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Transportation as a Barrier to AIDS Center Visits among People Who Inject Drugs Living with
HIV/AIDS in Kazakhstan

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Global Environmental Health

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Abstract

Transportation as a Barrier to AIDS Center Visits among People Who Inject Drugs Living with HIV/AIDS in Kazakhstan

By

Sophia Kiselova

Background: The Republic of Kazakhstan faces ongoing public health challenges with addressing human immunodeficiency virus (HIV) among people who inject drugs (PWID). Social and structural factors may be important barriers to medical care among PWID. Transportation is a known barrier to HIV services in low- and middle- income countries. No studies have explored the relationship between access to transportation and utilization of HIV services among people who inject drugs living with HIV/AIDS (PLWHA-PWID) in Kazakhstan.

Methods: Data from a survey of PLWHA-PWID (N=616) living in four Kazakhstan cities and their AIDS center clinic records were used to construct a generalized linear model examining the association between self-reported access to transportation for medical care (exposure) and the number of AIDS center visits (outcome).

Results: Mean number of AIDS Center visits was 1.56 (SD = 1.51) with 29.20% of participants not visiting the AIDS Center at all. 40.75% of participants reported not having transportation to medical care. Transportation did not show significance in bivariate (OR = 0.89, 95% CI 0.76 - 1.04) or multivariate analyses (OR = 0.87, 95% CI 0.74 – 1.03).

Conclusions: We found no evidence of association between access to transportation to medical care and AIDS Center attendance among PLHWA-PWID in Kazakhstan cities. Further research is needed to understand how transportation may affect access to other HIV-related care among PLWHA-PWID in Kazakhstan.

Keywords: HIV; PLWHA; PWID; built environment; transportation; Kazakhstan

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Table of Contents

Background

The Central Asian nation of the Republic of Kazakhstan has a population of approximately 18.6 million, a GDP per capita of US$ 9,244 and an unemployment rate of 4.8% as of March 2020 (Ministry of National Economy of the Republic of Kazakhstan Statistics committee, 2020, World Bank, 2019). In less than two decades, Kazakhstan has transitioned from lower-middle-income to upper-middle-income status with the estimated 8.5% poverty rate in 2019 that continues to decline (World Bank, 2019). Yet, Kazakhstan faces ongoing public health challenges with addressing human immunodeficiency virus (HIV) among some of its most vulnerable populations, including people who inject drugs (PWID). HIV prevention programs and services for marginalized social groups are still lacking in Kazakhstan, and stigma and homophobia remain widespread (Amirkhanian, 2018). Kazakhstan has approximately 127,800 PWID and 11,207 people who inject drugs living with HIV/AIDS (PLWHA – PWID) (Ganina et al., 2016, Kazakhstan National AIDS Center, 2017). It is estimated that over half of PLWHA in Kazakhstan acquired their infection through injection drug use (IDU) (Kazakhstan National AIDS Center, 2015).

Many social and structural factors in Kazakhstan, including gaps in access to HIV care, have led to a high prevalence of HIV among PWID at approximately 8.5% (Kazakhstan National AIDS Center, 2016, Stringer et al., 2019, Terlikbayeva et al., 2013). Social stigma, negative healthcare provider attitudes, and criminalization of drugs both prevent PWID from seeking HIV treatment and increase the spread of HIV (Amirkhanian, 2018, McCrimmon et al., 2019, Stringer et al., 2019). Such barriers contribute to limited access of PWID to needle and syringe programs (NSPs) and receiving safe injection materials, HIV prevention information, and referrals to medical treatment in Kazakhstan (Kazakhstan National AIDS Center, 2016, McCrimmon et al., 2019, Stringer et al., 2019). Interviews with people who use drugs in Kazakhstan have revealed that NSPs have been targeted by police in Kazakhstan, and that

clients of harm reduction services have been arrested on charges of needle/syringe possession (Human Rights Watch 2007, Terlikbayeva, 2013). NSPs are critical in reducing the spread of HIV, and AIDS Centers are responsible for providing comprehensive HIV testing, treatment, and prevention services in Kazakhstan, which are free to all Kazakhstani citizens (Davis et al., 2018). AIDS centers are especially critical in that they are the only entities which provide ART medications (Davis et al., 2018). NSPs and AIDS centers must be both safe and geographically accessible to clientele to effectively provide HIV-related services (McCrimmon et al., 2019).

Barriers to HIV care can take many forms, including ease of accessing transportation to the nearest AIDS Clinic. Public transportation infrastructure is widespread in major cities in Kazakhstan, but reforms following Kazakhstan's independence in 1991 have led to a reduction in public transportation use and an increase in personal cars (Bazarbekova et al., 2018). The nation's most populous city, Almaty, operates 131 bus routes, eight trolleybus routes, and seven metro stations, all at the cost of $US 0.19 per trip ("Modes of Transport"). The "marshrutka" or routed taxicab, is another common form of public transportation in many cities in Kazakhstan. Shymkent, the third most populous city in the nation, has at least sixteen marshrutka routes and forty-six bus routes ("Addresses of New Public Transportation Routes, Shymkent"). The average monthly wage in Kazakhstan is $US 458.40 as of March 2020 ("Main Socio-Economic Indicators"). Transportation barriers to medical services have not been previously studied in Kazakhstan or in any Central Asian nation. This project aims to address this gap in research by examining whether transportation to medical care is associated with the number of AIDS Center visits in Kazakhstan among a particularly vulnerable group, PLWHA-PWID.

Conceptualizing Built Environment

Built environment refers to physical environments that influence health outcomes through affecting resource access, creating risk, or influencing behavior (Bowen, 2016). Built environment is a key component of the "neighborhood level" of the multilevel ecological model of HIV risk, and it is increasingly regarded as a powerful influence on community and individual health risks, especially among marginalized communities in low- and middle-income nations (LMIC) (Bowen, 2016, Bronfenbrenner, 1977, Conners et al., 2016, Cooper & Tempalski, 2015).

Understanding and addressing barriers to HIV care within a built environment can inform effective policy and urban planning initiatives that ultimately increase access to HIV care (Bowen, 2016). This paper will focus on transportation as a key aspect of built environment. Factors in the physical and built environment such as transportation and neighborhood design have been shown to hinder HIV clinic attendance and ancillary care in the United States and in LMIC (Ashman, Conviser, & Pounds, 2002, Lankowski et al., 2014, Sagrestano et al., 2012, Sileo et al., 2019). Numerous studies have highlighted the challenges in accessing reliable transportation to HIV clinics in LMIC (Lankowski et al., 2014, Sileo et al., 2019). The cost of transportation can also be a barrier to accessing medical care, even if transportation systems are available and reliable (Tuller et al., 2010). Transportation is particularly important for individuals who require regular visits to a medical clinic and/or NSP, such as PLWHA-PWID (Goswami et al., 2017). It is critical to understand how transportation can influence access to HIV care among PLWHA-PWID, who have been shown to encounter barriers in the built environment when accessing medical services. This study examined the relationship between transportation and HIV-related services among PLWHA-PWID in Kazakhstan. Specifically, it was hypothesized that transportation to medical care was associated with the number of visits to AIDS centers.

Methods

Data Sources

This study utilized baseline data from longitudinal survey panel of PLWHA-PWID in Kazakhstan and clinic records from AIDS Centers in Kazakhstan. These data are a component of a broader HIV implementation study called "Bridge"; details of the full study are available elsewhere (Clinical Trial Identifier NCT02796027, McCrimmon et al., 2019). Longitudinal survey data were collected from a random sample of HIV-positive PWID (N=616) between February 2017 and July 2019 across four cities in Kazakhstan: Almaty, Shymkent, Karaganda, and Temirtau. Each city has one AIDS Center, located centrally. These cities were selected because of their high prevalence of PWID, high estimated population of PLWHA-PWID who have not been linked to HIV care, and sufficient numbers of Needle Syringe Programs (NSPs). Research assistants recruited potential participants from NSPs, AIDS Centers, field-based recruitment, and via peer referrals. Research assistants conducted a brief screening with potential participants to assess eligibility, for which they received a cash incentive equivalent to $3 USD. Participants were eligible to enroll in the survey if they were: at least 18 years of age, citizens of Kazakhstan, had injected drugs in the past 12 months, and were positive for HIV, as confirmed with a reactive rapid test administered by study staff. Participants who met these eligibility criteria had the opportunity to enroll in the study. Medical staff and outreach workers obtained verbal informed consent from participants prior to beginning data collection, including a consent form for release of medical records from the AIDS Center. Participants were assigned a unique alphanumeric code to uphold confidentiality.

The baseline survey used for this study included detailed questions surrounding participants' demographics, physical and mental health, substance use history, drug treatment history, criminal justice history, social networks, and perceived social barriers that were quantitatively coded. The survey used validated and harmonized measures for socio-demographics, drug and sexual risk behaviors, and study

outcomes currently employed in the National Institute on Drug Abuse (NIDA) Seek, Test, Treat and

Retain (STTR) data harmonization initiative. Using harmonized measures ensures a known level of

validity and reliability and provides the ability to compare and combine datasets across NIDA's portfolio

of studies. The measures are available at https://www.drugabuse.gov/research/research-data-measures-

resources/data-harmonization-projects/seek-test-treat-retain/addressing-hiv-among-vulnerable-

populations. Measurements selected for this study are described in more detail below. Participants

completed the surveys independently on a computer or in a study field office location. They received the

equivalent of $15 USD for their participation in the survey. Research staff received AIDS Center clinic

records for each participant, which included data on how many times each participant had visited the

AIDS Center prior to enrollment in the baseline study. All protocols received approval from the

Institutional Review Board (IRB) at Columbia University and from the ethics committee at the

Kazakhstan School of Public Health. The present study did not require additional IRB review through

Emory University as it used de-identified data.

Measures

The outcome of interest, number of visits to the AIDS Center in the six months prior to enrollment,

was measured using AIDS Center clinic records. Number of visits to the AIDS Center was analyzed as a

six-level count variable ranging from zero visits to six visits.

The exposure of interest, access to transportation, was measured by asking participants "In the past 6

months, I did not have transportation to medical care" with response options "Agree" (coded as 1) or

"Disagree" (coded as 0). Prior to responding to the survey item about transportation, participants were

given instructions to think of reasons why they may not have gotten the medical care they needed and to

respond "Agree" or "Disagree" for all of the survey measures assessing why they may have not received needed medical care in the past six months.

Several covariates were included in analyses. The sociodemographic variables measured and included in this analysis were: age, sex, monthly income (reported in Kazakhstani Tenge per month and converted into a US dollar equivalent based on an average of the yearly exchange rate between February 2017 and July 2019), education, and ethnicity. These sociodemographic variables have a demonstrated influence on PLWHA retention in medical care (Ashman, Conviser, & Pounds, 2002, Sileo et al., 2019). Income was categorized into quartiles for analyses. Ethnicity was categorized as Kazakh, Russian, Non-Kazakh Central Asian, Non-Russian Eastern European, and 'Other'. Non-Kazakh Central Asian included Uzbek, Kyrgyz, Uighur, and Tatar ethnicities. Non-Russian Eastern European comprised Ukrainian and Belorussian ethnicities. 'Other' included non-Central Asian and non-Eastern European ethnicities such as Turkish and Korean. Self-reported health status was included as a covariate in analysis as a proxy for overall health status. Participants were asked, "How would you rate your general health status?". Responses were measured as a five-level categorical variable ranging from very good to very poor. Housing stability was also assessed by asking participants if they had experienced homelessness or been without a regular place to sleep in the past six months; participants responded yes or no.

Data Analysis Approach

SAS version 9.4 was used for analyses. Univariate analyses produced descriptive statistics of exposure, outcome, and covariates. Poisson regression was used to examine bivariate associations between the outcome and the exposure and between the outcome and each covariate. Multivariate analyses were conducted using a Poisson generalized linear model. The odds ratios (OR) with a 95% confidence interval (CI) are presented for bivariate and multivariate analyses. No exposure data or descriptive data had

missing values. The exposure variable had three missing values (N=613; 0.5%). Cases with missing variables were excluded from the analysis.

Results

Participant Characteristics

   Table 1 shows detailed characteristics of the outcome variable, the exposure variable, and participant sociodemographics. The majority (70.80%) of participants had visited an AIDS Center at least once in the six months prior to enrollment. Men had an average of 1.54 visits to the AIDS Center, and women had an average of 1.62 visits. 40.75% of participants reported not having transportation to medical care.

   Men comprised 72.7% of the sample, and the mean age of participants was 41.7. Women were a mean age of 39.6; men were a mean age of 41.7. Most participants (58.28%) were of Russian ethnicity, with about a quarter (27.76%) of participants being of Kazakh or of Non-Kazakh Central Asian ethnicity. The average monthly income for participants was US$ 212.66 (SD 242.95), about half the average monthly income in Kazakhstan. Men earned an average monthly income of US$ 219.37, and women earned an average monthly income of US$ 192.43. Most participants had at least a high school education (76.63%) and 39.29% had obtained at least 2-3 years of college. 26.86% of participants reported being homeless or without a regular place to sleep in the past six months. Close to a third of participants (32.63%) rated their overall health status as poor or very poor, while only 13.96% of participants rated their overall health status as good or very good.

Table 1. Participant Characteristics, N=616

Characteristic	n (%) / Mean	SD	Range
AIDS Center Visits in Six Months Prior to Enrollment (N = 613; percent missing = 0.5%)	1.56		

0	179 (29.20)		
1	179 (29.20)		
2	103 (16.80)		
3	74 (12.07)		
4	44 (7.18)		
5	23 (3.75)		
6	11 (1.79)		
Self-Reported Transportation to Medical Care			
Yes	365 (59.25)		
No	251 (40.75)		
Gender			
Man	450 (73.05)		
Woman	166 (26.95)		
Age (in years)	41.17	7.02	44.00
Ethnicity			
Kazakh	88 (14.29)		
Russian	359 (58.28)		
Non-Kazakhs Central Asian	83 (13.47)		
Non-Russian Eastern European	21 (3.41)		
Other	65 (10.55)		
Monthly Income (US$)	212.66	242.95	2800
Education			
9th grade education or less	144 (23.38)		
High school education (completed 11th grade)	230 (37.34)		
Higher education (2-3 years of college or more)	242 (39.29)		
Self-reported Homelessness in the Past 6 Months			
Yes	147 (23.86)		
No	469 (76.14)		
Self-Reported Health Status			
Very good	7 (1.14)		
Good	79 (12.82)		
Neither good nor bad	329 (53.41)		
Poor	94 (15.26)		
Very poor	107 (17.37)		

Multivariate and Bivariate Results

Multivariate and bivariate results are presented in Table 2. Transportation was not significantly associated with AIDS Center visits in bivariate (OR = 0.89, 95% CI 0.76-1.04) or in multivariate analyses (OR = 0.87, 95% CI 0.74-1.03).

Table 2. Bivariate analysis and multivariate model testing sociodemographic and structural predictors of AIDS Center visits within the past six months among Kazakhstani PWID/PLHIV N=613

	Bivariate Analysis	Multivariate Model		
	OR (95% CI)	OR (95% CI)	χ^2	p
Transportation: (Has transportation to medical care = Ref)	0.89 (0.76-1.04)	0.87 (0.74-1.03)	2.35	0.1249
Sociodemographic Variables				
Gender: (Man =Ref)	0.95 (0.80-1.13)	0.91 (0.76-1.08)	1.05	0.3049
Ethnicity: (Kazakh = Ref)	0.71 (0.58-0.87)	0.70 (0.57-0.87)	10.69	0.0011
Self-Reported Health Status: (Neither good nor bad= Ref)	0.99 (0.47-2.04)	1.00 (0.48-2.06)	0.00	0.9971
Education: (Higher Education = Ref)	1.11 (0.91-1.36)	1.16 (0.94-1.42)	2.07	0.1504
Homelessness: (Did not report being homele in the past six months = Ref)	0.90 (0.75-1.09)	0.97 (0.80-1.19)	0.04	0.8333
Income: (1st Quartile of Income = Ref)	1.19(0.94-1.51)	1.17 (0.93-1.49)	1.85	0.1763

OR odds ratio, *CI* confidence interval, χ^2 Wald Chi square

Discussion

This study is the first of its kind to our knowledge to examine the relationship between transportation and AIDS Center attendance among PLWHA-PWID in Kazakhstan. Findings revealed 40.75% of participants reported not having transportation to medical care. This value is consistent with trends found

in current literature in barriers to medical care in LMIC, with one recent literature review finding that 17/31 (55%) of articles reported transportation as a hinderance to medical care (Kironji et al., 2018). Bivariate and multivariate results suggest participants who reported not having access to transportation to medical care were less likely to visit the AIDS Center, though this finding did not reach statistical significance.

Possible explanations for this finding may be lying within the local context. It is possible that participants who reported not having transportation to medical care were still able to access the AIDS Center by traveling with friends or walking if they lived close to the AIDS Center. The low costs of public transportation in Kazakhstan may have allowed some participants to occasionally use public transportation to visit the AIDS Center. Other short-term internationally supported projects at the AIDS Center may have also provided transportation assistance for AIDS Center clients. Interventions that include case management such as Bridge might have also played a role in increasing access to transportation access. These factors may have contributed to participants being able to visit the AIDS Center while also reporting no transportation to medical care.

Study limitations may have contributed to the lack of significant associations as well. This study used a self-reported measure to assess transportation to medical care, which may be subject to self-reporting bias and exaggerate the percentage of participants who did not have transportation to medical care. Participants may have also interpreted "medical care" to mean services unrelated to the AIDS Center, therefore diminishing the association between exposure and outcome. Participants were asked to report if they did not have transportation to medical care in the past six months, which could have been subject to recall bias and been interpreted in a variety of ways. This question may have also been interpreted as having no *private* transportation to medical care, such as a personal vehicle, leading to an overestimation of participants who did not have transportation access to medical care. Finally, negative phrasing of the survey item measuring access to transportation might have caused confusion among some participants.

This survey question was based on validated and harmonized measures of study outcomes currently employed in the NIDA STTR data harmonization initiative. Different interpretations of this question could have led to an underestimation or overestimation of effect. This study recruited participants from four large cities in Kazakhstan with well-established public transportation systems compared to rural areas of Kazakhstan. Therefore, the results this study are not generalizable to rural areas in Kazakhstan. This study also used cross-sectional data from the baseline survey of participants in a larger longitudinal panel study with PLWHA-PWID. Subsequent research may build upon the present study by examining how access to transportation to medical care changes influences number of AIDS Center visits over time.

Future studies may consider using objective area-level measurements of transportation such as number of bus trips in a certain period or proximity of participants' residence to transportation routes and to health service outlets in addition to self-report measures. Detailed transportation-related questions differentiating between access to AIDS Center and other medical services, capturing walking or use of different modes of transportation, and specific barriers to access to transportation (e.g. lack of money, living far from public transportation routes) could provide a deeper understanding of the relationship between transportation and access to medical care among PLWHA-PWID. Studies including PLWHA-PWID should consider the influence of transportation and other related built environment factors such as housing and neighborhood design influencing accessibility of HIV-related services. Qualitative studies exploring various barriers to receiving HIV-related services may help to explain our findings and inform future quantitative studies of built environment barriers.

Conclusion

Transportation is a key aspect of the built environment and a known barrier to HIV services in LMIC. Kazakhstan has experienced a rapid positive economic transition in the past twenty years, but it

continues to face challenges in providing comprehensive HIV services to members of stigmatized social groups. Although this study found no significant association was between access to transportation and AIDS Center attendance, transportation may still be a potential barrier to health care services among often marginalized populations such as PLWHA-PWID. This study begins to fill the gap in literature on barriers to medical care among PLWHA-PWID in Kazakhstan and highlights the need for more rigorous studies examining the role of built environment among this vulnerable population.

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