

Original Research

Distance to HIV care and treatment adherence: Adjusting for socio-demographic and geographical heterogeneity



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ABSTRACT

Distance to health services plays an important role in determining access to care and an individual's health. This study aims to examine the relationship between distance to antiretroviral therapy (ART) prescribing physician and adherence to HIV treatment in British Columbia, Canada. Only participants who provided highly accurate locational data for both place of residence and their physician were used in the analysis. Using logistic regression, a multivariable confounder model was created to assess the association between distance and adherence. A geographically weighted logistic regression was also performed to adjust for spatial dependency. There were 1528 participants in the analysis, for a median distance of 17.85km. The final model showed further away from ART prescribing physician had a higher chance of incomplete adherence to ART (adjusted odds ratio 1.31; 95% Confidence Interval 1.04–1.65). Mobile services could potentially increase adherence rates for population residing further away from their ART prescribing physician.

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1. Introduction

One of the five principles of the Canadian Health Act specifies that Canadian residents should have “reasonable access” to healthcare services (Bulger, 2009). While this is an integral component of Canada's predominantly publicly funded health care system, its actual definition is not clear.

Abbreviations: BC, British Columbia; PLWH, people living with HIV; DTP, drug treatment program; ART, antiretroviral therapy; GWR, geographically weighted regression; IDU, history of injection drug use.

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Furthermore, measuring access is a complex process which should take into consideration demographic, psychosocial, and clinical factors (Ricketts, 2010). In addition, the ability of people to receive care is also impacted by the physical distance to treatment facilities (HIV/AIDS JUNPo, HIV/AIDS JUNPo 2014).

Several studies have attempted to establish a direct relationship between the patients' length of commute and their use of health care services, leading to certain health outcomes (Dai, 2010; Wan et al., 2013). In the realm of HIV research, distance to care has been shown to directly impact a participant's outcome along the HIV prevention and care continuum (Dhedda et al., 2004; Collaboration, 2003; Hogg et al., 1998). For example, Leibowitz and Taylor (2007) investigated travel time to the nearest publicly available HIV testing sites in Los Angeles, California, and

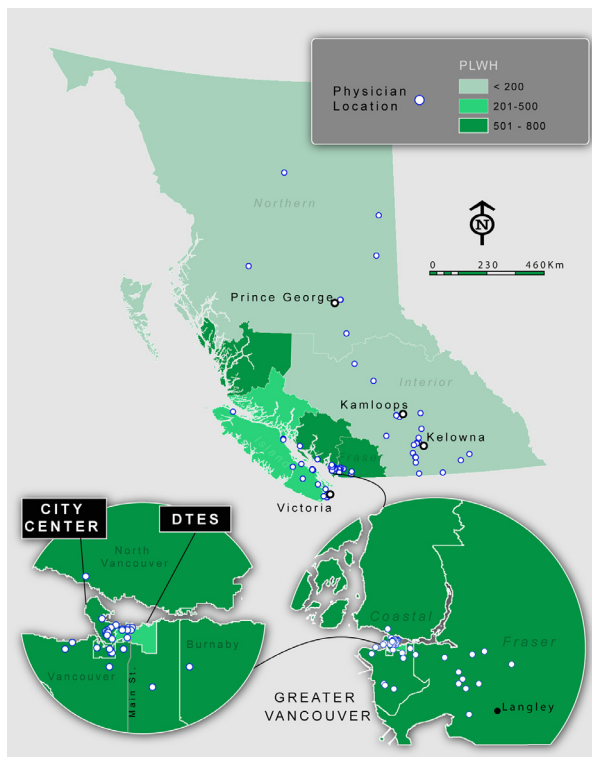


Fig. 1. Count of study participants at Health Authority level (DTES and City center are at Local Health Authority level). Notes: DTES: Down Town East Side.

found that travel time acts as a significant barrier to being tested for HIV. Siender et al. also found significant association between distance to care, measured using Global Positioning Systems, and HIV clinic absenteeism in rural Uganda (Siedner et al., 2013).

British Columbia (BC) is a geographically large province in western Canada with a population of just over 4.6 million people as of 2016 (Stats B, 2016). Most of the population resides in the Greater Vancouver area (60%). In terms of people living with HIV (PLWH), the vast majority lives in the city of Vancouver, particularly in the downtown area (Fig. 1). The populations residing in very remote areas tend to have limited access to health care services and, generally, have to travel longer distances to visit a physician when compared to those living in urban areas. In addition, populations in these geographic regions are more likely to have a lower socio-economic status (SES), which can also impede their ability to travel further to access care.

In recent years, advances have been made in spatial-epidemiology analytical approaches to understanding the relationship between distance and health outcomes, specifically those related to Geographic Information Systems technology (Moore and Carpenter, 1999). Consequently, the ability to incorporate spatial measures more accurately allows researchers and decision makers to better understand the impact of geography on health outcomes and utilization. The objective of this study is to examine the relationship between distance to HIV physician facilities (used as a proxy for travel time to care) and adherence to HIV

treatment in BC, between 2003 and 2013. Additionally, this study also aimed to explore the potential geographic clustering of incomplete adherence in BC, and its relationship to distance to care. The hypothesis was that those living in remote areas would have a lower level of adherence to treatment because it is harder for them to reach health care services. In addition, the lower SES of populations living in those areas may also contribute to disparity in access to care and consequently adherence to HIV treatment.

2. Material and methods

2.1. Data

Data from the Drug Treatment Program (DTP) of the BC Centre for Excellence in HIV/AIDS, collected between 2003 and 2013, was used for this analysis. The DTP is a population-based registry of all BC residents' ART access. It regularly monitors individuals, approximately every 3 months, with the aim of tracking their treatment's progress. At every follow-up, information regarding the participant's treatment progress, place of residence, and their physician's location is updated. However, only the location of the first ever ART prescribing physician (within BC only specialized physicians can prescribe ART) for each participant was used in this study (only the first ever ART prescribing physician was used because many participants drop in and out of treatment over time). Eligible participants were 18 years and older individuals who initiated ART for the first time in BC (i.e. ART naïve). The dataset allows for a study of participants' outcomes of HIV treatment in a setting in which all financial barriers to HIV/AIDS and other medical care are eliminated, an important factor when investigating access to care.

The University of British Columbia Ethics Review Committee at the St. Paul Hospital site provided ethics approval for this present study (H05-50,123). The study complies with the BC's Freedom of Information and Protection of Privacy Act. The study was conducted primarily using anonymized data, and therefore informed consent was not required.

2.2. Outcome, exposure and confounder variables

The primary outcome variable was adherence to treatment, defined as the number of days of antiretroviral drugs dispensed divided by the number of days of follow-up (expressed as a percentage) and categorized at 0 - < 40%, 40 - < 80%, 80 - < 95%, ≥ 95%. This definition of adherence have been previously shown to be strongly associated with relevant health outcomes (Maggiolo et al., 2007; Bangsberg et al., 2001). The primary exposure variable was distance from the participant's home address or postal code to the location of the first ever ART prescribing physician. This distance was calculated using Google Maps (Google inc., 2014). Only participants who provided accurate locational information (postal code or full address), regarding both their place of residence and their physician's location, were included in the analysis. In addition, participants who died during the study period were excluded from the analysis. Potential confounding variables, measured at ART

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