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Socio-ecological and pharmacy-level factors associated with naloxone stocking at standing-order naloxone pharmacies in New York City

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Abstract

Background: Research on socio-ecological factors that may impede or facilitate access to naloxone in pharmacies remains limited. This study investigated associations between socio-ecological factors, pharmacy participation in the naloxone cost assistance program (NCAP), pharmacy characteristics and having naloxone in stock among pharmacies in New York City.

Methods: Phone interviews were conducted with 662 pharmacies selected from the New York City Naloxone Standing Order List. Multi-level generalized linear modeling estimated associations between neighborhood racial and ethnic composition, poverty rates, overdose fatality rates, pharmacy participation in N-CAP, having private physical spaces within the pharmacy, knowledge of where to refer people to obtain naloxone and adjusted relative risk (aRR) that the pharmacy would have naloxone in stock.

Results: Findings from this study supported several of the hypotheses. Greater neighborhood poverty was associated with a lower likelihood of carrying naloxone compared to neighborhoods with less poverty (aRR = .79, CI95 % = .69, .90, $p < .001$). Pharmacies that provided a private window for consultations (aRR = 1.34, CI95 % = 1.19, 1.51, $p < .001$), a private room (aRR = 1.42, CI95 % = 1.30, 1.56, $p < .001$), and a private area (aRR = 1.42, CI95 % = 1.30, 1.56, $p < .001$) were associated with a higher likelihood of carrying naloxone compared than those that did not.

Conclusions: Findings from this study suggest that community-level socioeconomic marginalization is a contributor to disparities in naloxone availability among pharmacies in New

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Contributors

Bilal Abbas conceived of the research idea and carried out the study. Phillip Marotta conducted the statistical analyses and wrote the methods, results and discussion sections. Dawn Goddard-Eckrich, oversaw the research design and contributed to writing the manuscript. Diane Huang helped collect the data and write the manuscript. Jakob Schnaidt helped collect the data and write the manuscript. Nabila El-Bassel assisted in writing and revising the manuscript. Louisa Gilbert supervised the research study and contributed to writing the manuscript.

Declaration of Competing Interest

The authors report no declarations of interest.

York City. Findings support harm reduction interventions tailored to the built environment of pharmacies that respect privacy to those seeking naloxone.

Keywords

Overdose; Naloxone; Neighborhoods; Socioeconomic disparity; Pharmacy; Harm reduction

1. Introduction

The United States is immersed in the worst overdose crisis in its history (CDC, 2019). Opioids were involved in 70 percent (46,802) of the 67,367 fatal drug overdoses in the United States (CDC, 2019; Hedegaard et al., 2020; Wilson, 2020). The overdose crisis continues to disproportionately impact urban, socioeconomically marginalized and minority communities in the United States (Lippold et al., 2019). In 2017, Black populations experienced the largest increase in overdose death rates in New York City (New York State Department of Health [NYSDOH], 2018). In the same year, New York City residents located in high poverty neighborhoods had higher rates of non-fatal and fatal overdose compared to residents in wealthier neighborhoods (New York Department of Mental Health and Hygiene [NYDOMHH]; 2019; 2020; Epi Data Brief: Unintentional Drug Poisoning and New York City Department of Health (2000) NYDOH Epi brief, 2018). In New York City opioids were involved in 80 percent of all overdose deaths (NYCDOH, 2018). There is an urgent need to scale up naloxone distribution, particularly in low income and predominantly Black neighborhoods to redress emerging socioeconomic and racial disparities in opioid death rates. Pharmacies are an opportune setting to dispense naloxone to people who use opioids and yet emerging research suggests many pharmacies do not stock naloxone in low-income and predominantly minority communities (Bonner, 2017; Skoy et al., 2020).

1.1. Socio-ecological disparities in pharmacies that carry naloxone

Disparities in access to naloxone have been documented in non-white, low-income and racially segregated communities (Killing, 2015; Qato et al., 2014; 2017). Pharmacies within neighborhoods with greater proportions of white people are more likely to have naloxone available compared to neighborhoods with greater proportions of minority residents (Qato et al., 2014). A study in Philadelphia found lower pharmacy naloxone availability in neighborhoods with higher fatal overdose rates (Guadamuz et al., 2017). Another study of 90 pharmacies in New Jersey found lower naloxone availability among households in low income neighborhoods (Lozo et al., 2019).

1.2. Pharmacy participation in naloxone policies

Prior research has found pharmacies that participate in policies to allow the provision of naloxone without a prescription are more likely to have naloxone in stock (Abouk et al., 2019; Davis et al., 2015; Freeman et al., 2018; Meyerson et al., 2018; Xu et al., 2018; Meyerson et al., 2018). In 2016, New York expanded naloxone availability through the Naloxone Standing Order Program which allowed pharmacies to dispense naloxone without a prescription in New York City and required participating pharmacies to receive training in how to administer naloxone (NYCDOMHH, 2018). Research in other states with standing

naloxone order programs such as Massachusetts, North Carolina and Pennsylvania suggest that pharmacies that participate in the standing order program are more likely to have naloxone available than pharmacies that do not participate in the standing order program (Graves et al., 2019). A naloxone access policy that is yet to be examined in prior research is the Naloxone Co-payment Assistance Program (N-CAP) in New York State. Pharmacies who participate in NCAP provide a financial subsidy of 1—40\$USD to people who receive naloxone and may be more likely to have naloxone in stock compared to pharmacies who do not participate in NCAP New York State Department of Health (2020), New York State Senate Section 3309 (2020), NYC Health (2019) (New York City Department of Health and Mental Hygiene).

1.3. Pharmacy-level characteristics of carrying naloxone

Research shows that large chain pharmacies, and having knowledgeable staff is associated with greater likelihood that pharmacies will carry naloxone (Egan et al., 2020; Puzantian et al., 2018; Kim et al., 2009; Nielsen et al., 2016; Nielsen and Van Hout, 2016; Freeman et al., 2017; Thornton et al., 2017; Graves et al., 2019). Recent studies have also found that chain pharmacies are more likely to carry naloxone in stock than independent pharmacies (Egan et al. (2020; Puzantian et al., 2018). Other factors that are found in prior research that are associated with increased likelihood of carrying naloxone include a lack of physical space, and extended business hours (Green et al., 2017, 2019).

1.4. How this study addresses gaps in existing literature

Further research on socio-ecological and pharmacy-level factors that are associated with naloxone availability in pharmacies is needed to gain a better understanding of how to address inequities in naloxone distribution in pharmacies. Prior literature has examined these factors in separate studies using relatively small sample sizes of pharmacies such as 90 (Lozo et al., 2019) and 169 (Egan et al., 2019). Few studies have focused on urban environments when examining factors associated with having naloxone in stock. More research is needed that investigates socioecological and pharmacy-level factors and having naloxone in stock with large sample sizes in urban environments to increase the generalizability of findings. Prior studies have examined policies and naloxone access at the state-level without including participation in naloxone financial assistance policies at the pharmacy-level (Abouk et al., 2019; Davis and Carr, 2015). Studies are yet to investigate the relationship between participation in the Naloxone Cost Assistance Program and carrying naloxone in stock among pharmacies in New York City. At the pharmacy level studies that examine physical space and likelihood of having naloxone in stock did not include specific types of spaces including a private room, consultation booth or window to answer questions about administering naloxone (Green et al., 2017; 2019).

Research is lacking that investigates the relationship between socioecological factors and carrying naloxone in New York City. Rates of overdose continue to increase at alarming rates in predominantly black and Hispanic neighborhoods and neighborhoods with greater rates of poverty compared to areas with lower rates of overdose (NYDOH, 2018). There is an urgent public health need to identify multi-level factors associated with having naloxone in stock in New York City and other urban areas in the U.S. To address this need for

greater research, this study utilized a socio-ecological model to examine socioeconomic factors, pharmacy participation in naloxone policies, pharmacy-level characteristics and the likelihood that pharmacies will report having naloxone in stock in a sample of 662 pharmacies in New York City.

1.5. Hypotheses

This study generated hypotheses using the social ecological model of opioid overdose developed by Jalali et al., 2020 that presumes broader social and contextual factors are associated with increased rates of opioid overdose. The social ecological model of opioid overdose calls for greater research using multi-level approaches at the individual, community and policy levels to identify strategies of attenuating rates of deaths among people who use opioids (Jalali et al., 2020; Mair et al., 2018; McLeroy et al., 1988; Stokols, 1992). Guided by prior literature and the socio-ecological framework, this study put forth the following hypotheses: ***Socio-ecological characteristics***. Pharmacies in neighborhoods with greater proportions of racial and ethnic minorities (hypothesis 1), rates of poverty (hypothesis 2) and overdose death rates (hypothesis 3) will be less likely to have naloxone in stock. ***Pharmacy participation in the Naloxone Cost Assistance Program (N-CAP)***. Pharmacies that opt to enroll in N-CAP will be more likely to have naloxone in stock (hypothesis 4). ***Pharmacy characteristics***. Pharmacies that have private areas for consultations will have a greater likelihood of having naloxone in stock (hypothesis 5). Pharmacies with the knowledge to refer consumers to other providers when naloxone is not available will be more likely to have naloxone in stock (hypothesis 6).

2. Methods

2.1. Data collection procedures

The following research was deemed not human subjects research and exempted by the Columbia University Institutional Review Board. We recruited pharmacies using the publicly available directory of pharmacies participating in the New York City standing-order naloxone program updated and published in June 2018. Research assistants then conducted phone-interviews with 1151 pharmacies, of which 662 pharmacies consented (57.5 % participation rate) and completed the survey. Cited reasons for non-participation included corporate policy, insufficient time, or a general refusal. Fig. 1 presents the spatial distribution of pharmacies who consented and were included in this study.

2.2. Measures

2.2.1. Dependent variable

2.2.1.1. Carrying naloxone in stock.: Additionally, pharmacies were asked if they carried naloxone, if it was in stock, if they participated in the N-CAP program, and if they knew where to refer someone when not in stock. Pharmacies were asked if they carried naloxone in the form of 1) intranasal, 2) intramuscular, or 3) autoinjector.

2.2.2. Independent variables—Socio-ecological characteristics consisted of publicly available data provided by the NYC Department of Health aggregated and nested using 34 United Hospital Fund (UHF) boundaries. United Hospital Fund is a charitable organization

devoted to increasing racial and ethnic equity in New York City and divides the city into 34 neighborhoods to measure community-level sociodemographic, health factors including overdose, insurance coverage and other factors. The neighborhoods boundaries are used to understand the spatial distribution of disparities in NYC. **Racial and ethnic composition** consisted of the proportion of neighborhood residents who identified as non-Hispanic black, non-Hispanic white, Hispanic, Asian and other/more than one race. **Poverty rates** included percentage of the neighborhood residents whose annual income was less than the federal poverty line. **Overdose rates** consisted of rates of accidental and intentional fatalities resulting from use of illicit drugs.

Pharmacy participation in Naloxone Cost Assistance Program (NCAP): We asked pharmacies if they participated in N-CAP as a financial resource for consumers who could not afford to pay the co-payment costs of naloxone.

Pharmacy characteristics. Physical features.: We asked pharmacies whether they provided a private 1) room, 2) window, or 3) area to consult with consumers. **Pharmacy hours.** Pharmacies provided data on their hours of operation on nights and weekends. **Knowledge.** We asked pharmacies if they knew where to refer someone if naloxone was not in stock.

2.3. Data analysis

Descriptive analyses included frequencies and proportions of dichotomous variables and mean and standard deviations for continuous variables. Hypothesis testing first tested unadjusted associations between pharmacy, community and policy factors and pharmacies having naloxone in stock. Significant covariates were subsequently modeled in adjusted multi-level generalized linear models with random coefficients to account for the nested structure of the data (Nelder and Wedderburn, 1972; McCullagh, 2018; Dobson and Barnett, 2018; Hox et al., 2010; Diez-Roux, 2000). Relative risk estimates were chosen over odds ratios because when the dependent variable is common odds ratios do not approximate an estimation of risk and therefore lose utility as meaningful parameter estimates. When the outcome is <10 % the odds ratios approximate relative risk and are thus most useful when the outcome is relatively rare. The outcome variable of this study was relatively common thus warranting use of relative risk estimates. Statistical tests included p-values and 95 % confidence intervals of associations between the multi-level factors and the likelihood of carrying naloxone. All analyses were performed using Stata Version 15 (STATA Corp, 2020). Robust variance estimation adjusted standard errors and confidence intervals for potential bias (Lindquist et al., 2012; Wen and Chiou, 2009; Stata Corp, 2013).

3. Results

3.1. Naloxone supply

Table 1 presents descriptive analyses of pharmacies included in the sample. More than three-quarters of the pharmacies reported carrying naloxone (78.37 %, n = 511) and approximately two-thirds reported having naloxone in stock at the time of the survey (67.18 %, n = 438). More than two-thirds reported carrying intranasal naloxone (69.49 %, n = 460), 11.78 % (n

= 57) reported carrying intramuscular naloxone and 7.06 % (n = 46) carried autoinjector in stock.

3.2. Bivariate tests of differences between, socio-ecological factors, pharmacy participation in N-CAP, pharmacy characteristics and having naloxone in stock

Table 2 presents overall frequencies and bivariate tests of differences based on naloxone availability.

3.2.1. Socio-ecological factors—The mean overdose death rate was 16.36 deaths per 100,000 (SD = 6.83). Pharmacies that provided naloxone were in communities with significantly lower neighborhood overdose death rates compared to pharmacies that did not provide naloxone (Mean 15.45, SD = 6.61 vs 18.21, SD = 6.95, $p < .001$). The racial and ethnic composition at the neighborhood level was 21.16 % non-Hispanic black (SD = 21.48), 11.71 % Asian (SD = 9.29), 37.25 % (SD = 25.88) Non-Hispanic white and 27.28 % Hispanic (SD = 17.91). Pharmacies that had naloxone in stock were in neighborhoods with significantly higher proportion of white residents (38.99 % SD=25.40 vs. 33.71 %, SD = 26.55, $p < .001$) and significantly fewer Hispanic residents (25.29 %, SD = 16.69 vs. 31.36 % SD = 19.59 $p = .008$). Pharmacies that provided naloxone were in neighborhoods with significantly lower rates of poverty compared to pharmacies that did not provide naloxone (18.78 %, SD = 9.16 vs 24.44 %, SD = 9.36, $p < .001$).

3.2.2. Participation in naloxone cost assistance program—More than two thirds of the pharmacies participated in N-CAP (70.22 %, n = 422) and a greater proportion of pharmacies that provided naloxone participated in N-CAP compared to pharmacies that did not carry naloxone (81.65 % n = 356 vs. 40.00, n = 66).

3.2.3. Pharmacy characteristics—Most of the pharmacies (84.82 %; n = 553) reported knowing where to refer someone if naloxone was not in stock. A significantly greater proportion of pharmacies that carried naloxone reported knowing where to refer someone when naloxone was not in stock compared to pharmacies that did not have naloxone (93.84 % n = 411, 66.36 %, n = 142, $p < .001$). Most of the pharmacies reported having a private area (90.03 %, n = 587) and consultation window (51.23 %, n = 334) to talk to the pharmacist. A significantly greater proportion of pharmacies that carried naloxone provided a consultation window (42.92 %, n = 188 vs. 11.68 % n = 25, $p < .001$) a private area to speak with consumers (97.95, n = 429 vs. 73.83 %, $p < .001$) and private room to talk to pharmacists (59.36 %, n = 260 vs. 34.58 %, n = 74, $p < .001$) compared to pharmacies that did not have naloxone in stock. Few pharmacies reported being open on weekend nights (7.10 %, n = 47) and overnight (2.57 %, n = 17).

3.3. Generalized linear model of associations between socioecological factors, pharmacy participation in N-CAP and pharmacy characteristics

Table 3 presents adjusted and unadjusted models of associations between multi-level factors and relative risk of having naloxone in stock.

Socio-ecological factors.—Hypothesis 1: Pharmacies located in neighborhoods with greater rates of poverty were less likely to have naloxone in stock compared to pharmacies in wealthier neighborhoods (RR = .66, CI95 % = .57, 0.76, $p < .001$; aRR = .79, CI95 % = .69, .90, $p < .001$). **Hypothesis 2 and 3:** We did not find support for the hypothesis that neighborhoods with greater percentage of Hispanic and African American people and greater rates of overdose would be associated with pharmacies being less likely to carry naloxone after adjusting for other factors.

Pharmacy participation in N-CAP.—Hypothesis 4: Pharmacies that participated in the Naloxone Cost Assistance Program were more likely to carry naloxone compared to pharmacies that did not participate in N-CAP (RR = 1.87 95 % CI = 1.44, 2.45, $p < .001$; aRR 1.63 95 % CI = 1.27, 2.09, $p < .001$).

Pharmacy characteristics.—Hypothesis 5: Pharmacies that provided a private consultation window for consumers were more likely to have naloxone in stock (RR = 1.38, CI95 % = 1.22, 1.56, $p < .001$; aRR = 1.34, CI95 % = 1.19, 1.51, $p < .001$) compared to pharmacies that did not provide a private consultation window. Additionally, pharmacies that provided a private room to speak to a pharmacist were more likely to carry naloxone compared to pharmacies that did not provide a private room (RR = 1.54 CI95 % = 1.42, 1.67, $p < .001$; aRR = 1.42, CI95 % = 1.30, 1.56, $p < .001$). **Hypothesis 6: Pharmacies and referral for naloxone when not in stock.** We found support for the hypothesis that pharmacies with knowledge of where to refer people when naloxone is not in stock were more likely to report having naloxone (RR = 2.71, CI95 % = 1.88, 3.90, $p < .001$; aRR = 1.34, CI95 % = 1.02, 1.76, $p < .001$).

4. Discussion

This study identified several socio-ecological and pharmacy-level factors that are associated with lack of access to naloxone in pharmacies in New York City. **Socio-ecological characteristics.** This study found that pharmacies in neighborhoods with high rates of poverty were less likely to provide naloxone compared to pharmacies in wealthier neighborhoods. There are several potential explanations for these findings. Pharmacies in socioeconomically disadvantaged neighborhoods may lack the financial resources to train or hire staff to provide naloxone. Pharmacies in poor neighborhoods may lack access to cheaper supply chains of naloxone and financial resources to keep naloxone in their inventory given its relatively short shelf life. Pharmacies in low income areas may also be reluctant to stock naloxone out of stigma, negative attitudes towards serving consumers who use drugs or fear of increasing crime as a result of being viewed as a source of naloxone. Moreover, pharmacies in poor neighborhoods may experience high rates of policing and enforcement nearby and fear that by providing naloxone they may attract unwanted police attention. Future research is urgently needed to identify mechanisms and factors driving the lack of naloxone availability in pharmacies in impoverished neighborhoods given higher rates of fatal overdose.

4.1. Pharmacy participation in the naloxone cost access program

The finding indicating that pharmacies participating in the N-CAP program were more likely to have naloxone in stock than those which did not participate highlights the importance of including policy context factors that shape the availability of naloxone in pharmacies. The N-CAP program is an important insurance-reimbursement policy that is designed to widen access to obtaining naloxone among consumers by providing a \$40 copayment for naloxone for consumers who have health insurance and by referring the uninsured to community-based programs for free naloxone. Future research is needed, however, to determine whether uninsured consumers actually are successfully linked to these programs and obtain naloxone.

4.2. Pharmacy-level factors associated with having naloxone in stock

Physical features of pharmacies that afford privacy and places to consult with pharmacists was significantly associated with having naloxone in stock. Engaging consumers in a confidential and nonjudgmental manner is essential to promote naloxone distribution. Having a private room, window or area provides opportunities for pharmacy staff to assess co-occurring risks for overdose and provide referrals to substance use treatment. Increasing consumer demand for naloxone from pharmacies with private rooms or consultation areas and with such trained pharmacists may further incentivize pharmacies to keep naloxone in stock. The presence of private areas may function as a proxy for other factors associated with carrying naloxone such as the greater availability of naloxone in chain versus independent pharmacies. (Green et al., 2019). This study found that pharmacy staff who had the knowledge to make an external referral to obtain naloxone when it is not in stock were more likely to work in pharmacies that carried naloxone. Staff who understand the importance of providing immediate access to naloxone to consumers may be more likely to keep naloxone in stock and know alternatives if they run out of naloxone.

4.3. Limitations

Several limitations are worth noting in this study. The low participation rate may limit generalizability of the study to all pharmacies on the Naloxone Standing Order List in New York City (42.3 %). Pharmacies that refused to be included did not provide any data for the study thus precluding analysis of bias in non-response and analysis of how pharmacies who refused to participate differ based on pharmacy or community-level characteristics. The data is self-reported, without the ability to verify if pharmacies carried naloxone in stock at the time of the call. Another limitation of the data is the variable measuring clinic hours did not have sufficient cell sizes to include in regression analyses and may have lacked statistical power to detect a significant relationship in the bivariate analyses. The use of a binary question to measure knowledge of where to refer someone if naloxone was not in stock without asking for greater detail may lose nuance of measuring the extent to which prescribers know about the local community resources that are available to provide naloxone.

Another limitation of this study is that it did not measure characteristics of the pharmacy staff as well as the trainings provided by pharmacies on naloxone administration and education. Pharmacies with staff that have more training and credentials (PharmD) may be

more likely to provide naloxone compared to pharmacies with staff who have less training and education. This study did not measure access to naloxone in pharmacies among the most vulnerable populations including people without health insurance, people who inject drugs, people with inconsistent housing and people who are involved in the criminal justice system. Prior research suggests that these populations are reluctant to access naloxone in pharmacies even when naloxone is available thus reinforcing disparities in access to naloxone among the most vulnerable populations (Brinkley-Rubinstein et al., 2017; Reed et al., 2019).

4.4. Avenues of future research

Findings from this study give rise to several fruitful avenues of future research. Studies are needed using administrative or consumer level data that allows for confirming the accuracy of referrals. Greater research is needed that employs strategies to enhance participation rates such as financial incentives as well as working with management staff to recruit multiple pharmacies for participation in the study. Smaller pharmacies may be less likely to engage in research because of staffing issues and lack of time to provide information. Future research must investigate the association between the level of staff training, years of experience and credentials of staff, trainings on naloxone provided by the pharmacy on naloxone and the likelihood that the pharmacy will provide naloxone. Future research must investigate if having a private window or room available, inadvertently amplifies discriminatory treatment and stigma. Mixed methods research is needed to understand and elucidate neighborhood-level and pharmacy-level environmental factors (e.g. physical space, training of pharmacists, stocking of naloxone) that are associated with naloxone availability from consumer, pharmacist, provider and other key stakeholder perspectives. Future research on pharmacy-level factors associated with carrying and distributing naloxone should also include the effects of pharmacy staff stigma towards people who use drugs. Such factors may further illuminate the underlying mechanisms through which private areas in pharmacies shape pharmacies having naloxone in stock.

4.5. Conclusion

This study highlights the need for multi-level research into interventions to widen access to naloxone in pharmacies in New York City and other urban areas. Such intervention strategies may include ensuring that pharmacies have adequate private consultation space, incentivizing enrolment in the N-CAP or other insurance reimbursement programs and training of pharmacist staff on the importance of overdose education and naloxone distribution. Finally, the study findings are a call to action to scale up naloxone access in pharmacies in low-income neighborhoods that have been heavily impacted by the opioid epidemic in New York City.

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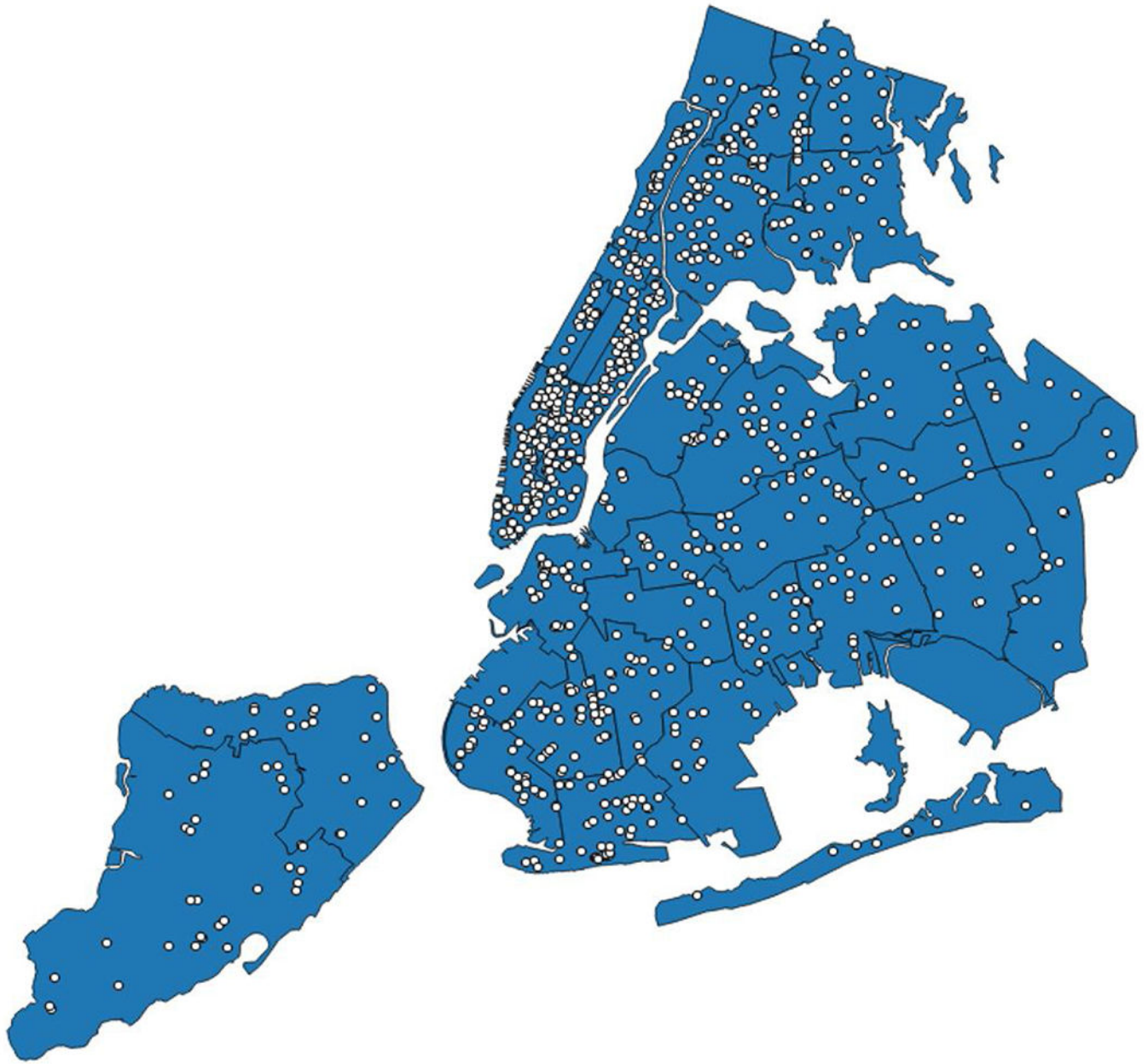


Fig. 1.
Pharmacies that participated in the survey (662) in New York City in 2018.
Dots represents pharmacies that participated in the survey.
Boundaries represent 34 United Health Fund Neighborhoods.

Table 1

Descriptive analyses of naloxone supply and cost of pharmacies (n = 662) who participated in the study.

Carry naloxone %(n)	78.37	(511)
Naloxone in stock %(n)	67.18	(438)
Intranasal %(n)	69.94	(456)
Intramuscular %(n)	11.78	(57)
Autoinjector %(n)	7.06	(46)

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Table 2

Descriptive and bivariate tests of differences between facilitators of access to naloxone, neighborhood sociodemographic factors and naloxone provision of pharmacies who participated in the study (n = 662).

	Has naloxone in stock				p<.value
	Overall	Yes	No		
Pharmacy characteristics					
Know where to refer someone % (n)	84.82 (553)	93.84 (411)	66.36 (142)		<.001
Physical features of the pharmacy					
Open overnight % (n)	2.61 (17)	3.65 (16)	.47 (1)		na
Open weekend nights % (n)	7.06 (46)	9.59 (42)	1.87 (4)		na
Private area % (n)	90.03 (587)	97.95 (429)	73.83 (158)		<.001
Private consultation window % (n)	32.67 (213)	42.92 (188)	11.68 (25)		<.001
Private room % (n)	51.23 (334)	59.36 (260)	34.58 (74)		<.001
Neighborhood-level					
Community overdose rates M(SD)	16.36 (6.84)	15.45 (6.61)	18.21 (6.95)		<.001
Race M(SD)					
Non-Hispanic Black	21.16 (21.48)	20.73 (22.21)	22.04 (19.92)		.127
Asian	11.71 (9.29)	12.30 (9.70)	10.51 (8.29)		.062
Non-Hispanic White	37.25 (25.88)	38.99 (25.40)	33.71 (26.55)		<.001
Hispanic	27.28 (17.91)	25.29 (16.69)	31.36 (19.59)		.008
Poverty M(SD)	20.64 (9.59)	18.78 (9.16)	24.44 (9.36)		<.001
Policy					
N-CAP Program	70.22 (422)	81.65 (356)	40.00 (66)		<.001

M: Mean; SD: Standard deviation; N-CAP: Naloxone Cost Assistance Program.

Table 3

Mixed effects generalized linear model of associations between facilitators of access to naloxone, poverty and naloxone provision of pharmacies who participated in the study n = 662.

	RR	95 %CI	p<.value	aRR	95 %CI	p<.value
Pharmacy factors						
Know where to refer someone	2.71	(1.88, 3.90)	<.001	1.34	(1.02, 1.76)	.036
Physical features of the pharmacy						
Private area to talk to pharmacist	5.27	(3.15, 8.83)	<.001	1.42	(1.28, 2.27)	<.001
Private window	1.38	(1.22, 1.56)	<.001	1.34	(1.19, 1.51)	<.001
Private room	1.54	(1.42, 1.67)	<.001	1.42	(1.30, 1.56)	<.001
Policy factors						
N-CAP	1.87	(1.44, 2.45)	<.001	1.63	(1.27, 2.09)	<.001
Community factors						
Community overdose	0.74	(.65, .84)	<.001	0.95	(.77, 1.18)	.655
Poverty	0.66	(.57, .76)	<.001	0.79	(.69, .90)	.001
Race (compared to black and other)						
White	1.06	(.92, 1.23)	0.403			
Hispanic	0.91	(.75, 1.09)	0.301			
Asian	0.99	(.88, 1.14)	0.957			
Policy factors						
N-CAP	1.87	(1.44, 2.45)	<.001	1.63	(1.27, 2.09)	<.001

RR: Relative Risk; CI: Confidence Interval; N-CAP: Naloxone Cost Assistance Program; RR: unadjusted relative risk; aRR: Adjusted relative risk.