Transportation Barriers and Health Access for Patient Attending a Community Health Center

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Introduction

Access to care is a pressing public health concern. Greater access to health care has been related to better health status, more frequent use of preventative services, and lower hospitalization rates.[1] These findings are particularly more problematic for the approximately 45 million Americans who either have no medical insurance or who are medically underserved.[2] Underserved populations, like the poor and uninsured, suffer higher rates of medical morbidity and premature mortality.[3] This situation is, in part, due to barriers accessing health care and has drawn the intense interest of public health researchers seeking to address the disparity in health access of those underserved populations to their more privileged counterparts.

Access barriers create discrepancies in the number, type, and timing of personal health services leading to poorer health status. Health insurance coverage is by far the most well-studied and understood barrier to care. Poor, low-income, and minority groups are more likely to be without or have erratic health insurance coverage.[4] While insurance coverage is a very important aspect to access, universal coverage would not result in universal access to healthcare.[5] Non-financial barriers have been identified as significant obstacles to access and are seen as important targets for future research in the effort to increase health service utilization.

Transportation is a commonly identified barrier to care but is understudied in terms of the detail needed to address more direct health and transportation policy interventions. Relatively little research has described the level and detail of actual transportation barriers experienced by patients when they need to obtain health services.

This study describes the transportation problems encountered by patients visiting a community health center in the Portland, OR metropolitan region. Community health centers are federally funded health delivery sites serving primarily poor, minority, and otherwise underserved populations vulnerable to transportation and other health access barriers. The study surveyed 75 adult patients about the transportation they use to access medical services. The survey assessed the type and occurrence of transportation barriers with the patient's ability to obtain needed health care services.

The paper begins with a general discussion on the context of access barriers and their relationship to personal health. A review of the planning and medical research literature regarding transportation barriers to health care access follows with a description of community health centers and the study's objectives. Study methods and results are presented, followed by a discussion of findings and implications that conclude the paper.
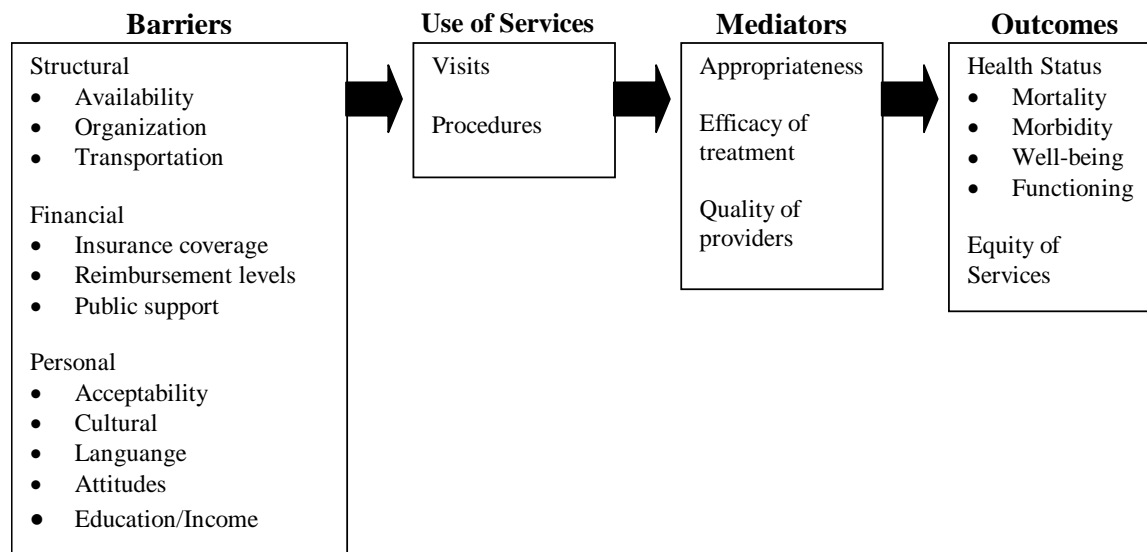
Background
Barriers to Health Care Access

Access to health care is a well-studied phenomenon in the medical literature with a majority of focus on socioeconomic elements, particularly the role financial barriers. The Institute of Medicine defines "access" as "the timely use of personal health services to achieve the best possible outcome". The general conceptual model for understanding access barriers in health care is depicted in Figure 1.

Access to health services is not an end in and of itself. The purpose of gaining access to the personal health care system is to achieve one or more of an array of possible health outcomes— not only avoidance of untimely death and relief of acute symptoms but also maintenance of long-term functioning and reprieve from anxiety about the meaning of symptoms. Barriers act to limit the delivery of health services to the individual and are captured in the downstream disparities of health outcomes of people who experience more or less barriers to care.

Figure 1. Conceptual model relating access barriers to health outcomes

Barriers	Use of Services	Mediators	Outcomes
Structural • Availability • Organization • Transportation Financial • Insurance coverage • Reimbursement levels • Public support Personal • Acceptability • Cultural • Languange • Attitudes • Education/Income	Visits Procedures	Appropriateness Efficacy of treatment Quality of providers	Health Status • Mortality • Morbidity • Well-being • Functioning Equity of Services

Source: Institute of Medicine (1993)[6]

Financial-based barriers, like the lack of health insurance coverage, are the most well studied elements of access in the medical literature.[7] Most Americans have some form of health insurance coverage, but the number of people who are under-insured or uninsured continues to increase as a function of declining employment-based insurance plans.[8] However, increased insurance coverage will not solve the access problem. A range of non-financial based barriers prevents patients from receiving health care services in a multitude of settings and circumstances.

For any individual these barriers might include education, language, personal experiences, attitudes and beliefs, unhealthy lifestyles, poor nutrition, provider's attitudes and beliefs, transportation, social support, and/or health professional supply and distribution.[9] In addition, race, ethnicity, gender, economic status, geography and environment are other important factors to consider. More broadly, non-financial barriers are distributed unequally across the population and are felt in greater extent and depth in the poor, minority and other vulnerable populations.[10] This may be due to not only the amount of care they receive but also the content, quality, and continuity of what care they do receive.

Addressing non-financial barriers to primary health care is critical if improved access is to be achieved. To significantly advance the health status of the American people, research directed at the examination of non-financial barriers to access and service utilization is essential.

Transportation Barriers

Transportation has been identified as a general barrier to health care in a number of broad based studies focusing on underserved populations. Okoro et al. analyzed data from the 2002 Behavioral Risk Factor Surveillance System and reported finding that 9% of older adults (65 and older) did not obtain needed medical care because of transportation problems, suggesting that they might be people living in rural areas, no longer drive, or depend on others or public transportation.[11] Ahmed et al. surveyed the non-elderly urban poor in door-to-door surveys and determined that 30% of respondents had a transportation barrier to health care with those living in poverty disproportionately affected.[12] Rittner and Kirk found that public transportation barriers have adverse effects on the populations that depend most on them for health services access, namely the poor and older persons.[13] The study described bus service to clinics as inconsistent, and bus stops were of poor quality and perceived to be unsafe. Likewise, a study assessing the impact of a transit strike in Minneapolis discovered a small decrease in the amount of scheduled primary care appointments during the three-week strike period at an urban hospital serving low-income and Medicaid patients.[14]

Fitzpatrick et al. found that 21% of respondents in the annual 1993 Cardiovascular Health Study reported that they experienced transportation barriers to accessing health care.[15] A study comparing urban and rural areas in North Carolina found that 8% of older adult survey respondents delayed health care visits due to transportation problems.[16] Relatively equal percentages of rural residents to urban residents reported transportation as a barrier despite the presence of mass transit systems in urban areas. Additionally, the study reported that people who rated their health as poor were almost twice as likely as other respondents to cite a problem with transportation. Rask et al. reported that transportation problems were the third most common reason patients cited for not having regular medical care.[17] Patients that said that they had a transportation problem were 1.45 times more likely to delay seeking medical care.

Several other studies have found that transportation to be a barrier to prenatal care, childhood preventative medical visits, cancer care, and the management of chronic diseases. Melnikow and Alemagno found the cost of public transportation to be a significant barrier to receiving adequate prenatal care for poor urban women.[18] Poland et al. reported a direct relationship between health service utilization and mode of transportation used to access the clinic for prenatal care. Women traveling by private vehicle or taxi had higher utilization rates than those relying on public transportation.[19] Flores et al. found that analyzing the preventative health care visits of Latino children in an urban setting that 21% of parents cited transportation problems as the single most important reason for not bringing their children in for routine medical examinations.[20]

A University of Texas study comparing the distance and mode of transportation to cancer therapy found that some patients forgo needed treatment because of problems with transportation.[21] Minority patients consistently reported that barriers such as distance, access to an automobile, and availability of someone to drive them to the treatment center were potential major problems. Finally, a study looking at the association of transportation and health care utilization for chronic care management in rural North Carolina reported that those who had a driver's license had 2.29 times more health care visits for chronic care and 1.92 times more visits for regular examinations than those who did not.[22] Respondents who had family or friends who could provide transportation had 1.58 times more visits for chronic care than those who did not.

Community Health Centers

Uninsured, underserved, and vulnerable patients, in both rural and urban areas, must rely on a safety net system of care. Without a national health insurance program to establish a system of primary care for these populations, the federal government funded neighborhood health centers in 1965 that were later codified as community, migrant, or homeless health centers through section 330 of the Public Service Act.[23]

The Bureau of Primary Health Care (BPHC) under the Health Resources and Services Administration operates about 3000 of these community health centers through a federal funding mechanism. At the local level, a host of state and local public health departments and other not-for-profit health delivery organizations operate community health centers. The BPHC provides an operating grant to subsidize physical operations, administration, and personnel costs.

Estimates indicate that 1 in 25 primary care visits in the nation in 1998 occurred in community health centers.[24] The community health center patient population is characterized by larger shares of ethnic minorities, individuals with Medicaid or no insurance, rural dwellers, and women receiving obstetric services compared with the patients seeking care at out-patient hospitals and physician offices. In 2002, nearly 10 million people received health care services from one of these clinics.[25] However, the BPHC estimates that only 1 in 6 people who lack access to a primary care physician actually use services at a community health center.[26]

Objectives

Health care access is a complex concept and there are no uniform methods for assessing it. The impact of transportation barriers is even less understood or measured. This study addresses transportation barriers affecting access to primary care services at a community health center in Multnomah County, OR. The objective of the study is to provide a more detailed analysis describing patient transportation behaviors and their relationship to perceived and actual transportation barriers in the primary care setting. Therefore, the project aimed to:

1. Describe how patients travel to the community health center ,
2. Describe patients' perception of transportation as a barrier,
3. Describe patients' experience with actual transportation barriers,
4. Determine if selected demographic and travel characteristics are related with perceived and actual transportation barriers, and
5. Discuss policy and planning recommendations

Methods

Study Population

The study used a cross-sectional sample of English-speaking adults making a primary care visit to a community health center (CHC) operated by the Multnomah County Department Public Health during a three-week period in May 2005. Multnomah County Department of Public Health operates five county medical clinics providing primary care services. While the county operates other specialty and school-based clinics, these five centers provide the majority of health services offered to their patients; and, unlike other operated clinics, remain open year-round.[27] The clinics vary in the medical, dental, and other specialty care services they offer, as well, as the socio-demographic composition of the patients attending the clinic. Due to shortfalls

in funding, the county was forced to close medical services at is Southeast CHC and reassigned many of its health providers and patients to the Mid-County CHC.

Mid-County Community Health Center, located at 127th and SE Division Avenue in Portland, OR, was selected as the study site using two criteria developed by county health administrators and the investigator. First, Mid-County sees a large percentage of total primary care visits within the county health system due to the shift in patients coming from the closure of Southeast CHC. County health administrators felt that the site would be best suited to obtain the approximately 150 primary care patients targeted for the study. Second, county CHCs are typically understaffed and overburdened. Mid-County was deemed best suited by administrators as a site where the study would not unduly disrupt clinic operations or the patients' clinic visit for the agreed upon three week data collection period.

The survey was only available in English due to lack of translation services. Prospective English-speaking patients were identified by a clinic receptionist while they checked-in for their clinic appointment. Patients were asked if they wanted to participate in a short survey about the transportation they use to get to the clinic. The patients were then informed of the study's purpose, voluntary nature, and confidentiality. Clinic staff was careful to consent patients of the voluntary nature of the study and not use their position within the clinic to coerce patients to participate.

Patients agreeing to participate self-administered the survey and returned the completed survey to the receptionist. A total of 75 of 183 of identified English-speaking patients completed the survey for a response rate of 41%. The 183 patients are a subset of the total English-speaking population since not all were asked to take the survey. Receptionist and investigator observations indicated that many eligible patients simply out-right declined to participate. Total primary care visits during the study period were not recorded or an approved measure in the study.

Mid-County Community Health Center receives a large proportion of immigrant and non-English speaking patients; generally representative of the four other clinics with exception of the Westside CHC in downtown Portland which sees a high number of homeless patients. Clinic administrators estimate that 60-70% of patients are non-English speaking; however, personal communications with the receptionists indicate that they perceived that percentage to be slightly higher during the data collection period.

Informed consent
The Institutional Review Board of the Oregon Department of Human Services approved the research protocol and survey procedures. Participants were informed about the voluntary nature of their involvement and the about the confidentiality of their responses. No protected health information was asked for or collected.

Survey
The survey asked patients about selected demographic characteristics and the patient's transportation to the clinic. Age, sex, race, insurance status, and car ownership were assessed. For the health insurance question, publicly funded health programs like Medicare, Medicaid, WIC[28], and the Oregon Health Plan are considered forms of health coverage. Patients were asked

to assess their health status with a global health perception question on a 5-point Likert scale (Excellent…Poor).[29] Patients were asked to report how they got to clinic for their current visits, as well, as how they typically get to the clinic. A visual analog scale assessed patients' perception of transportation as a barrier by asking them to rate how difficult is it for them to get to the health center (1=not difficult at all and 10=extremely difficult). The survey asked patients to report if they had "ever", or "within the last year", encountered transportation as a barrier to obtaining needed medical care or contributing to a missed appointment. If they had a barrier within the last year, they were asked to specify the exact nature of the transportation barrier. Patients were also asked to identify the distance they traveled to the clinic visit by naming the closet intersection to their home residence. However, the distance variable is excluded in the analysis since most patients refused to answer or did not fully answer the question parameters. A copy of the survey tool is included in the Appendix.

Data Analysis
The Statistical Package for the Social Sciences 11.5 (SPSS) was used for data entry and analysis.[30] Descriptive statistics were computed for all variables and summarized as frequency tables. A correlation analysis was used to relate reported perceived transportation difficulty to demographic variables and travel behaviors. Bivariate crosstabs examined relationship between travel characteristics and demographic data. Forward conditional logistic regression analyses were used to generate odds ratios of actual transportation barriers with demographic variables and travel behaviors. Covariates were included in the model to fit cut-off values of p=0.05.

Results
Patient Characteristics
Patient characteristics are summarized in Table 1. Of the 75 patients, 85.3% were white, 70.7% were women, and the average age was 42.4 ± 13.7 years. Approximately half, 42.7%, of patients reported that they owned a private vehicle. The majority of patients reported having some form of health insurance (82.7%). Patients have poor health status with 54.6% assessing their health as fair or poor, especially compared to county data collected in a national health tracking survey where only 12.6% rated their health as fair or poor.[31] Age and health status are moderately correlated (Pearson=0.421, p=0.001) with older persons reporting poorer health.

Table 1. Patient Characteristics (n=75)

| Demographic	Percent	Demographic	Percent
Mean Age	42.4 (13.7)	Health Status	
Over 65	4	Excellent	1.3
Gender		Very Good	14.7
Male	29.3	Good	29.3
Female	70.7	Fair	25.3
Race		Poor	29.3
White/Caucasian	85.3	Current Health Insurance	82.7
Black/African America	14.7	Own Car	42.7

Note: Standard deviation in parentheses

Patients sampled in the study are a unique population and not representative of CHC patients in Oregon or the general population of the county. Compared to all CHC patients in Oregon, patients sampled in the study are under-represented in terms of race (46% non-white) and gender (48.6% male), while over-represented in age (<1% over 65) and insurance status (53% insured).[32] Some caution should be used interpreting these figures, especially the insurance disparity since the survey asked for the presence of insurance to include publicly funded programs like Medicaid and the Oregon Health Plan; pre-testing of the survey indicated that respondents viewed public third-party payers, like Medicaid and the Oregon Health Plan, as types of private health insurance. Otherwise, publicly available CHC insurance data are not available by county or primary care service utilization and it is difficult to accurately characterize the county CHC population. Likewise, the study sample differs in composition to the overall population in the county in terms of age (10.2% over 65) and gender (49% male). The reported race of the survey sample population is similarly more white (79%). The lack of non-English language surveys did not address the reported prevalence of immigrant populations at the clinic and reflected in county Census population of 13.5% foreign born and the 17% who speak a language other than English at home.[33]

Transportation Characteristics

The majority of patients travel to the clinic by driving themselves in private vehicle in both cases on the day of their clinic visit and their typical clinic travel mode. This figure is similar to rates of patient car ownership (42.7%). Traveling by private vehicle is followed respectively by having someone else drive the patient in a private vehicle, using public transit, using para-transit services, and walking/biking (Figure 2).

Figure 2. Patient Mode of Transportation to Clinic
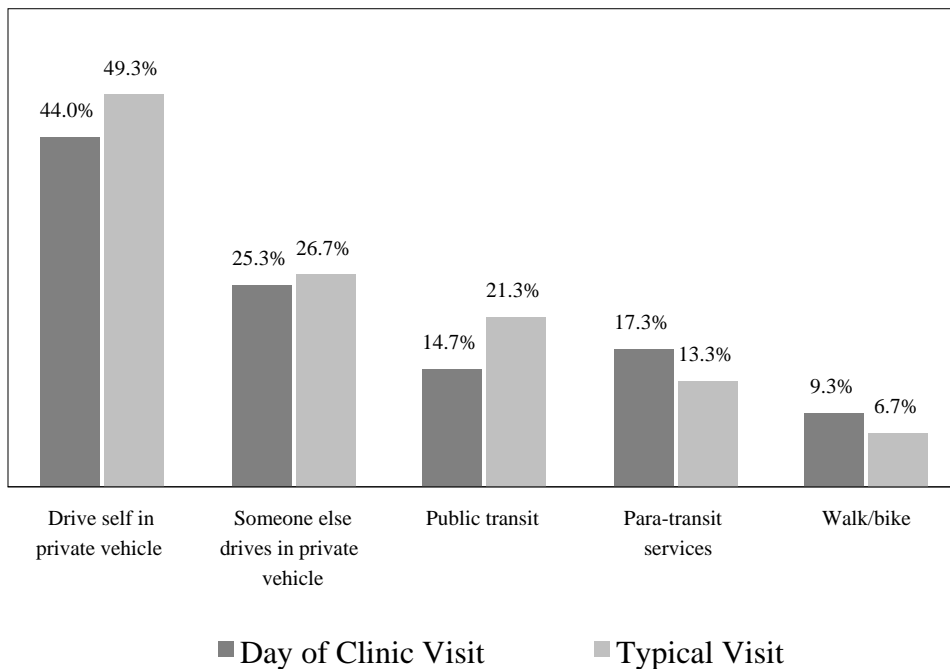
Slightly fewer percentages of patients used private vehicles, had someone else drive them, and used public transit relative to their typical clinic travel modes. Use of para-transit services and walking/biking increased for the day of clinic visit. Only 8% of patients used more than one mode to get to the clinic on the day of their visit. Approximately 21% or patients reported that they used different forms of transportation on the day of their visit from their typical method of travel.

Bivariate correlations show that patients traveling by car on their clinic visit own cars at higher rates than those relying on all other modes and are more likely to report having better health (Table 2). Public transit riders are moderately correlated with being non-white. Para-transit riders are more likely to be older and report poorer health. However, the relationships, while significant, are fairly weak.

Table 2. Bivariate Correlations of Travel Mode with Selected Patient Charateristics (n=75)

Travel Mode (day of clinic visit)	Car Ownership	Poor Health Status	Non-white	Older Aged
Drive self in private vehicle	0.865**	-0.318**	-0.140	-0.141
Someone else drives in private vehicle	-0.379**	-0.134	-0.068	0.107
Public transit	-0358**	0.193	-0.361**	-0.188
Para-transit services	-0.253*	0.242*	-0.190	0.387**
Walk/bike	-0.277*	-0.115	0.003	0.041

Note: Pearson coefficient, * significant at 0.05 (2-tailed), ** significant at 0.01 (2-tailed)

Perceived Transportation Barriers

Patients were asked to rate how difficult it was to get to the health clinic. Based on results of the visual analog scale, patients generally do not view their transportation to the clinic as difficult (mean, 2.85); however, respondents report some variation in how transportation difficulty is viewed (standard deviation, 2.30). Correlates of perceiving transportation to the clinic as more difficult included the inability to obtain needed health care because of transportation barriers, traveling to the clinic by para-transit services, untypical travel to the clinic on the day of the visit, and having no health insurance (Table 3). The inability to access health services because of transportation barriers "ever" and 'within the last year", were moderately correlated with rating transportation as difficult. Traveling by para-transit, untypical travel to the clinic, and having no health insurance are relatively weak relationships.

Table 3. Correlates of Perceived Transportation Difficulty

Correlate	Pearson Coefficient
Unable to obtain needed health care: Ever	0.529**
Unable to obtain needed health care: Last Year	0.407**
Traveled to clinic by para-transit	0.292 *
Untypical travel to clinic	0.247 *
No health insurance	0.353**

Note: * significant at 0.05 (2-tailed), ** significant at 0.01 (2-tailed)

There is some evidence that the amount of variation and clustering in patients' designation of transportation difficulty masks how certain at risk groups may perceive transportation as a barrier. Under the assumed condition that patients clustered their responses into three modes of high (7-10: 5.3%), medium (4-6: 25.4%), and low (1-3: 69.3%) difficulty, bivariate correlations found that those in the high mode perfectly correlated with poorer health status (Pearson=1.00, p=0.01). However, that figure is skewed due to only five individuals in the sub-sample. However, it does reveal a possible relationship between health status and transportation as a barrier to care for sicker patients.[16] There is some reason to suggest age might be correlated with transportation difficulty.[13] However, the study sample showed no such relationship and this could be due to the correlation of older persons with para-transit service utilization.

Actual Transportation Barriers
Substantial numbers of patients reported that they have experienced transportation barriers to health care access. Forty percent of patients said that transportation has kept them from obtaining needed health care "ever", while 32% reported that they had been able to get health services within the last year because of transportation problems (Table 4). For those people who had been unable to get health care during the last year, 37.5% report that they have problems riding transit, followed by problems with their private vehicle, problems with para-transit, problems walking/biking, and having no one to drive them in a private vehicle (Table 3).

Table 4. Actual Transportation Barriers with Cited Problems

Unable to obtain needed health care	Percent
Ever (n=30)	40
Within the last year (n=24)	32
Problems riding transit	37.5
Problems with private vehicle	20.8
Problems with para-transit	16.7
No one available to drive	12.5
Problems walking/biking	12.5

Two binary logistic regression models of actual transportation barriers were constructed to estimate the direction and magnitude of covariates. One model evaluated the factors associated for those who were unable to obtain needed health care services "ever" because of transportation problems. The other model evaluated the factors associated for those unable to obtain health care services "within the last year". The model specified all demographic and travel behavior variables. Table 5 summarizes the covariates included in the model at a significance level of p=0.05.

Patients who have ever been unable to access health services are 21.89 more times more likely to have no health insurance, 14.23 times more likely to have someone else drive them to the clinic, 2.09 times more likely to view traveling to clinic as difficult. To a lesser degree, patients traveling the clinic by transit and para-transit are more likely to have "ever" experienced transportation barriers.

Patients who have been unable to access health services within the last year are 6.45 times more likely to have traveled to the clinic by some other mode(s) than the one(s) they typically use to the clinic. Traveling by transit, para-transit, and relying on someone else to drive them to the health clinic were also included in the model as predictor variables. The predictive variables included in the separate models indicate that different factors may contribute to transportation problems experienced in two general classes of patients – one that may experience recent, more frequent problems and one that may experience relatively random and less frequent transportation problems.

Table 5. Covariate Odds Ratios of Transportation Barriers

Covariate	Unable to obtain needed health care:	
	Ever	Within last year
Perceived transportation difficulty	2.09 (1.26, 3.47)	***
Traveled to clinic visit by transit	0.07 (0.11, 0.47)	0.04 (0.01, 0.28)
Traveled to clinic visit by para-transit	0.07 (0.01, 0.66)	0.02 (0.01, 0.17)
No health insurance	21.89 (1.84, 259.93)	***
Usually travels via someone else drives	14.23 (1.35, 148.89)	0.05 (0.02, 0.55)
Non-typical travel to clinic	***	6.45 (1.11, 37.43)
Nagelkerke R^2	0.697	0.585

Note: Model covariates significant at p=0.05
95% confidence intervals in parentheses.
*** not included in model.

Both logistic regression models had good explanatory with R^2 values between 0.70 and 0.59. However, some caution should be used interpreting the magnitude of some of the odds ratios generated in the models. Large distances in the 95% confidence intervals suggest that the ratios may be overstated and should be viewed more in the predictive direction of the relationship and not the exact magnitude.

Analysis

Ensuring access to health care services is vital to improving health care utilization, health outcomes, and health status.[1] Although lack of health insurance has been shown to be a clear barrier to care, having coverage does not guarantee access to health care and preventative services. Prior studies have attempted to measure transportation barriers in other vulnerable populations.[10-20] In general, they have found that lack of car ownership, longer distance traveled, reliance on transit service, and unavailability of someone to drive them are related to decreased utilization of health services and poorer health outcomes. The results in this study are consistent with some of those findings.

This study adds important information on how community health center patients travel to their clinic visit, how difficult they perceive that transportation to be, and in what manner they encounter transportation barriers. Transportation barriers and travel modes have not been assessed for community health center patients in this manner before. Several important points are apparent. First, it is striking how many patients report that they have been unable to access health services because of transportation problems. Thirty-two percent of patients reported that they had experienced a transportation barrier within the last year and 40% reported that they, at some

point, had been unable to obtain needed health care. Patients show wide variations as to the exact nature of their transportation barrier. Obviously, transportation is inextricably linked with how patients access health services and these percentages suggest that transportation problems affect a large proportion of patients. However, they do not indicate how frequent or what impact on health outcomes this decrease in health service utilization produces. The impact of transportation problems is not only felt by the patient's health, but also creates inefficient delivery on the part of the clinic with providers seeing fewer patients because of missed appointments.

Second, those reporting that they had experienced a transportation barrier within the last year cited problems with riding transit as the most common impediment. The community health center is located on a street designated as a transit corridor and has frequent transit service and a transit stop located directly in front of the clinic. However, the clinic is only served by one bus route originating in downtown Portland and terminating in a nearby city. The one in five patients who typically use transit to get to the clinic would most likely have to transfer from other routes to get the center. While the exact nature of the transit problem is unclear, other studies have found that patients with public transportation barriers cite problems with fare cost, unreliable service, long travel times, exposure to weather, and personal safety at transit stops.[11, 34]

Third, based on the correlations of perceptions of transportation as a barrier and the covariates identified in the logistic regression, it appears that patients with transportation barriers can be separated into two classes. The first class of patients tend to be insured, but may experience infrequent transportation problems because they lack consistent forms of transportation to their clinic visit. These patients are more likely to view transportation as barrier if they relied on other people to drive them to the clinic and tend not to not take the same form of transportation on the day of their clinic as their typically do. Patients that have to rely on others or do not have consistent forms of transportation could be more susceptible to changes in external circumstances such as the availability of friends/family to drive them or having to prearrange travel for visit to the clinic; both situations that could be exacerbated in times of medical urgencies.

The second class of patients appears to have more chronic problems accessing healthcare in general. These patients could be some of the most vulnerable patients seen in the health clinic in terms of health status, poverty, health coverage, age, and disability; characteristics that would tend to emphasize problems with transportation. These patients view transportation as more of a barrier than others, they are also more likely to be uninsured, use para-transit services, and rely on others for transportation to the clinic. The survey used a very broad definition of health care coverage to include Medicaid, Medicare, and the Oregon Health Plan; forms of coverage are offered to older persons, the poor, and disabled who qualify for enrollment. Patients who reported that they did not have health insurance and experienced transportation barriers may be some of the most at risk individuals in the health care system – barring individuals who receive no treatment. These populations, especially the very ill and those living in poverty, have been documented in other studies as having higher incidence of transportation problems.[9-11]

The study has several limitations. The study attempted to assess transportation barriers of patients attending a community health center. However, the study only recruited a relatively small and selected population of English-speaking adults (15% non-white participants). Personal

communications with health center administrators indicate that roughly 30-40% of patients speak English. The community health center is located in an area of the metropolitan region with high proportions of recent immigrant populations and that make up the majority of the centers patients. The clinic provides much of its care to recent immigrants from Russia, Ukraine, Vietnam, and several Latin American countries. Generally, ethnic populations that are unable to communicate in English have poorly understood health care beliefs that affect their health care access and quality and it is unfortunate that the survey could not be translated to include them in the study. However, other studies have found that minorities are more apt to rely on the others and use public transit for transportation to the health care visits.[19]

Another limitation of the study is that it only considers transportation barriers to care and not its context with other barriers. Sampling and survey constraints limited the collection of variables representing other barriers. Even though health insurance status is included in the analysis, access to care is complex and more detailed information on how people experience types of barriers is needed. Patient may not distinguish between problems in transportation with other barriers in social support as indicated in the proportions of patients relying on other people to drive them to the clinic. Finally, distance traveled to the clinic was not included in the analyses because of data collection problems. Distance factors have been identified as significant barriers to receiving health care in other studies for both urban and rural patients. The location of the clinic in an area with housing densities less than at the urban core but more than truly rural areas suggest that distance traveled to the clinic could still be an important factor to consider. Nonetheless, the study adds important information on how community health center patients experience transportation barriers.

The findings clearly document the need for assistance for patients obtaining needed health care services, especially in the classes of patients that are more apt to encounter persistent problems with transportation. Three different points are apparent. First, increased access to community health centers could be met through better transit services in urban areas through collaborative efforts on the part of transit and public health agencies to reduce transportation barriers for those who rely on transit.[35] Trimet, the regional transit agency in the Portland region currently maintains a transportation program for eligible persons. LIFT is a shared-rider program available to qualified persons who are unable to ride transit because of health problems or disability and is offered at minimal cost. Person must meet eligibility requirements in order to qualify and remain in the program. Clinic administrators report that many clients utilize LIFT services, but that enrollment may be sub-optimal. Outreach efforts on the part Trimet and health officials may increase the utilization of services of targeted eligible patients by informing and enrolling them in the program. Additionally, improvements in transit service to the health center, network connectivity to CHCs, and targeted outreach at centers, such as transit information boards, could improve access for transit riders.

Second, federal Medicaid laws require state and local governments to ensure transportation services if they receive federal matching Medicaid funds as spelled out in Title XIX of the Social Security Act and accompanying regulations.[36] Medicaid will pay for costs of approved para-transit services for those who qualify. Improved coordination of Medicaid transportation services has shown the potential to increase utilization of available services while decreasing overall cost.[37] Further, many people eligible for Medicaid do not enroll or are not aware of the

program's transportation benefits. Increased efforts in Medicaid enrollment and better outreach informing eligible patients of transportation services could improve the access of health services.[38] TriMet's Medical Transportation Program provides transportation to eligible Oregon Health Plan and Medicaid patients traveling to covered medical services through Trimet and outside contracted drivers. While patients can travel at no cost, there are several procedural obstacles related to enrollment and scheduling that may be difficult for some patients. Imposed penalties for missed rides also may make transportation more difficult for vulnerable patients. Regardless, better coordination and outreach to eligible patients needing these services combined with programmatic redesign to be make the transportation more suited to those needing services could reduce transportation barriers.

Third, comprehensive land use planning that accounts for health access as a necessary community service should be considered. Planners often plan for access to public facilities, such as parks and schools but not health centers. While the majority of health services are provided by the private sector, the number of patients being seen at publicly funded CHCs continues to increase concomitantly with a rise in minority populations compounded with the growing number of Americans who are uninsured and underinsured.[24] Coordinated land use planning could address access to health services for these vulnerable populations by making it an explicit criteria in long range planning and equity discussions. The BPHC currently addresses the issue by offering preferred funding to CHCs operating in medically underserved areas or health professional shortage areas.[39] However, many key measures in the designation of these areas often do not have the same historical relevance, such as declining child mortality rates. Based on personal communication, the BPHC is currently redefining measures for these designations with a focus on the particular access barriers that CHC patients face – such as transportation. A key issue will be to understand the location, transportation origins, and travel behaviors of vulnerable patients. A collaborative effort on the part of planners and federal health agencies to design CHC location criteria could offer promise for better health access for those disproportionately affected.

Access to health care is complex, involving many barriers, and having health insurance does not eliminate the access problem. Addressing one barrier without addressing others provide little help in guiding policy makers in developing programs that improve health care accessibility for disadvantaged groups. This study has demonstrated that patients attending community health centers encounter transportation barriers in substantial proportions. Effective interventions to improve health care access need to address transportation barriers. A collaborative approach involving public health professionals and transportation and land use planners can contribute to improved health access and status.

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Appendix. Survey Tool

How did you get to the health center **today**? (☑ check all that apply)
- ☐ Drive self in private vehicle (car, truck, motorcycle, etc.)
- ☐ Someone else drives in private vehicle (car, truck, motorcycle, etc.)
- ☐ Public transit (bus, streetcar, MAX)
- ☐ Para-transit services (dial-a-ride or medical taxi service)
- ☐ Walk/bike
- ☐ Other, please specify _____

1. How do you **usually** get to the health center? (☑ check all that apply)
- ☐ Drive self in private vehicle (car, truck, motorcycle, etc.)
- ☐ Someone else drives in private vehicle (car, truck, motorcycle, etc.)
- ☐ Public transit (bus, streetcar, MAX)
- ☐ Para-transit services (dial-a-ride or medical taxi service)
- ☐ Walk/bike
- ☐ Other, please specify _____

2. On a scale of **1-10**, with **1 = "not difficult at all"** and **10 = "extremely difficult"**, how difficult is it for you to get to the health center? (circle one)

    1   **2**   **3**   **4**   **5**   **6**   **7**   **8**   **9**   **10**

3. Have you **ever** missed an appointment or been unable to obtain needed health care because of problems with your transportation? (☑ check one)
- ☐ Yes   ☐ No

4. Within the past **year**, have you missed an appointment or been unable to obtain needed health care because of problems with your transportation? (☑ check one)
- ☐ No   ☐ Yes

    If yes, what was the reason(s) you could not get to the clinic? (check all that apply)
- ☐ Your private vehicle is not available
- ☐ Someone else drives you – they were not available
- ☐ Problems riding transit
- ☐ Problems riding para-transit (dial-a-ride or medical taxi)
- ☐ Problems walking or biking
- ☐ Other, please specify_____

5. What is the closest intersection to your home?

_____ and _____ in what city _____ and zip code ___ ___ ___ ___ ___

    (example, NE 57th and E Burnside in Portland and 97213)

6. Do you own a car? (☑ check one)
- ☐ Yes
- ☐ No

7. What is your gender? (☑ check one)
- ☐ Male
- ☐ Female

8. What is your race? (☑ check all that apply)
- ☐ White
- ☐ Black
- ☐ Latino/Hispanic
- ☐ Asian
- ☐ Native American
- ☐ Other, please specify_____

9. What year were you born? (example: 1 9 7 1)

    ___ ___ ___ ___

10. Do you currently have health insurance? (☑ check one)
- ☐ Yes
- ☐ No

11. In general, how would you rate your health? (☑ check one)
- ☐ Excellent
- ☐ Very good
- ☐ Good
- ☐ Fair
- ☐ Poor

12. Do you have friends or family members who are unable to get to a health clinic because of problems with transportation? (☑ check one)
- ☐ Yes
- ☐ No