Does Medicaid Broaden the Choices of Patients with Low Socioeconomic Status? An Analysis of Bypassing Behaviors in Brooklyn

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Abstract

Background

Many governments worldwide have committed to extending choices in public service delivery. However, the extent to which policies ensure equity is unclear. We investigated whether Medicaid programs in the United States improve hospital accessibility among patients with low socioeconomic status, compared to those with non-low socioeconomic status who are non-Medicaid recipients or uninsured.

Methods

We employed a difference-in-difference-in-differences approach using a rich dataset of information on inpatients and their choice of hospitals from Statewide Planning Research and Cooperative System and information on hospitals from the American Hospital Association in Brooklyn, New York, from 2003 to 2009

Results

The findings indicated that Medicaid has failed to broaden the range of the hospital choices for patients with low socioeconomic status, assessed in terms of bypassing behaviors.

Conclusions

Medicaid is one public program that offers choices driven by purchasing power. The findings of this study imply that this program has some limitations in alleviating existing socioeconomic inequities in available hospital choices.

Background

In public service delivery, expanding upon existing consumer choices is central to the wider principles of recent service reforms in the Swedish elderly care sector [1], British health care sector [2], American education and health sectors [3,4], and Korean social service sector [5,6]. Such reforms aim to improve not only providers' efficiency but also their responsiveness to public service users or modify their responsiveness to better satisfy the requirements of consumer sovereignty [3,7]. However, conceptualizing and measuring the value of consumer choices is problematic in both theory and practice, because the criteria to determine whether a choice is welfare-enhancing are rarely suggested [8].

The Medicaid system in the United States is a consumer-driven purchasing policy that provides a mechanism for state and local governments to provide services in a manner that enhances consumer choices and improves the purchasing relationship between the government, providers, and consumers. Accordingly, patients are given a Medicaid entitlement that they can present at a hospital of their choice, to receive government-provided health insurance funds that align with their choice [2,3]. This study explored whether Medicaid can broaden patients' choice of hospitals because Medicaid patients can use

their purchasing power to pit hospitals against each other, and thus receive higher quality services [3,7]. However, while the natural motivation for such programs is to improve the health of lower-income persons [9], little research has been conducted to determine whether offering greater purchasing power for choices through existing health markets contributes to equity in accessing services; moreover, the existing programs are poorly documented in the public administration field.

There are concerns that increasing consumer-directed purchasing power may worsen equity—or at least not alleviate existing inequity—in accessing services, despite increasing the efficiency and responsiveness of health services. Even tools that offer consumer-directed purchasing power at subsidized prices or no additional charge involve distribution issues, as there may be non-monetary barriers—such as lack of information or poor local facilities—that impede access by different groups of patients [2,10]. Disadvantaged citizens tend to be left behind in terms of their access to the market-oriented provision of public services.

Therefore, this study aimed to investigate current differences in health service accessibility between vulnerable consumers and others, in terms of the geographic range of hospitals available to them, and to determine how such customers are affected by Medicaid. The findings can help to clarify whether demand-driven choices can change the existing inequities.

We analyzed patients' bypassing behaviors in Brooklyn, a borough of New York City in the United States. This was based on three reasons. First, there are substantial inequities within the current American health care markets [11]. Research has shown a relationship between health outcomes and socioeconomic status (SES). Moreover, coronary heart disease (CHD) and stroke (both incidence and mortality) are known to be higher among people and communities with lower SES [12,13]. Second, New York State has a history of being relatively liberal in expanding Medicaid eligibility, compared to some other states, partly due to the eagerness of state officials to avail themselves of federal funds [14]. Nonetheless, this commitment to providing generous health and social welfare benefits has had a decisive impact, not only on the scope and structure of the Medicaid program but also on the regulation of private health insurance [14,15]. Third, within New York State, New York City is particularly interesting because of the large number of hospital facilities (it has the largest public hospital system in the United States). It has, by far, the largest population of any municipality within the state and, in 2007, 62% of the state's Medicaid hospitalizations occurred in New York City [16, p. 1]. Within New York City, Brooklyn is interesting, because its CHD mortality rate in 1999 was over 30% higher than the state's average [12, p. 41], while its overall CHD hospitalization rate for 2000, at 72 per 10,000 residents, was slightly below the statewide rate of 75 per 10,000 [12, p. 73]—statistics that imply either a large annual variability or a delay in early hospitalization. Among all the city's boroughs, Brooklyn also has the highest number of residents eligible for but not covered by Medicaid [12].

Therefore, this study also investigated whether those who receive Medicaid benefits extend their hospital choices beyond geographic boundaries. The results will clarify whether such a policy, a type of consumer-directed purchasing tool, diminishes the existing inequities among citizens. The findings may be of

interest to administrative and health care policymakers, those researching theories on the choices of public service provision, and those at higher levels of government who are launching policies for lower SES patients.

Literature Review

The Concepts: Offering and Extending Choices

It is important to be clear about key concepts, as much of the debate in this area is characterized by confusing terminology. The measurement of offering and expanding choices is poorly documented and cannot readily be monitored. We differentiate between them as described below.

In terms of public services, the choices offered include the ability to make decisions from among all the various options available, such as choosing among providers (where), professionals (who), services (what), appointment times (when), and access channels (how) [17]. From an economic perspective, these choices are driven by both the supply and demand sides. For supply-driven choices, counting the alternatives measures the number of choices that exist, although, as Dowding and John [8] note, measuring by counting the alternatives seems counterintuitive, because a smaller set of better or more diverse alternatives seems to provide more choice than one that is simply larger. For demand-driven policy, a voucher program is a scheme that facilitates consumer purchasing power by providing subsidies to poor families. Dixon and Le Grand [17] posit that Medicaid—a government health insurance program that provides health care vouchers to low-income families and individuals—is a classic example of a program offering choices in the United States. A hospital will then redeem a voucher with the health department of the relevant government and, in return, receive a payment from public financial funds. Thus, this study concentrated primarily on Medicaid and patient choices under this program, as it is useful for conceptualizing choices driven by purchasing power. Consequently, this article defines "choices" as the ability of patients to decide among an increased number of hospitals based on their affordability through Medicaid entitlements. This is because increased financial resources may allow patients to compensate for not only their medical costs but also their information search costs or switching costs when deciding among more choices than they would have had access to previously.

Therefore, to measure the value of increasing choices from a patient perspective, we derived insights based on bypassing behaviors concerning health administration. Bypassing behaviors refer to patients bypassing a nearby hospital in favor of one further away in a pattern of seeking health care services outside their local community. This has been employed in many research studies on health policies in Europe [18] and the United States [19,20]. Bypassing behaviors have received relatively less attention in research on densely populated urban locations compared to rural locations, but they are still utilized in many studies [21,22]. Overall, the research on this topic agrees that patients are more likely to bypass the nearest hospitals to receive appropriate care elsewhere because of the perceived quality of care and

services available at other hospitals [23,24]. This higher tendency to bypass the closest hospital to one's residence could reflect a greater willingness to travel for care perceived to be better, rather than spatial access barriers.

The Concept of Inequity

Much of the controversy surrounding policies that offer choices stems from concerns about increasing inequity among citizens. Inequity is a concept that is subject to many interpretations in policy contexts. While it has many possible meanings, our study is congruent with those studies that consider equity as the eliminated consequence of differences between various SES groups [8,17]. Inequity, therefore, represents the consequences of differences between SES groups. This is because SES embodies an array of resources, such as money, knowledge, prestige, power, and beneficial social connections [25]. This study measured SES in terms of race, gender, and age, but these measurements should be regarded as provisional for various reasons.

The possibility arises that lower SES patients are left behind in the market-oriented provision of public services. This is a crucial concern of the opponents of the choice-movement, which introduced choice to public service delivery. Within the health care sector, these views are ambiguous. Some are concerned that extending choice may increase the efficiency and responsiveness of health services, but will worsen inequity. In exercising their right to choose a better option, patients can incur not only direct choice costs (e.g., distance costs) but also indirect choice costs (e.g., information costs, search costs, or switch costs) that are necessary to experience any benefits from their choices. Indeed, many options may entail information costs so high that increasing choice by adding alternatives actually makes the choice impossible [8]. Switching costs occur when patients need to change their current service provider and pick a new provider. Especially for those in vulnerable situations, such as a specific groups of patients, the costs of exercising choices also come with the risk of missing the care needed to prevent or maintain certain conditions [26]. The reason why people with lower SES have more problems in exercising choices is that exercising choice depends on the nature of information that is associated with higher levels of class stratification and racial segregation [27]. Thus, although lower SES patients may obtain choices driven by purchasing power through subsidies that make services affordable, they tend to reap fewer benefits from exercising those choices. With regard to the English National Health Service's policy to extend patients' choices of providers, Dixon and Le Grand [17] argued that extending patient choice may leave inequity unchanged due to differences in health beliefs (because choice does not affect these directly), or decrease inequity due to unequal capabilities (because the poor will have access to a new and, for them a more effective, source of leverage over health service professionals).

From these arguments, one can speculate that some patients with fewer resources, such as low SES patients, are unable to bypass the hospitals nearest to them, the way better-educated, middle-class patients can. Indeed, one can outline the idea of the number of hospitals to choose from being too large for low SES patients, compared to other patients, to comprehend enough information about each

alternative to distinguish one from another [8,27]. However, the extent to which low SES patients navigate smaller geographic choice sets of hospitals in comparison to other patients has not yet been discussed. Thus, our research sought to fill this knowledge gap.

Indeed, to our knowledge, no previous studies suggest the extent to which Medicaid enlarges low SES patients' choice sets of hospitals through bypassing behaviors, which would allow them to access higher quality services by broadening the geographic range of services, doctors, and hospitals available. However, this is important, as it could assist policy researchers and public administrators in determining whether or how Medicaid significantly influences the choice of hospitals for individuals with low SES in light of geographic access to health services. If Medicaid fails to expand the number of choices for low SES patients, it could lead to public health inequities.

Interestingly, this study highlighted the level of differences between low SES Medicaid and non-Medicaid groups in their choice of hospitals, which may indicate inequities. However, the challenge here is that inequity can be defined by a variety of definitions depending on which dimension is emphasized. In this study, the key dimension considered is the universality of access to a range of services. As it is not easy to capture the real differences in individuals' bypassing behaviors, we will discuss this issue in detail later on in the text.

Materials And Methods

Data

This study analyzed cardiac inpatient data in Brooklyn, New York, from 2003 to 2009. The data were collected by the Statewide Planning Research and Cooperative System (SPARCS) of the New York State Bureau of Health Informatics' Office of Quality and Patient Safety and the American Hospital Association (AHA). The number of cases totaled 136,103, with 25,761 observations in 2003, 26,681 in 2004, 41,451 in 2008, and 42,210 in 2009.

We chose to analyze data from 2003 to 2009 because 2009 was the year before the Affordable Care Act was passed; thus, no person was required to purchase health insurance, and the number of Medicaid-eligible persons had not yet been expanded due to the act's passage. Thus, inpatients were still using a medical billing and payment system they were familiar with and low SES inpatients had not yet secured the insurance that the Affordable Care Act made possible, which would have made both inpatients and outpatient care more affordable.

In this study, we specified service types. Specifying particular diagnoses codes allowed us to define the market for all patients diagnosed with those codes. For this study, we selected only cardiac inpatient cases. This was similar to other studies on patients receiving treatment for major diagnosis category conditions [28,29]. This is because each diagnostic group is considered to be one market. Patients with a specific diagnosis can opt for the same hospital choices. Accordingly bypassing, which differs from patient to patient, needs to be analyzed in each diagnostic group. Furthermore, cardiac patients may,

when possible, spend an unusual amount of time ensuring that they choose a good hospital; thus, potentially increasing the chances of bypassing the closest hospital. Table 1 presents the variables and measures used in the analyses [16,29,30].

Table 1. Variables and Measure

Variable	Category	Measure	Measure
Dependent	Extending Choices	Bypass	1, if a patient makes a decision to select a hospital in the same borough of his/her residence; 0, otherwise.
Independent	Offering choices	Public program	1, if Medicaid; 0, otherwise, (non-Medicaid or uninsured)
Control	Patient	Race	1, if African-American; 0, otherwise
		Age	Patient's age
		Gender	1, if female, 0, otherwise.
		The type of care needed	1, if the patient has one of surgical DRGs; 0, if medical DRGs.
		Length of Stays	It indicates the duration when patient was hospitalized.
		Emergence	1, if patient is in emergency acute Myocardial infraction condition which is DRG codes (280-290)
		The types of services needed	Diagnosis code
	Hospital Characteristics	Ownership type	Private: 1, if hospital's owned by investor-owned; 0, otherwise. Non-profit: 1, if hospital is owned by non-profit org.; 0, otherwise.
		Size	The number of hospital beds
		Reputation	The number of outpatients of a hospital (1,000 persons)
	Year		1, if year=2003; 0, otherwise
			2, if year=2004; 0, otherwise
			3, if year=2008; 0, otherwise
			4, if year=2009; 0, otherwise

Dependent Variable

To measure bypassing behaviors, it is important to consider the extent of utilization of certain areas from the perspective of economic demand theory to define an appropriate geographic market. The common approach to define the market based on the demand side focuses on the primary determinants of switching that are interesting and amenable to empirical investigation, which include the relative distances between consumers and alternative hospitals. With the increasing abundance of micro-level demand data, there appears to be scope for a refinement of the demand side analysis. This study utilizes matched micro-level data sets to approach the demand side considerations of the market definition from a micro-econometric perspective. Using Brooklyn's SPARCS data, we calculated the average non-bypassing percentages: 76.88% in 2003, 77.23% in 2004, 73.61% in 2008, and 73.08% in 2009, as shown in Table 2.

Table 2. The number of bypassing in Brooklyn

(Year: 2003, 2004, 2008, 2009)

year	non-bypassing		Bypassing		Total
2003	19,806	76.88%	5,955	23.12%	25,761
2004	20,605	77.23%	6,076	22.77%	26,681
2008	30,512	73.61%	10,939	26.39%	41,451
2009	30,847	73.08%	11,363	26.92%	42,210
Total	101,770	74.77%	34,333	25.23%	136,103

This reveals that the majority of actual demands were met by the supply of hospitals located in the borough. This is in line with McLafferty and Grady [23], who considered Brooklyn to be one geographic analysis unit in their empirical analysis of health markets.

According to previous studies [19,31,32], patients who have more resources tend to tolerate longer travel distances. Bypassing implies that patients have to travel further; additionally, it costs patients more in terms of not only money (due to travel costs such as traffic fees) but also time (spent on searching for information, switching providers, etc.). This means that patients are willing to travel farther to receive treatment at what they believe to be better-quality hospitals. Therefore, we assumed that bypassing behaviors occur more often when patients are able to cover direct costs, such as higher distance or time costs, or indirect costs, such as information costs [28,29]. Thus, it is not unreasonable to presume that patients are more likely to exhibit bypassing behaviors when they are informed about the services offered by hospitals outside their local area, and these services are adequate to meet the patients' needs.

The dependent variable in the present study was a dichotomous identifier variable. This variable was assigned a value of 1 when a patient chose a hospital outside their borough of residence (i.e., Brooklyn),

and 0 when a patient chose a hospital within the borough. We measured bypassing behavior based on the geographic market, which considers the potential geographic area from which a hospital draws its actual patients. Thus, bypassing behavior is conceptually closer to the potential choice set of patients for each hospital compared to the distance itself. We measured every case from the perspective of the behavior of an inpatient; for example, we counted one instance of non-bypassing behavior when a patient visited a hospital within his or her own health market, and one instance of bypassing behavior when that the same patient visited a hospital outside that market later the same year.

Independent Variable

We represented a patient's Medicaid status through a dummy variable as a proxy for the experience of consumer-directed purchasing policy. We assigned this variable a value of 1 if a patient used Medicaid as his or her primary or sole source of medical insurance. Then we created three different counterfactual groups. First, a patient was designated as non-Medicaid— meaning his or her sole or primary medical insurer was not Medicaid (including commercial insurance, Medicare, workers' compensation [which covers employment-related injuries], other federal programs, Blue Cross, and Civilian Health and Medical Program of the Uniformed Services [CHAMPUS])—or as self-paying (or uninsured) and assigned a value of 0. Second, for making another counterpart group for Medicaid patients, we assigned this variable a value of 0 only if a patient were uninsured.

As shown in Table 3, the number of Medicaid patients was 22,202 and the numbers of yearly cases were 6,553 in 2003, 6,084 in 2004, 4,771 in 2008, and 4,794 in 2009.

Table 3. Patients' insurance types (sole or primary carrier)

(Years: 2003, 2004, 2008, 2009, Unit: persons)

		2003	2004	2008	2009.	Total
Medicaid		6,553	6,084	4,771	4,794	22,202
Non-Medicaid	Medicare	7,614	8,122	18,971	19,404	54,111
	Private insurance	8,198	9,062	13,416	13,491	44,167
	Blue Cross	1,837	2,036	2,826	2,929	9,628
	Workers' compensation	256	222	47	49	574
	Other non-federal/federal Insurance/CHAMPUS	6	7	63	78	154
	Uninsured (self-pay)	1,297	1,148	1,357	1,465	5,267
Total Number of Patients		25,761	26,681	41,451	42,210	136,103

Next, we attempted to measure the potential vulnerability of patients in accessing health services. However, as the SPARCS database does not contain direct information on patients' income, wealth status, or education, none of these could be included as separate variables. Our SES variables represent demographic characteristics, such as gender and race, which play important roles in the health market. For example, female patients are more likely to visit local hospitals than are male patients, and older patients strongly prefer closer hospitals [33, p. 8]. In addition, race may act as a proxy for income, as African-American populations tend to have lower incomes in the health market [28, p. 95]. Therefore, we measured low SES using demographic variables (African-American, female) as follows: race variable 1 indicates inpatients who are African-Americans, and 0 indicates inpatients who are white; gender variable 1 indicates inpatients who are female, and 0 indicates patients who are male. However, it is only acceptable to use this measurement to assess SES in light of bypassing behaviors in the health market.

Control Variable

Bypassing may occur not only because of demand factors, such as the nature of the admittance-related situations encountered (e.g., emergency versus non-emergency), but also supply factors, such as hospital-physician affiliations, professional beliefs and attitudes (e.g., patients' cardiologists preferring a particular hospital), and risk selection or "cream-skimming" by providers [34,35]. Thus, this study employed the following steps to remove as many of these confounding factors as possible.

First, we investigated some other important relationships in advance. For example, to get a sense of whether patients facing emergencies are likely to engage in bypass behaviors, descriptive statistics were employed.

As shown in Table 4, there were 6,902 patients with acute myocardial infarction (AMI) out of our total sample of 136,103. AMI patients are usually admitted in emergency situations to the nearest hospital from his or her location. General AMI patients (20%) are also less likely to bypass nearby hospitals than are other patients (26%). Interestingly, Medicaid AMI patients (18%) are even less likely to bypass nearby hospitals, compared to others (21%). Detailed information on diagnoses for cardiac patients is shown in Table 4. We also included the recorded diagnosis-related group (DRG) codes (ranging from 215 to 316) using dummy variables. The diagnoses of heart attacks analyzed in this study comprised cardiac/cardiovascular/vascular events (215–264), AMI (280–290), heart failure and shock (209–293), and other cardiac conditions (294–316). These diagnoses include all types of cardiac inpatients, as they represent comorbidities. In addition, we took into consideration whether a patient's health condition required medical or surgical services (using dummy variables) and total length of stay, because severely ill patients would require a hospital with more resources and services, which can influence their bypassing behaviors.

Table 4. Bypassing rate according to cardiac patients' conditions

(Years: 2003, 2004, 2008, 2009, Unit: persons)

Health Condition	DRG Codes	All Patients		Medicaid Patients	
		Bypassing	Total	Bypassing	Total
Emergency Acute Myocardial Infraction (AMI patients)	280−290	1,354 (20%)	6,902	181 (18%)	1,034
Less Emergency (Non-AMI patients)	215−264, 291−293, 294−316	32,979 (26%)	129,201	4,382 (21%)	21,168
Total		34,333	136,103	4,563	22,202

Note: DRS Ⓧ Codes (215−264) indicate Cardiac valve & other major cardiothoracic proc /cardiac defib implant , other cardiothoracic procedures / coronary / major cardiovascular procedures / amputation for circulatory system disorders / permanent cardiac pacemaker implant / perc cardiovascular proc / other vascular, etc.Ⓧ Codes (280-290) indicate Acute myocardial infraction / circulatory disorders except AMI Ⓧ Codes (291−293) indicate Heart failure & Shock Ⓧ Codes (294−316) indicate deep vein thrombophlebitis, cardiac arrest, peripheral vascular disorder, atherosclerosis, hypertension, cardiac congenital & valvular disorder, angina pectoris, syncope & collapse, chest pain, other circulatory system diagnoses.

Second, we considered supply factors, such as hospital ownership [7,30], the number of beds, and the number of outpatients, as hospital characteristics [29]. Table 5 shows the descriptive statistics. We also controlled for year-related factors by using year dummy variables for 2003, 2004, 2008, and 2009.

Table 5. Descriptive Statistics

 (Years: 2003, 2004, 2008, 2009)

Variable			Mean	Std. Dev.	Min	Max
Dependent		Bypass	0.25	0.43	0	1
Independent		Medicaid (0=others)	0.84	0.37	0	1
Inpatients	Low SES	Race (1=African-American)	0.35	0.48	0	1
		Gender (1=female)	0.52	0.50	0	1
		Age	64.66	20.42	1	120.06
	Health Condition	Length of Stays	5.08	8.34	1	894
		Condition(1 = surgical, 0 = medicine)	0.70	0.46	0	1
		AMI conditions	0.05	0.22	0	1
Hospitals		Ownership (1=nonprofit, 0=public)	0.82	0.38	0	1
		The number of beds	635.72	335.87	30	2207
		Out patients (1000 persons)	431.92	311.47	30.71	1860.878
Observations			136,103			

Note: Regarding insurance types, others dummy variable includes Blue Cross, Worker's Compensation, Other non-federal/federal insurances, and etc.

Model

This study examined whether and how the Medicaid program helps lower SES inpatients choose between various hospitals that are distant from their residence or prevents them from doing so. We used datasets of hospitals and patient characteristics and specified the model to measure the probability of patients bypassing a hospital.

Regarding the data design, to improve the internal validity of the estimations of the Medicaid variable, the difference between before (control) and after (treated) low SES Medicaid groups should be compared. However, simply comparing the two groups (difference estimator) raises the problem that unobserved differences between Medicaid (treated) and non-Medicaid (untreated) groups could be correlated with the outcome.

To compare the outcomes of Medicaid groups with low SES patient characteristics, the model needs to control the problem of unobserved characteristics. As this study employed a rich data set of information on inpatients across several years, we attempted to borrow the frame of quasi-experimental designs, such

as difference-in-differences (DD). The model used was similar to the difference-in-difference-in-differences (DDD) approach used by Falck, Heblich, and Kipar [36] and Pieroni and Salmasi [37]. However, as the SPARCS database does not contain panel data, it is difficult to distinguish macroeconomic trends from the policy impact. Our empirical strategy differed from previous strategies in two main ways. We utilized datasets collected from all inpatients and their chosen hospitals over the years. Thus, our first strategy was to specify the yearly changes in an outcome measure and compare Medicaid and non-Medicaid patients' outcomes for the earlier and later time periods. The next strategy was to compare the outcomes of low SES and non-low SES inpatients, according to the earlier and later time periods.

Equation 1 focuses on Medicaid patients using a DD approach. Here, M denotes Medicaid for low SES patients, NM denotes non-Medicaid for other patients (e.g., the uninsured), and I^t represents an inpatient i's bypassing in year t; t1 and t0 denote the earlier and later year. We used a binary variable that equals unity if an inpatient has engaged in a bypassing behavior, and 0 otherwise. The model includes year dummy variables from 2003, 2004, 2008, and 2009, with 2003 being a reference year.

$$\Delta^2_M = (I_M{}^{t1} - I_M{}^{t0}) - (I_{NM}{}^{t1} - I_{NM}{}^{t0}) \quad (1)$$

Based on patient-level data, we estimated Equation 2 by linear models, irrespective of whether the outcome measure was binary or continuous [38]. In the case of a binary outcome measure, the linear probability model is:

$$\text{Prob}(I_i{}^t | \cdot \bigcirc) = \alpha_t + \gamma_0 M_{i2004} \gamma_1 M_{i2008} + \gamma_2 M_{i2009} + \beta_0 z_{it} + \beta_1 p_{jt} + \varepsilon_{ijt} \quad (2)$$

Here, $I_i{}^t$ equals unity if a low SES patient i engaged in a bypassing behavior in year t, and 0 otherwise. α_t is a full set of year dummies. z_{it} are the characteristics of the patient i (age, gender, race, total length of stay, medical condition, AMI condition), and p_{jt} are the characteristics of the hospital j (ownership, size, reputation) the patient selected in year t. M_i is a binary variable that equals unity for patients who received Medicaid. γ_0, γ_1, and γ_2 are the DD coefficients indicating the specific time effect of Medicaid on a low SES patient's propensity toward bypass behavior, with the reference year being 2003.

To control for SES factors (i.e., African-American and female) that may have affected patients bypassing behaviors, we additionally considered the control group (e.g., non-low SES groups) and changes in the bypassing behaviors of patients who do not belong to a low SES patient group, resulting in a DDD estimator:

$$\Delta^3 = \Delta^2_M - \Delta^2_{SM} \quad (3)$$

Again, M denotes the target, low SES patients, and SM denotes non-low SES patients. The first differences are identified by the different bypassing behaviors of low SES patient over time (i.e., between 2003 and 2009). The second differences include differences in the bypassing behaviors between Medicaid and non-Medicaid patients. The third and final set of differences includes the differences

between the target and non-target groups (i.e., low SES and non-low SES patients). In the case of a binary outcome measure for bypassing behaviors, we estimated Equation 4 with the following linear probability model:

$$\text{Prob}(I_i{}^t \mid \cdot \odot) = \alpha_t + \alpha_{M,2004+} + \alpha_{M,2008+} + \alpha_{M,2009+} + \gamma_0 M_{i2004}\, \gamma_1 M_{i2008} + \gamma_2 M_{i2009} + \beta_0 z_{it} +$$

$$\beta_1 p_{jt} + \varepsilon_{ij} \ (4)$$

We estimated Equation 4 considering all patients, regardless of whether they received Medicaid benefits or included non-target-low SES patients. In addition to a full set of year dummy variables α_t, the DDD approach allowed us to add target-low SES-specific time dummies (α_M) to control for Medicaid-specific and low SES patient time trends. Thus, to interpret α_M as the time specific effects of the Medicaid policy on low SES patients' bypassing behaviors, the identifying assumptions are fairly strong in this approach. It assumes that there is no contemporaneous shock that specifically affects the bypassing behavior among low SES Medicaid patients in relation to their low SES non-Medicaid counterparts in the same year when Medicaid was utilized [39].

Results

Bypassing Trends

This study explored the demand-side factors of bypassing behavior by analyzing the trends that reveal the link between the market-oriented provision of services and different groups of citizens, which has important implications for the theory of public service provision [40,41]. We investigated the extent of the disparities between different layers of society in a market, which differ depending on choice affordability from Medicaid, in terms of inpatients' bypassing behaviors.

Table 6. The Number of inpatients' bypassing according to their types of insurance.

(Year: 2003-2009)

Types of Insurance		Bypassing	Total	Bypassing Rate
Medicaid		**4,563**	**22,202**	**21%**
Non-Medicaid	Medicare	12,316	54,111	23%
	Private insurance	12,704	44,167	29%
	Blue Cross	3,037	9,628	32%
	Workers' Compensation	283	574	49%
	Other non-federal/federal insurance/CHAMPUS	51	154	33%
	Uninsured (self-pay)	1,379	5,267	26%
	Total	34,333	136,103	25%

Table 6 shows that bypassing behavior variations occur among Medicaid patients, non-Medicaid patients, and the uninsured.

Medicaid inpatients (21%) were found to be less likely to bypass nearby hospitals than were non-Medicaid inpatients, such as those using Medicare (23%), private insurers (29%), Blue Cross (32%), Workers' Compensation (49%), other non-federal/federal insurance or CHAMPUS (33%), or those who were uninsured (26%). This indicated that Medicaid inpatients may face narrow choices for hospitals and limited options.

Figures 1 and 2 plot the average bypassing rates in the period between 2003 and 2009. Average bypassing rates were calculated as the number of bypassing behaviors across all Medicaid and non-Medicaid (including uninsured) patients based on data from SPARCS. These figures plot the average bypassing rate of Medicaid patients compared to that of non-Medicaid patients; this trend was maintained over the study period, as shown in Table 6.

Figure 1 shows the average bypassing rates of African-American inpatients, who are much less likely to bypass than are other inpatients. Their rates present a contrasting trend to that of other inpatients, as the bypassing rates of African-American inpatients appeared to considerably decrease, while those of the other inpatients slightly increased during the study period. Figure 2 shows the average bypassing rates of male and female inpatients, which were similar, except for the fact that the bypassing rates of female inpatients appeared to diminish, while those of male inpatients increased again. These figures shed some light on how receiving Medicaid may have differential effects on patients' bypassing behaviors depending on whether patients belong to low SES groups.

Findings

Table 7 shows the results of our analyses accounting for the control variables of patients' health condition (seriousness, whether the patient receives medical or surgical care, the duration of hospitalization, diagnostic codes), patients' characteristics (age, gender, race), and hospital factors (non-profit status, number of beds and outpatients) [42]. First, we estimated the model for all inpatients (Medicaid or non-Medicaid). Second, we estimated the model for Medicaid and uninsured inpatients, who were another possible counterfactual group [42]. Model 1 was analyzed based on the groups of Medicaid and non-Medicaid inpatients; Model 2 was analyzed based on the groups of Medicaid and uninsured inpatients..

Table 7. Results

	Model 1 (Medicaid vs. Non-Medicaid)	Model2 (Medicaid vs. Uninsured)
$\alpha_{M1,2004}$	-0.117 (0.126)	0.286*** (0.089)
$\alpha_{M1,2008}$	**-0.609*** (0.131)**	-0.130 (0.110)
$\alpha_{M1,2009}$	**-0.642*** (0.125)**	-0.159 (0.099)
$\alpha_{M2,2004}$	0.032 (0.116)	**-0.425* (0.253)**
$\alpha_{M2,2008}$	**-0.264** (0.124)**	-0.388 (0.241)
$\alpha_{M2,2009}$	**-0.297** (0.117)**	-0.183 (0.235)
M_{T2004}	-0.090 (0.087)	-0.160 (0.173)
M_{T2008}	0.278*** (0.091)	-0.158 (0.175)
M_{T2009}	**0.330*** (0.087)**	-0.107 (0.165)
Constant	-2.864*** (0.051)	-3.865*** (0.159)
Patient characteristics	Incl.	Incl.
Hospital characteristics	Incl.	Incl.
Year dummies	Incl.	Incl.
Observation	136,055	27,442
Pseudo R^2	0.27	0.23

*p<0.05; **p<0.01; ***p<0.001

Notes1: In difference-in-difference-in-differences (DDD) estimation analyses, the dependent variable is bypassing behavior. Y_{T2004} , Y_{T2009}, Y_{T2009} equals unity for patients in Medicaid in the year 2004, 2008 and 2009, respectively. $\alpha_{S1T2004}$ equals unity for African-American Medicaid patient in the year 2004, 2008 and 2009. $\alpha_{S1T2004}$ equals unity for female Medicaid patient in the year 2004, 2008 and 2009. .

Note2: Model 1 was analyzed based on the groups of Medicaid and non-Medicaid inpatients; Model 2 was analyzed based on the groups of Medicaid and uninsured inpatients

M_T indicates whether Medicaid patients are more likely to display bypass behavior than are other patients. Our findings reveal that the trend of Medicaid patients being more likely to bypass does not appear in any year, except in 2009. Thus, it is unclear whether Medicaid patients benefit from a wider range of choices driven by purchasing power.

The negative α_M signs indicate that low SES Medicaid inpatients are less likely to bypass than are low SES non-Medicaid inpatients. We observed that overall $\alpha_{M1, 2008}$, and $\alpha_{M1, 2009}$, in Model 1, and $\alpha_{M1, 2008}$, in Model 1 and 2 were negatively associated with our dependent variable, bypassing behaviors, during the period analyzed. This finding revealed that low SES Medicaid inpatients in are less likely to bypass than are low SES non-Medicaid patients. This supports the hypothesis that low SES Medicaid inpatients may not broaden their choices of hospitals, compared with low SES non-Medicaid inpatients, over time. More specifically, African-American inpatients were found to less likely to bypass (-0.609***, -0.642***) in Model 1 and (-0.286**) Model 2. Female Medicaid patients were found to be insignificantly less likely to bypass (-0.264**, -0.297**) in Model 1, (-0.425*), Model 2. These results indicated that low SES Medicaid inpatients are often faced with narrow choices of hospitals and thereby offered more limited options than are low SES non-Medicaid inpatients over time. Notably, the findings also revealed that these trends held over time. This may imply that low SES Medicaid inpatients are less likely to display bypass behavior over time. We expected that the affordability offered by a public program would not be sufficient to increase low SES Medicaid patients' bypassing behaviors, compared to low SES non-Medicaid patients.

This is an interesting finding because, although Medicaid offers inpatients choices, it may not be enough to continually contribute to widening low SES patients' range of choices for hospitals; thus, it could potentially limit their access to better-quality hospitals. This indicated that the choices in demand driven by affordability between potentially vulnerable citizens who are members of lower SES groups and others tend to be less significant than expected.

Overall, we found preliminary evidence to suggest that Medicaid offers affordability to inpatients in terms of a range of choices in hospitals, although this may not be enough to be effective for low SES inpatients, in terms of their bypassing behaviors. Although Medicaid attempts to improve lower SES inpatients' decision-making choices, these patients need more support to enjoy the potential benefits provided by choosing these now-accessible hospitals.

Discussion

This study aimed to provide insights into whether Medicaid, by offering choices based on affordability, weakens or mitigates inequity in patients' access to health services. To achieve this aim, we addressed this specific question: are disparities between Medicaid and non-Medicaid patients significantly and positively associated with the probability of a hospital bypassing behavior when controlling for patient and hospital characteristics and including yearly effects?

The findings reveal that low SES Medicaid patients seem to be less likely to bypass aggregately over time than are non-low SES non-Medicaid patients, especially African-American and female patients. This indicates that Medicaid has some limitations to broadening some patients' range of hospital choices when patients exercise the right to choose providers. Therefore, such policies with regard to health care markets might gradually cause a deterioration of the situation related to the existing inequities experienced by citizens with low SES.

These findings reveal that disparities exist in bypassing behaviors between different layers of society in terms of the affordability of health services and the ability of citizens to explore their annually expanding choices of hospitals in light of bypassing behaviors. The bypassing behaviors of lower SES patients are not greater than those of non-lower SES patients in relation to Medicaid, thus implying that demand-side policies cannot fully cover these patients. We can speculate that there were some patients with lower SES who could have exercised patient choice in health care, but chose not to do so.

However, a more important implication is that choices driven by demand may not consistently alleviate existing inequalities among citizens. When analyzing this by year, the evidence supports the view that polices for extending patient choice in preexisting markets may not necessarily enhance equity unless they are properly designed. This implies that increasing the number of low SES Medicaid patients appears to increase their ability to afford hospital care, but does not fully improve their chances of obtaining the level of care and type of hospital they prefer. Medicaid eligibility needs to be more inclusive for some patients with lower SES (e.g., African-American and female patients). This could have important implications for political debates regarding the allocation and distribution of both public services and Medicaid funding.

However, our study's findings may be affected by several limitations. First, although race and gender are certainly important, there may be other socioeconomic variables that also influence hospital bypassing behaviors, such as wealth or social class. In the future, these variables need to be considered when estimating bypassing behaviors. Second, the supply-side factors that impact bypassing were not fully captured. The physician's hospital affiliation may be a contributing factor in this decision, as might be the fear of potential insurance payment issues (such as refusal by a provider network to include a particular hospital or a refusal by a hospital to accept a particular type of insurance). In addition, our data source (New York State's SPARCS database) did not specify whether Medicaid patients used traditional fee-for-service Medicaid or managed care Medicaid as their method of insurance; thus, we did not differentiate between patients using these two plans as their method of payment despite realizing that some managed care plans may influence an individual hospital choice. Third, our research focused on bypassing

behaviors measured by the relationship between a patient's residence location and his or her selected hospital's location. However, a patient's work location as well as the location of his or her relatives may have a significant influence on hospital choice. Moreover, the location of a patient's physician may also influence this decision, particularly if the physician is not located in close proximity to the patient's home.

The influence of these factors on patients' bypassing decisions may warrant further research, as these effects may be significant. More intensive research on these relationships may prove beneficial to the development of public health and social policies, whether in New York City (at the neighborhood-, borough-, or city-wide levels) or in other urban centers.

Abbreviations

AHA: American Hospital Association

AMI: Acute Myocardial Infraction

CHAMPUS: CivilianHealthandMedicalProgramoftheUniformed Services

CHD: Coronary heart disease

DRG: Diagnosis-related group

DD: Difference-in-differences

DDD: Difference-in-difference-in-differences

SES: Socioeconomic status

SPARCS: Statewide Planning Research and Cooperative System

Declarations

Ethics approval and consent to participate: Not applicable.

Consent for publication: Not applicable.

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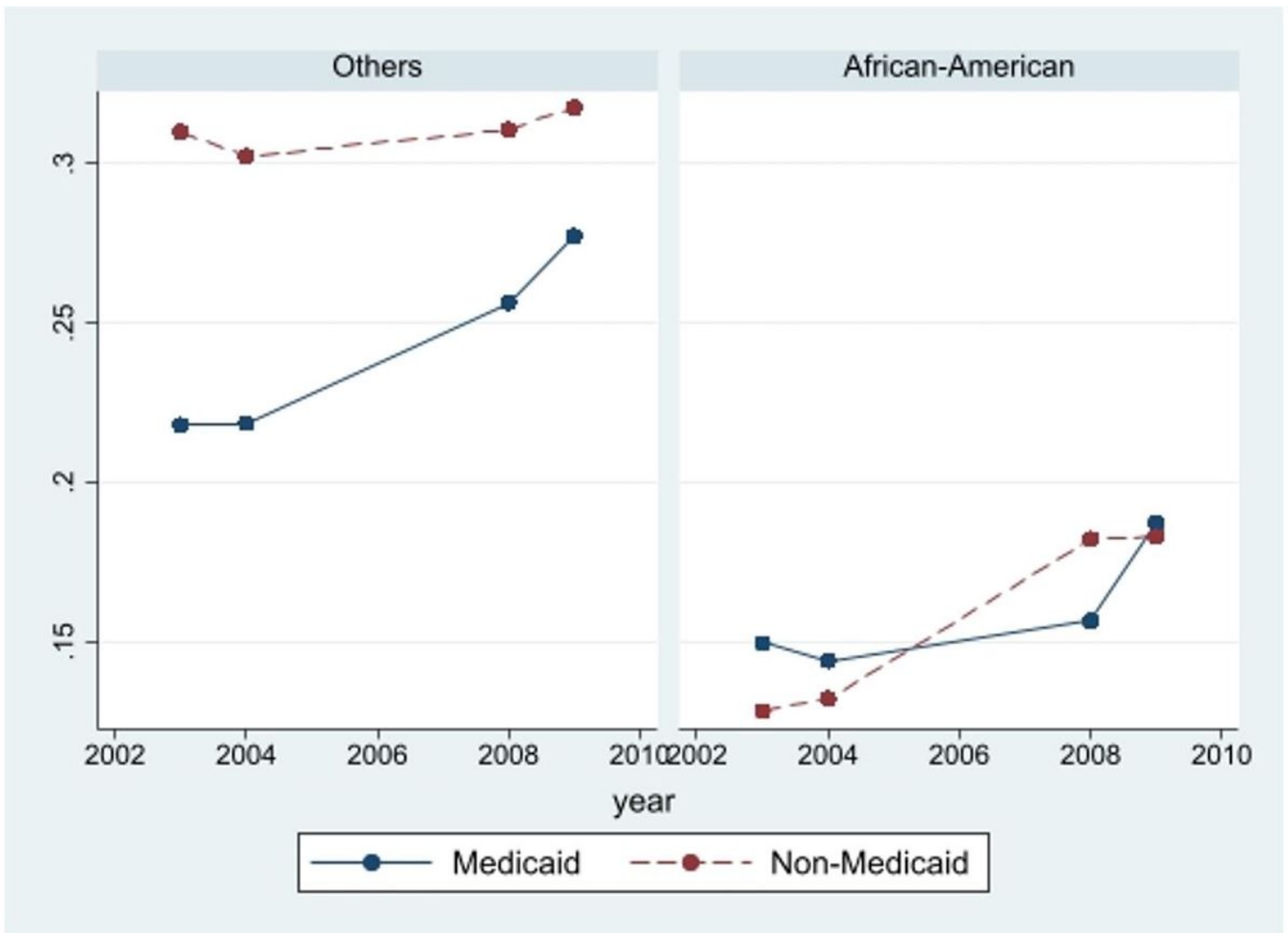
Figures

Figure 1

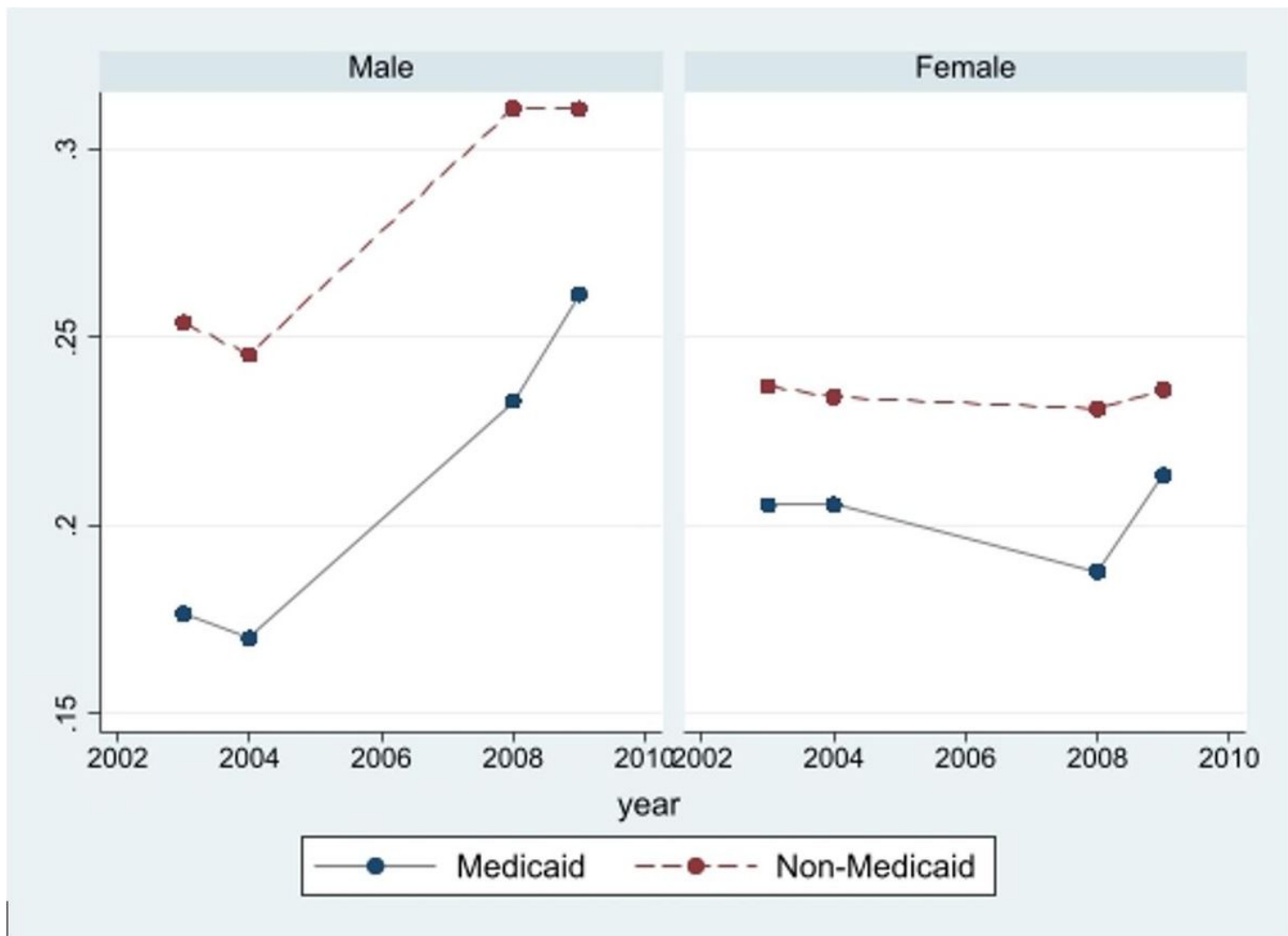Average bypassing rates of African-American and other inpatients (2003–2009)

Figure 2

Average bypassing rates of female and male inpatients (2003−2009)