

RESEARCH ARTICLE

Policing as a Social Determinant of Health: The Impact of Drug Enforcement on Prenatal Care Utilization in Urban Communities.

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Abstract

Background: Prenatal care is an important health behavior for optimizing maternal-child outcomes. Social ecological studies have identified both individual- and community-level factors that significantly impact this health behavior. While public health researchers have demonstrated that police officers can act as both barriers and facilitators to health promoting behaviors, little is known about their effect on women's adequacy of prenatal care utilization (APNCU).

Aim of the Study: Use a mixed-model procedure that nests individuals within their census-tracts of residence to examine the effects of drug arrests (a common police strategy in vulnerable communities) on APNCU among pregnant women residing in an urban setting.

Results: While controlling for several known individual-level factors (i.e., maternal age, education, and pregnancy risk/complications), the study found that police drug arrests negatively impacted APNCU, as did structural disadvantage, distance to primary care, and residential stability. As expected all three individual-level factors positively impacted APNCU.

Conclusions: This research demonstrates that the police are an important social determinant of prenatal care and further supports the limited research on the effect of American policing tactics on community health promotion/disease prevention efforts. We hope this research initiates a new policy paradigm that views the police as an institution of public health as much as an institution of criminal justice.

Key Words: Prenatal care, police, health behavior, social determinants of health, violence, vulnerable populations

Introduction

An estimated four million women in America give birth each year; and while maternal mortality is dropping worldwide,

the incidence is rising in the United States with 26.4 deaths/per 100,000 live births in 2015 (1). The US also has one of the highest rates of preterm births among developed nations, which can lead to

neurodevelopmental delays and/or disabilities in the child, as well as maternal depression and/or psychological distress (IOM, 2007).

In order to optimize maternal/fetal birth outcomes -- which are often directly linked to low birthweight and preterm deliveries -- women should seek prenatal care as soon as they find out they are pregnant (2). Prenatal care allows for the early identification of maternal/fetal problems, as well as for the close monitoring of high-risk pregnancies (3). When women receive adequate prenatal care, they reduce the risk for preterm and/or low birthweight babies and neonatal death (4–7), rendering prenatal care the most effective health behavior for optimizing maternal-child outcomes. Yet, despite myriad public health campaigns, nearly 30% of women still do not receive adequate prenatal care and more than 10% deliver preterm (8).

Environmental Correlates of Health Behaviors and Prenatal Care

Although most health promotion campaigns and PSA messaging focus on the individual's knowledge, attitudes, and behaviors, health science researchers have long recognized that health behaviors are largely influenced by social ecological factors such as the quality of the person's social and physical environments (9). In particular, researchers have demonstrated how distrust or negative encounters with healthcare institutions can lead to pregnant women receiving poor and/or inadequate prenatal care (10–12), especially among marginalized women who report feelings of powerlessness, stigma, "being labeled and judged", and/or experiencing "broken confidences" (13).

Researchers have similarly found that the physical environment, such as structural disadvantage (5,14) and other forms of neighborhood distress (15,16), can serve as

direct barriers to prenatal care. In recent years, researchers have also shown that neighborhood violence can discourage multiple health promoting behaviors (16–19). Indirectly, a pregnant woman's cumulative exposure to violence (e.g., intimate partner violence or perceptions of neighborhood safety) increases her odds of depression and PTSD (17), both of which are noted barriers to seeking prenatal care (18,19). The collective result of this body of research suggests that neighborhood conditions often represent important determinants of prenatal care.

Policing and Community Health

Some public health researchers have argued that police can act in ways that reduce the negative consequences of violence and/or other environmental risks on health behaviors by serving as escorts to residents, increasing their presence in parks, and coordinating with local leaders to provide safe places for community health utilization (20,21). This reasoning, however, ignores that the primary "tool" the police typically bring to bear in neighborhoods is coercion, usually in the form of stop-and-frisk activities, arrests, and/or use of force. Research, however, shows that police coercion can negatively impact public health behaviors, such as the decision to *not* seek healthcare (12,22), or *not* use syringe exchange programs (SEP) among persons who inject drugs (PWIDs) (23,24). Moreover, at least one study has found that aggressive police coercion can increase needle sharing among PWIDs (25). And while arrests are often viewed as part of the police "mandate" (26) – mounting evidence suggests that in the most vulnerable urban communities, aggressive arrest practices actually *decrease* cooperation between the police and local public through loss of public legitimacy (27–30), and in some settings, even cause violent crime to *increase* (29,31).

Of particular importance to public health promotion efforts are police drug arrests because they are highly discretionary (32), pervasive, and aggressive. Police departments decide when and where to crack down on public drug use; and such arrests often destabilize drug corners, leading to increased violence from the newly-created power vacuums (33). Conversely, even when residents acknowledge that crackdowns help clean up the neighborhood, many resent the police profiling/harassment that occurs in public (34). To that extent, drug policing can lead to a loss of legitimacy in the same way that perceived provider discrimination leads to a loss of trust in healthcare workers.

The present study thus integrates the public health and criminological perspectives within a social ecological framework (9) to test whether outdoor drug arrests were associated with decreased APNCU among pregnant women residing in an urban setting.

Methods

The research was conducted using a nested cross-sectional design that included drug arrest and violent crime data from the District of Columbia (DC) Metropolitan Police Department (MPD), as well as structural variables from the 2000 U.S. Census (SF3). We aggregated these measures into census tracts, to create proxy Level-2 (i.e., community) factors (35–37). We then used birth files from the DC Department of Health (DOH) for the years 2005 through 2007 (n=22,482 birth events), which included the Level-1 (i.e., individual) factors and the outcome measure of interest. The birth files contained a census tract identifier for each mother in the data set,

allowing us to link the mothers (through tract ID number) to their census tracts of residence (as the census data also contained the same tract ID number).

A. Measuring the Dependent Variable: Adequacy of Prenatal Care

The Adequacy of Prenatal Care Utilization (APNCU) Index is a well-documented index used to measure care received during pregnancy (38,39), and is based on ACOG guidelines that recommend 14 visits for women who deliver at 40 weeks gestation (40). Note, however, that women who initiate late prenatal care will have fewer visits, while women with complicated pregnancies such as twins may have more visits. To account for these issues, the APNCU combines two indices: one that considers when the mother initiated prenatal care (Adequacy of Prenatal Care Initiation [APCI]), and one that considers the percentage of expected visits once care was initiated (Adequacy of Received Prenatal Care Services Index [ARPCSI]) (39). Both the APCI and ARPCSI scores are categorized as “inadequate”, “intermediate”, “adequate” and “adequate plus.” Thus for this study, once the month of prenatal care initiation was calculated, the women received a score for her APCI. The next step was to calculate the ARPCSI: The number of prenatal visits was divided by the number of expected visits, and then this ratio was multiplied by 100. From these calculations, a final score for the APNCU index was derived. Women’s APNCU index was also scored as 1=inadequate, 2=intermediate, 3=adequate, or 4=adequate plus (40). Fig. 1 shows the spatial distribution of prenatal care across DC census tracts.

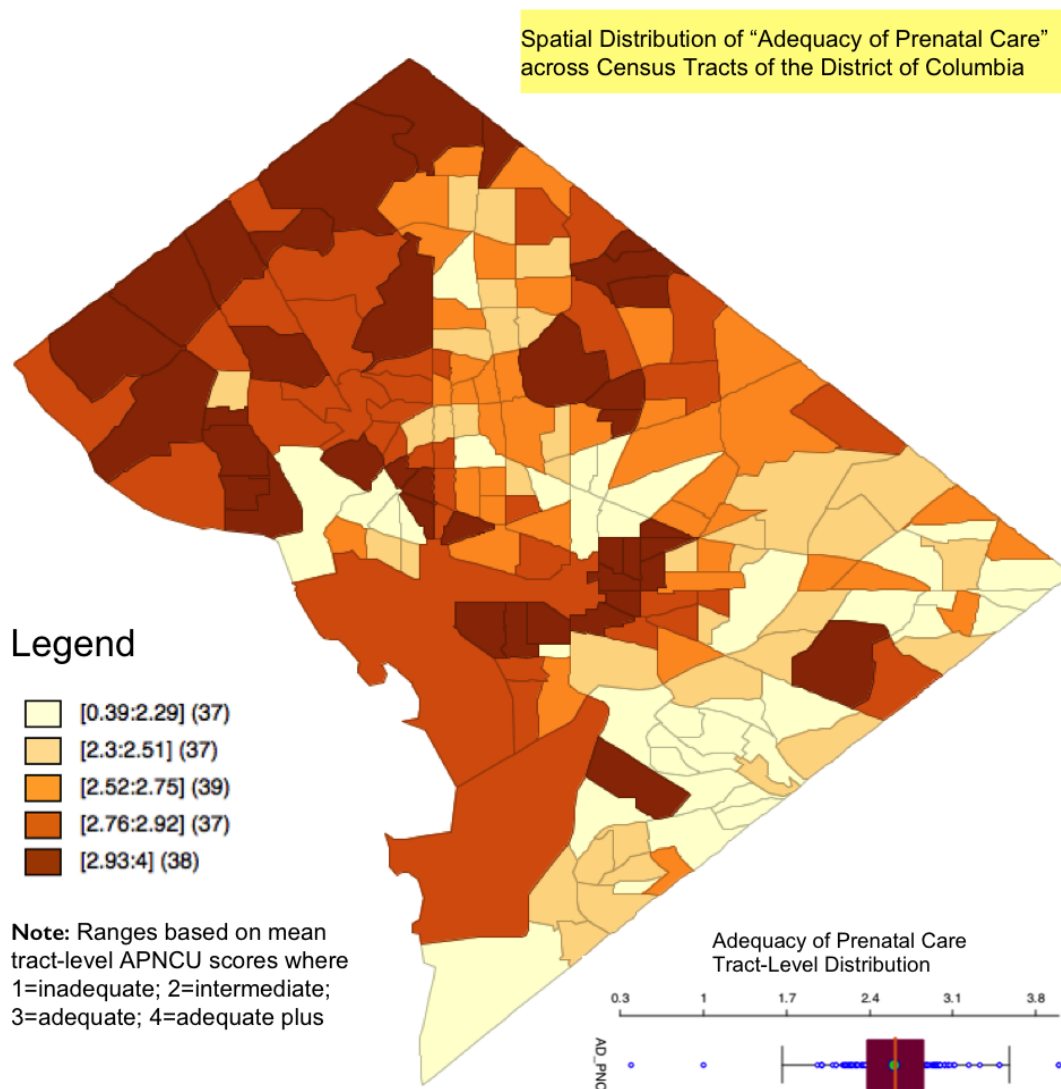


Figure 1. Spatial distribution of "Adequacy of Prenatal Care" across Census Tracts of the District of Columbia

B. Measuring Drug Enforcement: The Primary Independent Variable

We operationalized drug enforcement as the number of juvenile drug arrests per census tract for the years 2005 through 2007. As noted, drug arrests—particularly among juveniles—represent among the most discretionary forms of law enforcement, almost exclusively initiated by police officers (5,32). Overall, MPD made 6,462 juvenile drug arrests during the study period for both misdemeanor and felony charges. Misdemeanor drug arrests typically resulted from possession or usage of an illegal

substance (e.g., marijuana, crack, cocaine, or heroin); felony drug arrests typically resulted from charges of possession with intent to distribute, i.e., drug dealing.

C. Community-level Control Variables

Social ecological research generally finds that structural (or neighborhood economic) disadvantage represents among the strongest predictors of compromised health and crime at the community-level (5,14,35,41,42) due to its systemic features that limit economic opportunities, institutional participation, and collective

efficacy (5,14). Therefore, to estimate the potential effects of structural disadvantage on APNCU, we constructed an unweighted additive index for each census tract that included the percentages of the residential population and/or households that were Black, living in poverty, female-headed with children, receiving public assistance income, unemployed, and aged twenty-five years or older without a high school diploma.

A principal component analysis confirmed that all indicators measured a single underlying construct, extracting a single factor on which the six variables of interest converged. (Eigenvalue=4.31; total model variance explained=71.84%). Variable loadings on the component matrix ranged from .746–.889, demonstrating strong internal reliability. Given the observed spatial distributions of social, economic, and the racial composition variables, it was impossible to distinguish the percent Black residential population from the other indicators of structural disadvantage. Therefore, the composite index may be regarded as a measure of racially-concentrated structural disadvantage (Cronbach's alpha=0.849).

In addition to structural disadvantage, we included a measure of community-level violence as another important control variable. To construct this measure, we created an additive index that included tract-level counts of homicide, rape, robbery, and assault with a deadly weapon.

The study also included the percentage of immigrant population/foreign born to estimate the "ethnic enclave" effect (43), which is often inversely associated with maternal prenatal behaviors (44,45). The study used an unweighted additive index for each tract using percentage foreign-born residents, Latino, and linguistic isolation (Cronbach's alpha=0.807). Principal component analysis confirmed that all three

variables measured a single underlying construct, extracting one factor with an Eigenvalue score=2.41 (total variance explained=80.21%). Variable loadings on the component matrix ranged from 0.816–0.939. Tables available from author upon request.

Finally, the study included a number of community-level control variables that often indicate access to certain health-related or presumed health promoting neighborhood resources (46). These included the distance from each tract's centroid to the closest primary care center (PCC), and community institutions that provided an infrastructure supportive of social affiliations and information sharing. Community institutions included the numbers of schools (K-12 and universities), libraries, action groups, recreational facilities, places of worship, and senior citizen centers. The study summed the number of community institutions per tract and included them as a single "underlying capacity" variable in all models. The study also included a variable for residential stability (i.e., % residents who had lived in the same location for at least the past 5 years), as it is often an indicator of enhanced local social ties (47).

D. Individual-level Control Variables

In addition to the community-level control factors, the study also included several individual-level controls that have been linked to prenatal care. These included: mother's education (often a proxy for health literacy and access to private insurance which are known covariates of prenatal care) (48,49); advanced maternal age (mothers who were thirty-five years and older at time of delivery), a risk factor for preterm delivery and often associated with increased need for prenatal care (50); and known pregnancy complications/maternal risk indicators, such as gestational diabetes,

cardiovascular disease, hypertension, anemia, genital herpes, previous preterm or low prenatal care delivery, preeclampsia, and low weight gain during pregnancy (14). Although pregnancy complications and maternal risk factors may be considered different categories of risk, such events

were rare enough in the present data that a single variable representing a count of any maternal risk factors/pregnancy complications performed virtually identically to two separate variables. Table 1 presents the summary statistics for the substantive variables included in the analyses.

Table 1. Summary of all Substantive Variables under Analysis

Variables	Mean	Std. Deviation
Community-level Factors		
Structural Disadvantage	111.72	61.00
Drug Arrests	6.52	8.56
Violent Crime	52.85	51.63
Residential Stability	48.99	17.15
Percent Foreign Born	6.78	8.98
Percent Latino Population	5.30	6.46
Percent Linguistically Isolated	3.45	4.96
Distance to Closest PCC	.31	.66
Underlying Capacities (Social Institutions in Tract)	69.19	80.45
Individual-level Factors		
Mother's Education Level	12.74	3.03
Advanced Maternal Age	9.06	8.56
Pregnancy Complications/Risks	1.33	.47

E. Analytical Strategies

We used the MIXED MODEL procedure in SPSS (Version 23) for hypothesis testing. The MIXED procedure in SPSS is virtually identical to the SAS PROC MIXED procedure (Singer, 1998) in that it reliably fits hierarchical models using both fixed and random effects while accounting for the clustering of standard errors (51). The data consisted of 22,008 birth events (Level-1),

which were nested into 181 census tracts. In 2000, there were 188 census tracts, however, this study excluded seven census tracts because they contained zero or nearly zero residential populations (e.g., the National Mall, White House, and National Arboretum).

The study tested for multicollinearity by running a series of OLS regressions and examining variance inflation factors (VIF)

and tolerance scores. All independent variables produced VIFs below 2.50, and tolerances between .400 and .900, suggesting sufficient independent variation among factors (52) (tables available upon request). To estimate spatial dependence, we used the Moran's I procedure (ArcGIS 10.2). Results showed no significant spatial clustering or dependence across census tracts of DC, allowing us to forgo spatial models.

Findings

Table 2 shows the parameter estimates and variance components of the full mixed

model, which included both the individual- and community-level variables. As is customary for mixed modeling (51), we first estimated an unconditional model that included just the dependent variable and its cross-sectional units (i.e., census tracts) to observe how much of the within-tract variation was statistically similar to the between-tract variation. The interclass correlation coefficient $(17378/[17378+412417.5])=0.04$, showed that only 4% of total APNCU variability occurred between census tracts ($F=227.02$; $p<.001$), though the significant F-test still favored a multi-level solution (53). We thus proceeded with the mixed-model analysis.

Table 2. Mixed-Model Results of APNCU (n=22,008 births)

Variables	Estimate	T
Community-level Factors		
Intercept (APNCU)	2.450	23.080**
Structural Disadvantage	-.901	-5.290**
Drug Arrests	-.801	-4.050**
Violent Crime	-.003	-.834
Ethnic Enclave	-.055	-.795
Residential Stability	.012	2.460*
Distance to Closest PCC	-.042	-2.420*
Underlying Capacities (Social Institutions in Tract)	.001	.544
Level-1 Factors		
Mother's Education Level	.231	8.460**
Advanced Maternal Age	.050	3.440**
Pregnancy Complications/Risk	.027	2.110*
*p<.05; **p<.001		
Random Effects		
Intercept	.031	
Level 1 Residual	(p<.001)	
	.839	
	(p=.015)	

Full Model Results

As the data in Table 2 show, drug arrests per tract exerted a strong inverse effect on maternal APNCU: For every one standard deviation increase in tract-level drug arrests, APNCU decreased by .801 standard deviations ($t=-4.05$), indicating not just a significant, but also clinically important, effect. This drug arrest finding not only strongly supports our hypothesis, but also aligns with an emerging literature (54,55) that suggests policing can – and perhaps should – be regarded as a social determinant of maternal-fetal health, rather than simply as a law enforcement institution.

The data in Table 2 also show several important secondary results. For example, half of the community-level controls exerted significant influence over APNCU. In particular, structural disadvantage – as anticipated – was strongly associated with APNCU, showing that for every one standard deviation increase in structural disadvantage, APNCU decreased by .901 standard deviations ($t=-5.29$). This finding supports most of the social ecology research that collectively finds neighborhood resource deprivation to be the primary macro-level driver of problematic health behaviors and outcomes in disadvantaged communities.

Interestingly, and contrary to expectations, tract-level violent crime (as an additive index) was not significantly associated with APNCU, despite evidence that measures of crime and/or fear of violence have been associated with certain health behaviors in the past (56–58).

The community-level findings also showed that residential stability was also a significant predictor, indicating that for every one standard deviation increase in the residential stability, the APNCU increased by .012 standard deviations ($t=2.46$). This

result supports previous findings that as community attachment builds in a neighborhood, residents likely provide each other with increased social support (5,14). Finally, distance to PCCs was moderately and negatively associated with the APNCU ($t=-2.42$), suggesting that geographic access to healthcare resources played a role facilitating prenatal care.

Finally, at the individual-level, Table 2 shows that mother's educational level ($B=.23$; $t=8.46$), advanced maternal age ($B=.05$; $t=3.44$), and pregnancy complications/risk ($B=.027$; $t=2.11$) all significantly and positively impacted APNCU. Advanced maternal age, and pregnancy complications are conditions that would trigger early and consistent care; and it is likely that mother's educational level – which exerted the strongest and most clinically important individual effect – was also a proxy for individual social/economic standing.

Discussion

Overall, this research suggests that neighborhoods – particularly vulnerable neighborhoods – are fragile ecosystems susceptible to disruption by formal authorities. As we previously noted, research has found that distrust of social and healthcare institutions and/or fear of neighborhood violence can negatively impact engagement in health promoting behaviors (22), and that such attitudes can endure over the long-term (10) and may affect community members' trust (or distrust) across multiple social institutions (12). Thus, while the police have the potential to work in partnership with community members to promote health behaviors, when they engage in overly coercive law enforcement activities, they can in fact discourage residents from utilizing the services of other institutions, including health care, due to distrust, and/or

fear of getting hassled in the public realm. Our findings add to the emerging literature that has demonstrated the negative effect of local policing tactics on a community's health promoting behaviors (11, 25-27).

The present study was limited in that it did not include survey data that could have helped directly measure women's attitudes toward police drug arrests. As a macro-level study, this research presumed, but did not directly measure, its presumed theoretical processes. The study also may have been limited by its violence measure, which might help explain its lack of significance in the mixed model. Specifically, this study measured violence as the number of violent crimes *committed*, whereas other studies have used mothers' perceptions of violence, a more subjective, but perhaps more reliable, indicator of perceived community safety (59–61).

Conclusion

Policing – particularly in vulnerable communities – is increasingly recognized as a factor that can influence health behaviors and outcomes. The few studies to date that have examined marginalized women of color and the effect of law enforcement practices on prenatal care have been descriptive and/or qualitative (41,62,63). The present study adds empirical evidence of this relationship and lends further support to the limited research on the effect of American policing tactics on community health promotion/disease prevention efforts. Thus, we hope this research initiates a new policy paradigm that views the police as an institution of public health as much as an institution of criminal justice.

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