140	2879
	Baseline	2044	8	300	992	525	542	460	0	9	0	0	4880
	Difference	-1897	192	-147	-355	-495	-95	368	47	221	20	140	**-2001**
MSSSA001965	Post-Treatment	470	17	165	192	32	55	325	0	20	125	26	1427
	Baseline	53	68	0	32	0	29	39	5	0	0	7	233
	Difference	417	-51	165	160	32	26	286	-5	20	125	19	**1194**
MSSSA001970	Post-Treatment	183	0	17	60	26	25	65	2	2	7	12	399
	Baseline	937	129	55	338	90	65	100	0	0	0	0	1714
	Difference	-754	-129	-38	-278	-64	-40	-35	2	2	7	12	**-1315**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Control Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MSSSA001982	Post-Treatment	267	13	3	102	46	19	178	0	10	40	30	708
	Baseline	805	77	12	8	160	0	92	0	25	0	0	1179
	Difference	-538	-64	-9	94	-114	19	86	0	-15	40	30	**-471**
OCSSA002834	Post-Treatment	101	3	20	7	16	20	11	25	6	15	19	243
	Baseline	566	52	68	30	10	61	85	0	18	0	0	890
	Difference	-465	-49	-48	-23	6	-41	-74	25	-12	15	19	**-647**
OCSSA005441	Post-Treatment	50	0	11	0	10	10	5	35	0	0	0	121
	Baseline	196	0	0	0	0	0	3	0	0	0	0	199
	Difference	-146	0	11	0	10	10	2	35	0	0	0	**-78**
OCSSA005786	Post-Treatment	813	0	0	50	0	480	160	8	0	13	8	1532
	Baseline	1465	380	70	452	94	600	2091	220	332	0	80	5784
	Difference	-652	-380	-70	-402	-94	-120	-1931	-212	-332	13	-72	**-4252**
SPSSA002041	Post-Treatment	245	0	44	318	0	0	533	0	0	170	40	1350
	Baseline	1070	40	192	587	80	909	151	0	0	0	39	3068
	Difference	-825	-40	-148	-269	-80	-909	382	0	0	170	1	**-1718**
SPSSA002065	Post-Treatment	13052	240	270	2853	468	1998	2248	0	78	6	98	21311
	Baseline	525	45	0	100	0	0	0	0	0	0	0	670
	Difference	12527	195	270	2753	468	1998	2248	0	78	6	98	**20641**
SRSSA000714	Post-Treatment	2157	23	370	750	166	67	680	25	43	30	60	4371
	Baseline	1062	240	179	501	222	80	215	2	0	0	35	2536
	Difference	1095	-217	191	249	-56	-13	465	23	43	30	25	**1835**
SRSSA002003	Post-Treatment	671	26	121	284	109	34	123	26	26	0	7	1427
	Baseline	375	42	100	689	0	0	0	115	0	0	0	1321
	Difference	296	-16	21	-405	109	34	123	-89	26	0	7	**106**
SRSSA002160	Post-Treatment	495	56	218	170	106	66	80	40	0	0	24	1255
	Baseline	485	160	560	720	160	20	0	0	3	0	0	2108
	Difference	10	-104	-342	-550	-54	46	80	40	-3	0	24	**-853**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Treatment Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
GRSSA002875	Post-Treatment	8266	134	1394	2401	418	1684	1193	0	121	0	90	15701
	Baseline	374	0	2	0	119	5	0	0	0	0	0	500
	Difference	7892	134	1392	2401	299	1679	1193	0	121	0	90	**15201**
GRSSA004531	Post-Treatment	736	14	50	46	84	53	85	2	60	8	9	1147
	Baseline	265	107	567	92	166	8	39	0	0	0	78	1322
	Difference	471	-93	-517	-46	-82	45	46	2	60	8	-69	**-175**
JCSSA002340	Post-Treatment	1586	88	161	732	313	160	994	16	85	648	94	4877
	Baseline	1288	0	86	970	200	592	430	0	0	0	0	3566
	Difference	298	88	75	-238	113	-432	564	16	85	648	94	**1311**
MCSSA000060	Post-Treatment	546	10	3	6	4	12	103	0	0	0	11	695
	Baseline	340	20	50	370	30	55	0	0	65	0	35	965
	Difference	206	-10	-47	-364	-26	-43	103	0	-65	0	-24	**-270**
MCSSA000171	Post-Treatment	1881	190	9	91	53	12	179	2	8	8	4	2437
	Baseline	981	85	61	288	94	70	303	3	16	0	35	1936
	Difference	900	105	-52	-197	-41	-58	-124	-1	-8	8	-31	**501**
MCSSA000282	Post-Treatment	4389	255	8	1668	852	346	2033	0	19	0	76	9646
	Baseline	2171	74	134	394	42	49	36	0	20	0	62	2982
	Difference	2218	181	-126	1274	810	297	1997	0	-1	0	14	**6664**
MCSSA000796	Post-Treatment	773	100	2	575	36	12	63	0	10	65	27	1663
	Baseline	726	129	413	103	23	67	48	0	0	0	35	1544
	Difference	47	-29	-411	472	13	-55	15	0	10	65	-8	**119**
MCSSA000813	Post-Treatment	1086	29	17	159	46	15	152	0	16	0	9	1529
	Baseline	465	12	33	59	0	0	32	0	0	0	8	609
	Difference	621	17	-16	100	46	15	120	0	16	0	1	**920**
MCSSA000854	Post-Treatment	647	5	49	187	47	18	449	0	47	10	31	1490
	Baseline	29	16	64	83	23	10	10	0	48	0	15	298
	Difference	618	-11	-15	104	24	8	439	0	-1	10	16	**1192**
MCSSA001863	Post-Treatment	1761	46	73	899	712	123	102	0	25	0	19	3760
	Baseline	1614	232	58	611	400	2	279	0	31	0	77	3304
	Difference	147	-186	15	288	312	121	-177	0	-6	0	-58	**456**
MCSSA002044	Post-Treatment	13834	640	1710	1100	2398	0	40	0	0	360	200	20282
	Baseline	5859	390	509	1862	391	288	608	0	0	0	91	9998
	Difference	7975	250	1201	-762	2007	-288	-568	0	0	360	109	**10284**
MCSSA002790	Post-Treatment	537	0	20	130	40	0	110	3	20	0	2	862
	Baseline	220	0	140	270	0	180	40	0	80	0	30	960
	Difference	317	0	-120	-140	40	-180	70	3	-60	0	-28	**-98**
MCSSA003000	Post-Treatment	1163	660	380	375	230	10	150	75	40	30	65	3178
	Baseline	77	0	5	0	0	0	32	0	0	0	0	114
	Difference	1086	660	375	375	230	10	118	75	40	30	65	**3064**
MCSSA003012	Post-Treatment	4132	630	110	1879	200	190	1194	20	0	0	104	8459
	Baseline	1065	0	30	200	2	20	20	0	0	0	10	1347
	Difference	3067	630	80	1679	198	170	1174	20	0	0	94	**7112**
MCSSA003316	Post-Treatment	3898	34	78	1904	1002	169	162	0	158	16	24	7445
	Baseline	1613	57	92	351	107	170	0	0	20	0	90	2500
	Difference	2285	-23	-14	1553	895	-1	162	0	138	16	-66	**4945**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Treatment Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MCSSA005240	Post-Treatment	3477	118	13	4087	1279	25	454	0	67	12	62	9594
	Baseline	602	0	0	40	0	0	28	0	0	0	0	670
	Difference	2875	118	13	4047	1279	25	426	0	67	12	62	**8924**
MCSSA005264	Post-Treatment	806	11	47	2732	676	20	272	528	10	0	0	5102
	Baseline	310	0	20	1020	0	0	0	0	0	0	0	1350
	Difference	496	11	27	1712	676	20	272	528	10	0	0	**3752**
MCSSA005322	Post-Treatment	1912	190	391	1239	654	0	202	4	64	5	0	4661
	Baseline	662	125	52	2281	44	126	32	0	1	0	0	3323
	Difference	1250	65	339	-1042	610	-126	170	4	63	5	0	**1338**
MCSSA005853	Post-Treatment	493	65	10	128	5	0	200	0	0	16	7	924
	Baseline	721	44	147	177	21	34	59	0	0	0	15	1218
	Difference	-228	21	-137	-49	-16	-34	141	0	0	16	-8	**-294**
MCSSA005894	Post-Treatment	1160	18	597	86	72	0	772	0	30	0	2	2737
	Baseline	354	0	239	80	35	60	0	0	7	0	30	805
	Difference	806	18	358	6	37	-60	772	0	23	0	-28	**1932**
MCSSA005906	Post-Treatment	17	1	4	9	5	3	8	0	4	5	2	58
	Baseline	21	11	27	77	5	10	0	0	0	0	11	162
	Difference	-4	-10	-23	-68	0	-7	8	0	4	5	-9	**-104**
MCSSA005911	Post-Treatment	491	0	432	86	3	188	610	0	24	0	17	1851
	Baseline	0	0	0	0	0	0	60	0	0	0	0	60
	Difference	491	0	432	86	3	188	550	0	24	0	17	**1791**
MCSSA006046	Post-Treatment	815	24	112	772	305	156	37	15	2	260	52	2550
	Baseline	20	380	0	0	0	0	5	0	0	0	0	405
	Difference	795	-356	112	772	305	156	32	15	2	260	52	**2145**
MCSSA006063	Post-Treatment	2008	24	95	630	302	186	704	25	90	58	40	4162
	Baseline	553	121	14	272	20	53	0	0	0	0	125	1158
	Difference	1455	-97	81	358	282	133	704	25	90	58	-85	**3004**
MCSSA006261	Post-Treatment	3389	35	96	1163	535	112	242	6	11	0	0	5589
	Baseline	3078	212	347	673	485	122	119	0	41	0	10	5087
	Difference	311	-177	-251	490	50	-10	123	6	-30	0	-10	**502**
MCSSA008175	Post-Treatment	2139	80	60	628	374	146	644	34	24	114	16	4259
	Baseline	1018	150	50	262	142	16	226	0	0	0	0	1864
	Difference	1121	-70	10	366	232	130	418	34	24	114	16	**2395**
MCSSA008221	Post-Treatment	634	46	0	354	135	38	339	5	6	16	26	1599
	Baseline	374	0	45	190	56	0	39	1	0	0	3	708
	Difference	260	46	-45	164	79	38	300	4	6	16	23	**891**
MCSSA008262	Post-Treatment	1194	220	118	456	170	74	238	26	100	64	0	2660
	Baseline	306	0	86	260	50	131	10	0	55	0	30	928
	Difference	888	220	32	196	120	-57	228	26	45	64	-30	**1732**
MCSSA008612	Post-Treatment	1112	100	136	866	114	90	460	60	20	50	60	3068
	Baseline	0	0	0	0	0	0	2	0	0	0	0	2
	Difference	1112	100	136	866	114	90	458	60	20	50	60	**3066**
MSSSA000372	Post-Treatment	866	8	72	199	87	420	326	0	0	90	58	2126
	Baseline	559	30	239	829	60	190	305	62	0	0	320	2594
	Difference	307	-22	-167	-630	27	230	21	-62	0	90	-262	**-468**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Treatment Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MSSSA000384	Post-Treatment	381	38	28	126	105	24	182	19	122	26	66	1117
	Baseline	509	642	102	701	0	91	0	4	0	0	52	2101
	Difference	-128	-604	-74	-575	105	-67	182	15	122	26	14	**-984**
MSSSA000396	Post-Treatment	665	766	330	210	19	139	658	3	14	0	21	2825
	Baseline	217	79	50	234	94	0	0	0	0	0	4	678
	Difference	448	687	280	-24	-75	139	658	3	14	0	17	**2147**
MSSSA000413	Post-Treatment	445	8	171	50	33	184	47	15	4	9	3	969
	Baseline	1518	30	220	435	0	280	430	0	0	0	10	2923
	Difference	-1073	-22	-49	-385	33	-96	-383	15	4	9	-7	**-1954**
MSSSA000430	Post-Treatment	841	134	527	196	59	5	54	72	7	11	86	1992
	Baseline	561	67	85	208	105	200	160	0	0	0	10	1396
	Difference	280	67	442	-12	-46	-195	-106	72	7	11	76	**596**
MSSSA000553	Post-Treatment	488	26	119	202	52	57	104	11	0	0	61	1120
	Baseline	263	22	28	122	7	4	34	4	0	0	60	544
	Difference	225	4	91	80	45	53	70	7	0	0	1	**576**
MSSSA000792	Post-Treatment	1365	52	172	600	416	182	534	34	12	30	62	3459
	Baseline	289	120	129	519	33	3	48	0	0	0	76	1217
	Difference	1076	-68	43	81	383	179	486	34	12	30	-14	**2242**
MSSSA000804	Post-Treatment	1097	232	136	541	219	256	504	68	46	39	36	3174
	Baseline	1073	162	58	637	224	50	268	9	0	0	62	2543
	Difference	24	70	78	-96	-5	206	236	59	46	39	-26	**631**
MSSSA001381	Post-Treatment	200	10	30	19	76	201	204	0	0	18	758	
	Baseline	622	158	0	262	127	42	177	0	0	0	108	1496
	Difference	-422	-148	30	-243	-51	159	27	0	0	0	-90	**-738**
MSSSA001422	Post-Treatment	451	1	58	166	34	124	127	0	21	67	36	1085
	Baseline	2214	90	100	700	0	50	56	0	0	0	270	3480
	Difference	-1763	-89	-42	-534	34	74	71	0	21	67	-234	**-2395**
MSSSA001451	Post-Treatment	687	14	107	110	82	140	226	5	7	8	7	1393
	Baseline	36	9	0	45	0	29	53	3	0	0	6	181
	Difference	651	5	107	65	82	111	173	2	7	8	1	**1212**
MSSSA001463	Post-Treatment	374	3	268	261	67	280	440	0	0	15	43	1751
	Baseline	450	100	100	150	100	100	150	0	0	0	0	1150
	Difference	-76	-97	168	111	-33	180	290	0	0	15	43	**601**
MSSSA001480	Post-Treatment	417	78	108	141	132	48	126	28	30	92	20	1220
	Baseline	975	57	53	204	179	20	293	58	0	0	65	1904
	Difference	-558	21	55	-63	-47	28	-167	-30	30	92	-45	**-684**
MSSSA001492	Post-Treatment	517	24	76	243	34	124	751	10	26	45	19	1869
	Baseline	23	67	0	59	0	30	38	6	0	0	8	231
	Difference	494	-43	76	184	34	94	713	4	26	45	11	**1638**
MSSSA001936	Post-Treatment	401	0	89	167	24	40	190	7	76	31	62	1087
	Baseline	130	62	0	54	0	268	43	6	0	0	8	571
	Difference	271	-62	89	113	24	-228	147	1	76	31	54	**516**
MSSSA001941	Post-Treatment	1013	50	175	230	119	35	332	0	65	381	80	2480
	Baseline	328	58	0	172	20	0	44	0	0	0	0	622
	Difference	685	-8	175	58	99	35	288	0	65	381	80	**1858**

Appendix D (cont'd): *Units of Medication at Treatment and Control Facilities by Indication*

Treatment Facilities		Indications											
Facility	Period	1	2	3	4	5	6	7	8	9	10	11	Total
MSSSA001994	Post-Treatment	214	5	105	74	0	194	640	3	0	26	21	1282
	Baseline	171	54	0	35	0	22	42	8	0	0	9	341
	Difference	43	-49	105	39	0	172	598	-5	0	26	12	**941**
OCSSA002274	Post-Treatment	2	0	0	64	0	1	0	0	0	0	0	67
	Baseline	0	0	0	0	0	0	0	0	0	0	0	0
	Difference	2	0	0	64	0	1	0	0	0	0	0	**67**
OCSSA005436	Post-Treatment	482	0	126	676	91	0	61	33	0	0	36	1505
	Baseline	103	0	9	0	0	0	5	0	0	0	0	117
	Difference	379	0	117	676	91	0	56	33	0	0	36	**1388**
OCSSA005453	Post-Treatment	151	0	26	35	3	2	0	30	0	0	0	247
	Baseline	952	21	25	545	6	40	135	6	0	0	90	1820
	Difference	-801	-21	1	-510	-3	-38	-135	24	0	0	-90	**-1573**
OCSSA005494	Post-Treatment	1324	98	320	758	254	176	192	32	75	16	28	3273
	Baseline	152	0	0	0	0	0	0	0	0	0	0	152
	Difference	1172	98	320	758	254	176	192	32	75	16	28	**3121**
SPSSA002024	Post-Treatment	1247	50	190	505	125	156	605	0	30	2	80	2990
	Baseline	477	60	0	0	0	0	0	0	0	0	0	537
	Difference	770	-10	190	505	125	156	605	0	30	2	80	**2453**
SPSSA002823	Post-Treatment	0	0	0	0	0	0	0	0	0	0	0	0
	Baseline	357	0	0	60	44	23	0	0	30	0	0	514
	Difference	-357	0	0	-60	-44	-23	0	0	-30	0	0	**-514**
SPSSA000405	Post-Treatment	905	50	211	380	210	220	180	110	20	0	15	2301
	Baseline	500	47	91	208	103	105	291	45	0	0	62	1452
	Difference	405	3	120	172	107	115	-111	65	20	0	-47	**849**
SPSSA001006	Post-Treatment	600	82	225	280	118	72	448	30	54	32	24	1965
	Baseline	1067	35	108	125	45	23	71	6	0	0	35	1515
	Difference	-467	47	117	155	73	49	377	24	54	32	-11	**450**

0.13   Appendix E: *Individual Level Results*

	DV: Unadjusted Quality			
	1	2	3	4
sex	-.03	-.04	-.03	-.03
	(.17)	(.17)	(.17)	(.17)
age	-.02	-.02	-.02	-.02
	(.01)***	(.01)***	(.01)***	(.01)***
SESfactor	.25	.24	.25	.25
	(.02)***	(.02)***	(.02)***	(.02)***
black	.24			
	(.28)			
white		-.27		
		(.18)		
indigenous			.32	
			(.75)	
mulatto				.04
				(.18)

0.14   Appendix F: *Municipal Level Results*

	DV: Unadjusted Quality		DV: Adjusted Quality	
	1	2	1	2
sex.average	-.24	-.23	-.23	-.23
	(.71)	(.71)	(.75)	(.75)
age.average	-.05	-.05	-.05	-.05
	(.02)**	(.02)**	(.02)*	(.02)*
avg.ses	.39	.39	.41	.41
	(.05)***	(.05)***	(.05)***	(.05)***
current.rev.per.cap02	.00	.00	.00	.00
	(.00)	(.00)	(.00)	(.00)
perc.valid02	-.01	-.01	-.01	-.02
	(.01)	(.01)	(.01)	(.01)
same00.02	.37	.35	.39	.36
	(.27)	(.27)	(.28)	(.28)
pt00.04	.36	.23	.39	.23
	(.50)	(.50)	(.50)	(.50)
tax.of.current03	.01	.01	.00	.00
	(.01)	(.01)	(.02)	(.02)
health.percap02		.00		.00
		(.00)		(.00)

Part VII

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