

Local population characteristics and access equity of 340B contract pharmacies

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Abstract

The 340B Drug Pricing Program allows certain US medical entities with vulnerable patient populations to receive large discounts on outpatient prescriptions and use those savings at the entity's discretion. Since reforms in 2010, the number of pharmacies with whom 340B entities contract grew massively. This article explores the locations of 340B contract pharmacies and corresponding local populations within Texas. We measured and tested for statistical differences in population characteristics between 340B and non-340B pharmacies and the association with other local amenities. We focused on measures of pharmacy accessibility, local population social vulnerability, and local access to other crucial amenities, measures of population well-being previously not investigated in this debate. We found that 340B and non-340B pharmacies are located in fairly similar local populations, but 340B pharmacies are located in statistically significantly less-vulnerable populations than the facilities with which they contract. We found that comparisons of pharmacy accessibility measures are complicated by sensitivity to data sources. Our results suggest that the contract pharmacy program within Texas may target less-vulnerable populations through the shift from covered entity pharmacies to outside pharmacies. Impacts on the target patient population at the covered entity require further research to measure.

Lay Summary

The 340B contract pharmacies in Texas are located in areas that are significantly less vulnerable than the covered entities with which they contract. When compared with non-340B pharmacies, 340B contract pharmacies are not located in systematically different areas. Data discrepancies between major sources challenge efforts to determine differences in accessibility amenities between 340B and non-340B pharmacies.

Key words: pharmacies; 340B drug pricing.

Introduction

Since 1992, the 340B Drug Pricing Program requires drug manufacturers that participate in Medicaid or Medicare Part B to provide covered outpatient drugs at a discounted price to eligible health care entities. Rules around Medicaid pricing had disincentivized manufacturers from continuing to offer lower prices to health care facilities that were financially strained due to serving low income populations. The 340B program was created as a means to reduce outpatient drug costs for eligible facilities while not impacting Medicaid prices. Through this program, eligible medical facilities, called covered entities (CEs), can receive substantial discounts, often on the order of 50%, for outpatient drugs they prescribe their patients.¹ Eligible facilities include certain disproportionate share hospitals, children's hospitals, cancer hospitals, sole community hospitals, rural referral centers, critical access hospitals, Federally-Qualified Health Centers, and other entities serving particularly vulnerable populations. Generally, these covered entities can retain the savings after payment for drugs from insurers and use those savings without restrictions.

Since 2010, all covered entities can contract simultaneously with multiple outside pharmacies to dispense outpatient drugs to their patients. Following this reform, the number of

contract pharmacy relationships in the 340B program has increased from approximately 1% of pharmacies to over 40%, and increasingly, covered entities are contracting with pharmacies across larger geographic distances.² Critics of the program, and specifically the contract pharmacy element of it, have noted that the program creates potentially strong financial incentives for participating entities, effectively transferring money from pharmaceutical companies to covered entities. While complex regulations govern the simultaneous use of 340B discounts and Medicaid rebates in order to avoid duplicate discounts, covered entities are not required to target their vulnerable patients with their use of the program. In the case of Medicare or privately insured patients, the covered entity is typically reimbursed well above the discounted price of the drug, generating savings. This creates an economic incentive to target patients with these more generous payers. And without any regulation on how covered entities use these savings, it opens up the possibility that this program may be used as a general profit booster rather than as a means to specifically provide more services to vulnerable patients. Focusing on the incentive to target more lucrative patients, this study explores whether contract pharmacies are located among better-off populations. This does not necessarily mean that covered

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entities are using the contract pharmacy relationships to access more affluent patients, but it is another data point in the discussion of whether this program expands health care access to the most vulnerable.

This article most closely relates to 2 recent studies,³ and,⁴ on contract pharmacy locations. Such studies use county-level data to determine if growth in contract pharmacies between 2009 and 2019 is associated with county characteristics³ found that, for pharmacies contracting with hospitals in the 340B program, growth was not correlated with uninsured rates, poverty rates, or medical underservice.³ For pharmacies contracting with safety-net clinics, however, growth was positively correlated with poverty rates and metropolitan statistical status⁴ focused on growth of contract pharmacies. They found, among other trends, that between 2011 and 2019 the share of 340B retail pharmacies in disadvantaged and minority neighborhoods declined. The percentage of non-340B pharmacies in the lowest-income neighborhoods increased, while the percentage of 340B pharmacies declined. Alongside this, the highest-income neighborhoods saw increases in the percentage of 340B pharmacies.⁴ These results, among others, while informative, do not specifically demonstrate whether the contract pharmacy growth benefits or hurts vulnerable patients. It is possible that these patterns of growth among well-off populations is evidence of the 340B program successfully allowing the program to increase the stretch of resource-constrained medical facilities through the prescriptions of wealthier patients.⁵

There are many other studies that evaluate various aspects of the 340B program, which, while not as directly related to our study as the previous 2 papers, help to fill in our understanding of the way the program has grown in scope and potential unintended consequences. Work has been done to study the impact of 340B on provider consolidation.^{6,7} Others evaluated the expansion of affiliated clinics and found that those entities that joined the program later serve more affluent communities.⁸ Additionally there has been evidence of strategic behaviors by hospitals to gain access to the 340B program.⁹ More work evaluated the impact of program participation on where patients receive cancer drug administration.¹⁰

Another set of studies,¹¹⁻¹⁴ evaluated whether participants might be using their savings to assist vulnerable patients. One such study compared early and later participating covered entities and found that early participants were more likely to offer uncompensated care and low-profit services.¹¹ Others found that entry into 340B is not associated with an increase in the provision of uncompensated care.¹² Additional research found that new 340B participants do not increase uncompensated care, low-profit services, or total community benefit spending, but are associated with an increase in charity care spending and offering discounted care.¹³ Impacts might depend on the type of participating facility, as 1 study found that critical-access hospitals might be passing cost-savings onto patients.¹⁴

In this article we expanded on the understanding of where contract pharmacies are located using rich data on local populations, focusing on pharmacies in Texas. Our analyses shed light on whether the most vulnerable populations have access to the pharmacies participating in the 340B program. We did so by comparing the local population characteristics, pharmacy characteristics, and access to other amenities between 340B pharmacies and non-340B pharmacies. We found that 340B pharmacies are located in similarly vulnerable areas

when compared with non-340B pharmacies. We also found that 340B pharmacies are located close to fewer other health care facilities than non-340B pharmacies, but are less likely than non-340B pharmacies to be located in an area with very few supermarkets. We additionally found that available data are inconclusive as to differences in accessibility amenities between 340B and non-340B pharmacies. Regardless of data or definition of local used, we found that 340B pharmacies are located in significantly less vulnerable areas than the covered entities with which they are contracting.

Data and methods

Pharmacies

We combined 3 detailed datasets on pharmacies in Texas to analyze the relationship between 340B program participation and amenities. Our analysis focused on pharmacies operating as of January 31, 2019, in order to avoid changes resulting from the COVID-19 pandemic.

We used data directly from Health Resources and Services Administration's Office of Pharmacy Affairs Information System (OPAIS) database to identify all 340B contract pharmacies and covered entities as of January 2019, restricting attention to those operating in Texas. These data do not include any information on Texas pharmacies that are not contracting within the 340B program. To provide a complete list of all pharmacies as of January 2019, we used 2 large datasets. The first is from the National Council for Prescription Drug Programs (NCPDP), which provides detailed information about pharmacy operations and characteristics. As an alternative source of all Texas pharmacies, we used data from the Texas State Board of Pharmacy (TSBP), which maintains records of all licensed pharmacies operating in Texas, restricting our analysis to those with active licenses as of January 2019.

Our Texas pharmacy data do not include complete information regarding the 340B status of each pharmacy. To identify all 340B and non-340B pharmacies, we matched the pharmacies in OPAIS to those in NCPDP, as well as those in TSBP. First, we standardized addresses across all 3 databases to facilitate matching. This process includes normalizing directional indicators, street types, and unit designations. We then implemented a hierarchical matching algorithm that first attempts exact matches on standardized address components, followed by fuzzy, and if necessary, manual, matching for cases where exact matches are not possible. For chain pharmacies, we developed a classification algorithm that identifies major retail chains through regular expression matching on pharmacy names and addresses.

Social vulnerability

To account for local socioeconomic conditions, we merged in the Centers for Disease Control and Prevention's (CDC's) Social Vulnerability Index (SVI) at 2 geographic levels: the immediate census tract of each pharmacy and the population-weighted average SVI across all census tracts within a 5-mile radius (see [Supplemental Materials](#)). The SVI, developed by the Agency for Toxic Substances and Disease Registry (ATSDR) and the CDC, quantifies the relative vulnerability of each US Census tract based on various social factors. The SVI incorporates 15 social factors including poverty, unemployment, income, and housing conditions, providing a robust measure of local socioeconomic conditions.

Local amenities

To measure other amenities local to pharmacies we used the Geoapify Places Accurate Points of Interest (API). For each pharmacy and covered entity in our sample, we query the API using Geoapify to identify 3 categories of establishments within a 5-minute driving distance: pharmacies, supermarkets, and hospitals. The API leverages isoline-based search functionality, which defines service areas based on actual travel times rather than straight-line distances.

Analyses

Our analyses tested for statistical differences between pharmacy and local population characteristics between 340B and non-340B pharmacies, as well as between 340B pharmacies and their corresponding contracting covered entities. While only correlational, these tests identify statistically significant differences between the average 340B contract pharmacy and the pharmacies that do not have active 340B contracts.

Test for differences in means

Our main analyses tested for significant differences between the local characteristics of the 340B contract pharmacies and the corresponding covered entities with which they have contracts. This is meant to investigate whether covered entities contract with pharmacies serving different local populations than the covered entity itself. For these analyses, each observation is the difference between measures of each party in a contract, and we tested the following hypothesis:

$$H_0: \text{mean}(X_{340B} - X_{\text{CoveredEntity}}) = 0$$

Similarly, we also focused on computing and comparing the mean of different pharmacy or local population attributes for all 340B pharmacies in Texas and all non-340B pharmacies within Texas. We formally computed a *t* test for differences in those means:

$$H_0: \text{mean}(X_{340B}) = \text{mean}(X_{\text{non340B}}),$$

Where X_{340B} refers to the values of the SVI for all 340B pharmacies, and similarly defined for the right-hand-side term. We conducted tests for the 5 aggregate measures of social vulnerability, as well as pharmacy accessibility characteristics and measures of local other amenities (hospitals, pharmacies, and supermarkets).

As shown in the [Supplemental Materials](#) we conducted robustness tests of the above analyses using an alternative measure of “local” by computing means using population-weighted averages of all census tracts within a 5-mile radius of the pharmacy or covered entity. Additionally, as an additional test of differential pharmacy location, we compared the population characteristics of the pharmacy census tract with that of the county average, testing for differences between 340B and non-340B pharmacies. This informs about whether 340B pharmacies are located in more privileged areas of their counties than non-340B pharmacies.

Limitations

We acknowledge a number of limitations of our study. First, our analysis focused solely on the state of Texas. This is appealing as Texas is very large, very diverse, and is home to the largest uninsured population in the United States, the latter being a group that the 340B program was designed to aid. It is

likely the case, however, that results in Texas may not fully carry over to the broader American population. Second, our analyses are purely descriptive in nature and thus reflect correlations rather than clear results of strategic behavior by covered entities or pharmacies.

Third, we faced data imperfections. We present results using both NCPDP and TSBP data precisely because both datasets have strengths and weaknesses. While these data are appropriately considered very high quality, we did not find concordance even in the list of all pharmacies operating within the state of Texas as of January 31, 2019. Moreover, the datasets contain differing information on pharmacy characteristics, such as language and accessibility services. Moreover, while the utmost care was taken with merging OPAIS data with both NCPDP and TSBP data, slight discrepancies in address information across data made it possible that some data were not available for analysis. Finally, our data on amenities within a 5-minute drive of facilities are contemporary and may not be precisely descriptive of our analysis period.

Results

We present our results grouped based on measure of comparison: SVI, pharmacy features, and nearby amenities. In each case, we present the average value of these measures for 340B pharmacies and non-340B pharmacies and display the *t*-statistic for the test of the hypothesis of equal means. Recall differences in means are statistically significant at the 10% level when the absolute value of the *t*-statistic is above 1.645, the 5% level above 1.96, and the 1% level above 2.576.

Social Vulnerability Index

[Table 1](#) and [Figure 1](#) present the results on the measures of social vulnerability. The SVI represents an overall aggregate measure, averaging across sub-measures of Household, Minority, Socioeconomic Status, and Housing and Transportation.

Table 1. Differences in social vulnerability.

	Mean 340B		Mean non-340B	<i>t</i> -Statistic	
	CT	Pharm— CE, CT		CT	Pharm— CE, CT
NCPDP					
SVI	0.49	−0.14	0.49	0.33	−25.69
Household	0.49	−0.02	0.45	3.57	−3.32
Minority	0.49	−0.06	0.50	−1.58	−14.12
SES	0.46	−0.12	0.45	0.83	−22.56
Housing and Transp	0.54	−0.20	0.55	−1.27	−37.92
TSBP					
SVI	0.49	−0.14	0.47	1.45	−29.71
Household	0.48	−0.04	0.44	4.67	−8.40
Minority	0.48	−0.06	0.48	−0.85	−15.97
SES	0.45	−0.13	0.44	2.51	−26.84
Housing and Transp	0.54	−0.19	0.55	−1.29	−39.41

Source: Authors' calculations using 2019 NCPDP data, OPAIS data, and 2019 TSBP data.

Abbreviations: CE, covered entity; CT, census tract; NCPDP, National Council for Prescription Drug Programs; OPAIS, Office of Pharmacy Affairs Information System; Pharm, pharmacy; SES, socioeconomic status; SVI, Social Vulnerability Index; Transp, transportation; TSBP, Texas State Board of Pharmacy.

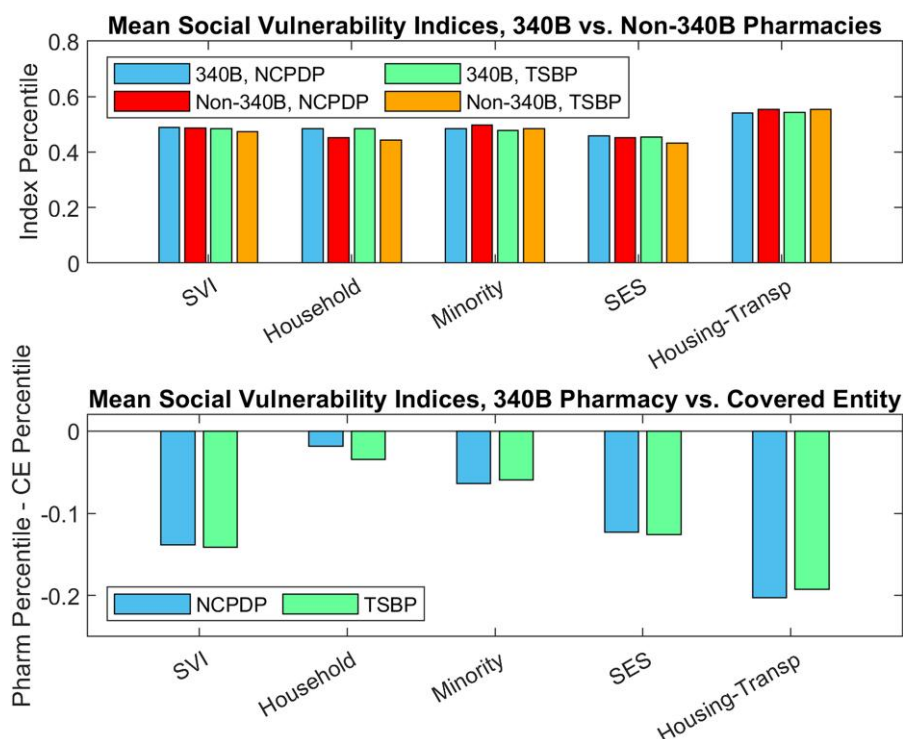


Figure 1. Differences in Social Vulnerability Indices. Source: Authors' calculations using 2019 NCPDP data, OPAIS data, and 2019 TSBP data. Abbreviations: NCPDP, National Council for Prescription Drug Programs; OPAIS, Office of Pharmacy Affairs Information System; SES, socioeconomic status; SVI, Social Vulnerability Index; Transp, transportation; TSBP, Texas State Board of Pharmacy.

Comparison of 340B pharmacies and covered entities

The clearest results on whether 340B contract pharmacies are systematically located near more or less-vulnerable populations relate to locations of contract pharmacies relative to their contracting covered entities. The results are robust across data sources and all measures of social vulnerability: 340B contract pharmacies are located in significantly less-vulnerable areas than the covered entities with which they are contracting.

Census tract of pharmacy

These results compare the SVIs of the immediate area surrounding a pharmacy by comparing the social vulnerability measures of the census tract in which the pharmacy is located across 340B and non-340B pharmacies. Using NCPDP pharmacies and locations we found that there is very little difference between 340B and non-340B pharmacies, with the only significant difference being that 340B pharmacies are in more-vulnerable neighborhoods according to Household measures. That result is overall robust to using TSBP data, where 340B pharmacies are also found to be located in more-vulnerable census tracts as measured by the socioeconomic status factors. Additional results based on the population-weighted average SVI of all census tracts within a 5-mile radius yield similar results and can be found in [Exhibit A1](#). Those results indicate that 340B pharmacies may be located in more-vulnerable areas than non-340B pharmacies.

Pharmacy characteristics

Findings on pharmacy characteristics were not consistent across data sources. [Table 2](#) presents the results on pharmacy characteristics. Using NCPDP data, we found that 340B pharmacies are significantly more likely than non-340B

pharmacies to have drive-up, immunization, emergency, and 24-hour services. They are statistically less likely than non-340B pharmacies to have Spanish or Vietnamese languages available, handicap access, delivery services, or walk-in services. These results, however, are not robust to data source. Conducting the same test using TSBP data for the overlapping variables, we found all results change signs. Upon closer investigation, there are some clear differences in the data that account for some, but not all, of these discrepancies. For languages, specifically, many NCPDP pharmacies, especially large chains, do not report any languages (the data contain 5 fields to list languages, including English). When we limited our analysis to the pharmacies that do report at least 1 language, we found that the gap between 340B and non-340B pharmacy shrinks somewhat, but the result that 340B pharmacies are significantly less likely to offer Spanish or Vietnamese remains. The TSBP data include fields specifically for these 2 languages and do not include any missing values. It is left to further investigation what the remaining source of difference is.

Proximity to other amenities

As shown in [Table 3](#), our results indicate that 340B pharmacies are located near significantly fewer hospitals than non-340B pharmacies, and TSBP data indicate they are also located close to fewer other pharmacies and supermarkets. When assessing whether 340B pharmacies are located more or less frequently in underserved areas, however, the count of such businesses nearby may not be of first-order importance. Rather, we additionally measured the share of 340B and non-340B pharmacies that are located near either 0 or 1 of these types of businesses. Our results indicate that 340B

Table 2. Pharmacy characteristics.

	Mean 340B		Mean non-340B		t-Statistic	
	NCPDP	TSBP	NCPDP	TSBP	NCPDP	TSBP
Spanish	0.098	0.801	0.381	0.679	−25.439	9.801
Vietnamese	0.002	0.493	0.049	0.354	−13.131	8.75
Handicap	0.864	0.996	0.944	0.91	−7.882	18.994
Drive-up	0.635	-	0.331	-	18.768	-
Delivery	0.157	0.49	0.49	0.398	−24.391	2.173
Walk-in	0.065	-	0.109	-	−4.006	-
Immunization	0.894	-	0.528	-	25.089	-
Emergency	0.362	-	0.316	-	2.271	-
24-Hour	0.073	0.063	0.019	0.126	7.124	−7.952

Source: Authors' calculations using 2019 NCPDP data, OPAIS data, and 2019 TSBP data. Dashes indicate fields not included in TSBP data.

Abbreviations: NCPDP, National Council for Prescription Drug Programs; OPAIS, Office of Pharmacy Affairs Information System; TSBP, Texas State Board of Pharmacy.

Table 3. Differences in nearby amenities.

	Mean 340B			Mean non-340B		t-Statistic		
	Count	Zero or 1	Pharm—CE	Count	Zero or 1	Count	Zero or 1	Pharm—CE
NCPDP								
Pharmacies	3.686	0.294	−0.056	3.7	0.3	−0.143	−0.351	−0.864
Hospitals	1.531	0.68	−1.984	1.958	0.611	−5.844	4.624	−29.068
Supermarkets	4.363	0.14	0.507	4.445	0.18	−0.802	−3.473	8.521
TSBP								
Pharmacies	3.588	0.31	0.057	3.808	0.29	−2.313	1.473	0.986
Hospitals	1.597	0.683	−1.49	2.168	0.572	−7.672	7.913	−23.456
Supermarkets	4.258	0.145	0.505	4.487	0.17	−2.385	−2.36	9.55

Source: Authors' calculations using 2019 NCPDP data, OPAIS data, and 2019 TSBP data, and counts of businesses within 5 minutes of locations based on Geoapify queries conducted by the authors. Zero or 1 values reflect the share of pharmacies near 0 or 1 of the listed amenities.

Abbreviations: CE, covered entity; NCPDP, National Council for Prescription Drug Programs; OPAIS, Office of Pharmacy Affairs Information System; Pharm, pharmacy; TSBP, Texas State Board of Pharmacy.

pharmacies are significantly less likely to be in an area with access to very few supermarkets. This result suggests that food deserts may also be locations that lack access to a 340B participating pharmacy.

Discussion

Our study results indicate that some of the debates with regard to the 340B contract pharmacy program are nuanced, at least in Texas. We compared local population and pharmacy characteristics of 340B pharmacies and non-340B pharmacies and found that overall measures of SVIs, data not yet used for such evaluations, do not unambiguously support some of the existing findings that 340B contract pharmacies are located in differentially more privileged areas. This is in contrast to some previous studies that have focused on other measures of population well-being.

It is clear in our results, however, that 340B contract pharmacies are located in substantially less-vulnerable areas than the covered entities with which they are contracting. Prior to 2010, contract pharmacies were only permitted when a covered entity lacked an in-house pharmacy. Thus, most 340B prescriptions were dispensed through pharmacies within covered entities. The proliferation of outside contract pharmacies has shifted the program's prescription fulfillment to significantly less-vulnerable areas according to the detailed social vulnerability data used in this study. To the extent that the location of pharmacies impacts which patients are targeted, these results do not suggest that the contract pharmacy

program is aimed at the most vulnerable. If, instead, this pattern reflects the program's ability to allocate resources from less-vulnerable parties—such as pharmaceutical manufacturers or payers located in better-resourced areas—to the more-vulnerable covered entity, then this pattern may indicate an improvement for the target population. Such a conclusion depends crucially on the way in which the covered entity uses the savings generated through the program. This is beyond the scope of this study, but previous research has not consistently found such a result across the program, as discussed earlier in this study's review of prior literature.

Large-chain pharmacies make up the majority of contract pharmacies within the 340B program. Our results are robust across large and medium chains. One exception, however, relates to the data discrepancies between NCPDP and TSBP pharmacy data. Our result on pharmacy characteristics varies widely depending on which pharmacy data are used. Much, but not all, of the gap between pharmacy amenities stems from large- and medium-chain pharmacies: TSBP indicates these pharmacies have amenities such as language services and handicap access, while NCPDP indicates either no value or that the amenity is not featured at these chain pharmacies. Our study, unintentionally, brings to light a crucial issue for researchers in the field. The NCPDP has very widely used data on pharmacies in the United States, as it covers a very large number of pharmacies across the country and includes a much wider breadth of information than other datasets. State pharmacy boards, however, are the regulatory bodies overseeing the industry and are thus potentially rich sources

of detailed data on pharmacies. Researchers may view our study as a note of caution about relying on single sources of pharmacy data.

Conclusion

This study aimed to provide additional, rigorously investigated information regarding the location differences between 340B contract pharmacies and both the covered entities with which they contract and other pharmacies that do not participate in the program. We did so by bringing together detailed population data directly and indirectly measuring vulnerability with data on all pharmacies operating in the state of Texas. These detailed data allow for statistical comparisons of local populations along a number of measures and across both differing data and differing definitions of “local.” Our results are informative for policymakers debating whether to suggest reforms to the contract pharmacy program.

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Supplementary material

Supplementary material is available at *Health Affairs Scholar* online.

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Conflicts of interest

Please see ICMJE form(s) for author conflicts of interest. These have been provided as supplementary materials.

Data availability

The authors are not permitted to share purchased NCPDP data, but similar data can be purchased by interested individuals. All other data in this study is publicly available or collected by the authors using API queries. For questions regarding the public or API-queried data, please contact authors.

Notes

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