Geographic Determinants of Hepatitis C Screening in a Mixed Urban/Rural Epidemic

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Background

- Prior research has shown that syringe exchange programs can facilitate screening for hepatitis C virus among people who inject drugs.
- Syringe exchange programs are relatively uncommon in non-urban settings, and whether limited access to such programs affects hepatitis C testing for people who inject drugs in rural communities is unknown.
- The goal of this study was to determine whether travel distance to syringe exchange programs affects hepatitis C testing among people who inject drugs.

Methods

- A social-network based strategy was used to recruit people who inject drugs from a large multi-site syringe exchange program in Wisconsin, USA.
- Participants completed a computerized questionnaire to gather information about previous hepatitis C testing, place of residence, and other demographic characteristics. As a standard service to syringe exchange clients, all participants were offered a rapid hepatitis C test at the time of enrollment. For the purpose of this analysis, anyone who received their first ever hepatitis C test at enrollment was not considered having been previously tested.
- We used geocoded addresses and Google Maps to estimate driving distances between home addresses and the nearest syringe exchange program.
- Participants were considered urban-dwelling if they resided in one of Wisconsin's two largest municipalities: Milwaukee or Madison, where the syringe exchange programs are located.
- Multiple logistic regression was used to estimate the association between travel distance and the odds of being tested for hepatitis C among rural- and urban-dwelling participants, while adjusting for the confounding influences of gender, employment status, and access to health care.

Figure 1: Social network diagram of peer referral chains, by hepatitis C testing history

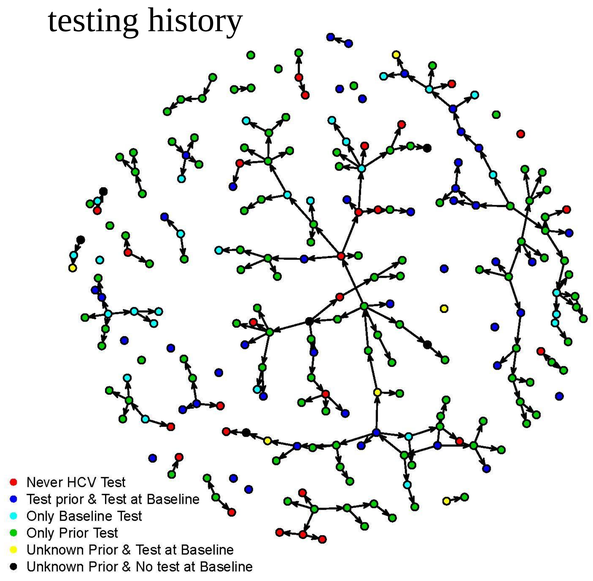


Figure 2: Social network diagram of peer referral chains, by hepatitis C status

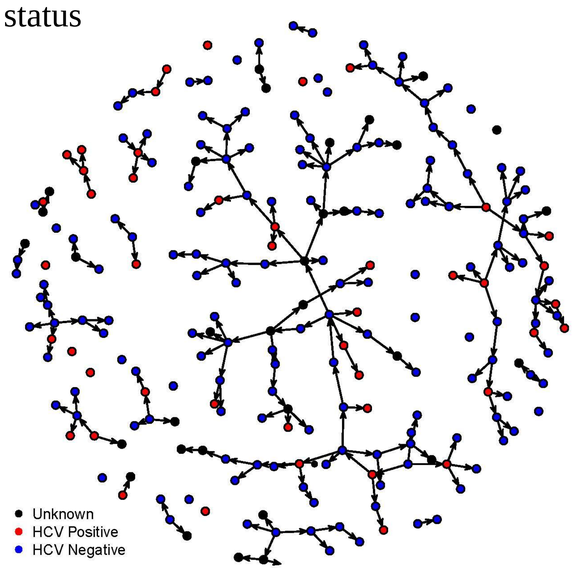


Table 1: Demographic Characteristic of Urban vs. Rural Participants

Categorical Characteristic	Urban, N (%)	Rural, N (%)	P-Value
Male	127 (83.0)	51 (64.6)	**0.0017**
Female	26 (17.0)	28 (35.4)	
Not Employed	112 (73.2)	46 (59.0)	**0.0278**
Employed	41 (26.8)	32 (41.0)	
Not homeless in past year	55 (35.9)	55 (69.6)	**<0.0001**
Homeless in past year	98 (64.1)	24 (30.4)	
No health insurance	19 (12.5)	11 (13.9)	0.7600
Have health insurance	133 (87.5)	68 (86.1)	
No PCP	63 (41.4)	28 (35.9)	0.4151
Have a PCP	89 (58.6)	50 (64.1)	
Income $0-$11,499	119 (79.9)	50 (64.1)	**0.0097**
Income >$11,499	30 (20.1)	28 (35.9)	
White	65 (43.0)	71 (89.9)	**<0.0001**
Non-white	86 (57.0)	8 (10.1)	
Did not finish high school	44 (29.1)	20 (25.6)	0.5761
High school graduate	107 (70.9)	58 (74.4)	
Not living with children	132 (86.8)	54 (69.2)	**0.0013**
Living with children	20 (13.2)	24 (30.8)	
Do not use heroin every day	104 (69.8)	41 (51.9)	**0.0075**
Use heroin every day	45 (30.2)	38 (48.1)	
Never tested for HCV	46 (30.1)	21 (26.6)	0.5791
Previously tested for HCV	107 (69.9)	58 (73.4)	
Never tested HCV-positive	126 (82.4)	61 (77.2)	0.3483
Have tested HCV-positive	27 (17.6)	18 (22.8)	
Continuous Characteristic	**Urban Mean (Std. Dev)**	**Rural Mean (Std. Dev)**	**P-Value**
Age	32.3 (9.0)	38.3 (11.6)	**0.0002**
# of people they share needles/cottons/cookers with	3.2 (4.0)	5.6 (13.1)	0.0542
% of time they use a new, unused needle	69.8 (28.8)	67.2 (28.6)	0.5286
% of time they use a needle that had already been used by someone else	14.2 (27.0)	12.1 (18.9)	0.5604
Duration of injecting drugs (years)	6.7 (7.7)	11.3 (10.9)	**0.0019**
Driving distance to nearest SEP (miles)	41.2 (29.6)	3.5 (3.1)	**<0.0001**

Results

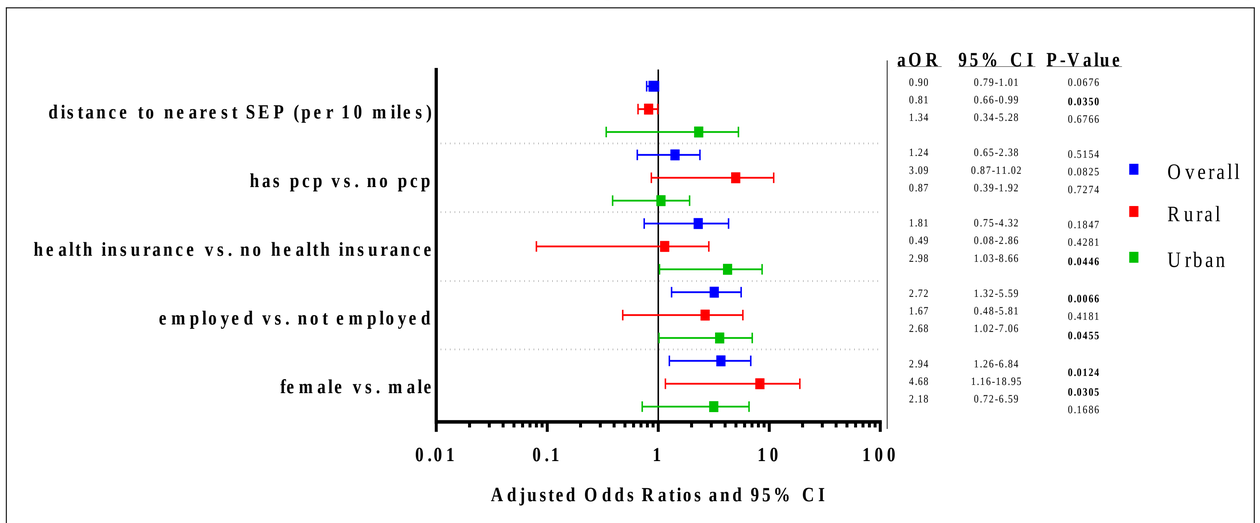
- Prevention staff recruited 40 syringe exchange program clients. These clients recruited 195 eligible peers from their social networks, allowing for a total study population of 235.
- On average, participants reported having injected drugs for 7.8 years. Heroin was the drug most frequently injected by participants and nearly half reported injecting on a daily basis.
- Overall, 67 individuals (28.9%) reported they had never been tested for hepatitis C (Figure 1).
- Overall, 45 individuals (19.4%) had previously tested positive for hepatitis C (Figure 2).
- 79 participants were considered rural-dwelling and 153 participants were considered urban-dwelling. Urban- and rural-dwelling participants differed with respect to several baseline characteristics (Table 1).
- Overall, no association was observed between travel distance to a syringe exchange program and previous hepatitis C testing. However, we found that the relationship between travel distance and being tested for hepatitis C differed significantly between urban and rural participants.
- We identified several other independent predictors of hepatitis C testing that differed significantly between urban- and rural-dwelling respondents (Table 2 and Figure 3).
- The main predictors of hepatitis C testing in an urban setting were demographic variables such as being employed and having health insurance.
- The main predictors of hepatitis C testing in a rural setting were related to health care access, include having a primary care provider and travel distance to the nearest syringe exchange program.

Table 2: Significant predictors of hepatitis C Screening

	overall (n=232)		urban participants (n=153)		rural participants (n=79)	
Demographic Characteristic	**Crude Odds Ratio (95% CI)**	**Adjusted Odds Ratio* (95% CI)**	**Crude Odds Ratio (95% CI)**	**Adjusted Odds Ratio* (95% CI)**	**Crude Odds Ratio (95% CI)**	**Adjusted Odds Ratio* (95% CI)**
Female vs Male	**2.36 (1.08-5.15)**	**2.94 (1.26-6.84)**	2.00 (0.71-5.69)	2.18 (0.72-6.59)	3.00 (0.90-10.04)	**4.68 (1.16-18.95)**
Employed vs Not Employed	**2.33 (1.18-4.61)**	**2.72 (1.32-5.59)**	**2.59 (1.05-6.39)**	**2.68 (1.02-7.06)**	2.10 (0.71-6.18)	1.67 (0.48-5.81)
Have health insurance vs No health Insurance	2.04 (0.94-4.46)	1.81 (0.75-4.32)	**3.11 (1.17-8.29)**	**2.98 (1.03-8.66)**	1.04 (0.25-4.36)	0.49 (0.08-2.86)
Have a PCP vs. do not have a PCP	1.68 (0.94-2.99)	1.24 (0.65-2.38)	1.19 (0.59-2.41)	0.87 (0.39-1.92)	**3.42 (1.21-9.66)**	3.09 (0.87-11.02)
Driving distance to nearest SEP (per 10 miles)	0.94 (0.85-1.05)	0.90 (0.79-1.01)	2.19 (0.62-7.78)	1.34 (0.34-5.28)	**0.82 (0.68-0.98)**	**0.81 (0.66-0.99)**

*Adjusted for gender, employment status, health insurance, having a PCP, and driving distance
BOLD = Statistically significant ($p \leq 0.05$)

Figure 3: Predictors of hepatitis C screening overall, in a rural setting, and an urban setting



Discussion

- Despite recommendations that people with a history of injection drug use should be screened for hepatitis C in health care settings, many are not receiving testing.
- Barriers to hepatitis C testing and prevention in rural communities are very different from barriers in urban communities, where the majority of epidemiologic studies have been conducted.
- Geographic inaccessibility of syringe exchange programs appears to pose a significant barrier to hepatitis C testing for rural-dwelling people who inject drugs.
- Additional research is needed to develop hepatitis C screening strategies that are responsive to the unique challenges in rural communities.

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