ANNOTATED BIBLIOGRAPHY of GIS REFERENCES

Aday LA, Andersen R. [**A framework for the study of access to medical care.**](http://www.ncbi.nlm.nih.gov/pubmed/4436074) Health Serv Res. 1974 Fall;9(3):208-20.

Definitions and aspects of the concept of access to medical care are reviewed and integrated into a framework that views health policy as designed to affect characteristics of the health care delivery system and of the population at risk in order to bring about changes in the utilization of health care services and in the satisfaction of consumers with those services. Indicators are suggested for the measurement of the various relevant aspects of access, with the system and population descriptors seen as process indicators and utilization and satisfaction as outcome indicators in a theoretical model of the access concept.

[Albert DP,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=ALBERT,%20DP) [Gesler WM](http://apps.webofknowledge.com/DaisyOneClickSearch.do?product=WOS&search_mode=DaisyOneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&author_name=GESLER,%20WM&dais_id=11830181), [Wittie PS](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=WITTIE,%20PS). **Geographic Information-Systems and Heath - An Educational Resource**. Journal of Geography. 1995 Mar-Apr; 94(2): 350-56.

The use of geographic information systems to analyze spatial dimensions of health care and disease ecology is becoming a realistic prospect for investigators in the social sciences. This review of the literature, bringing together a diverse collection of professional and academic journals, can be grouped into four categories: potential, cautionary, preliminary, and application. Enough references have been collected and reviewed to provide instructors with material for a classroom unit about 1) using GIS in a medical geography class; 2) medical applications in a GIS class; or 3) using GIS in classes which have a health and disease component.

[Allshouse WB](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Allshouse%20WB%22%5BAuthor%5D), [Fitch MK](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Fitch%20MK%22%5BAuthor%5D), [Hampton KH](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Hampton%20KH%22%5BAuthor%5D), [Gesink DC](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gesink%20DC%22%5BAuthor%5D), [Doherty IA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Doherty%20IA%22%5BAuthor%5D), [Leone PA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Leone%20PA%22%5BAuthor%5D), [Serre ML](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Serre%20ML%22%5BAuthor%5D), [Miller WC](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Miller%20WC%22%5BAuthor%5D). **Geomasking sensitive health data and privacy protection: an evaluation using an E911 database.**  [Geocarto Int.](http://www.ncbi.nlm.nih.gov/pubmed/20953360) 2010 Oct 1;25(6):443-452.

Geomasking is used to provide privacy protection for individual address information while maintaining spatial resolution for mapping purposes. Donut geomasking and other random perturbation geomasking algorithms rely on the assumption of a homogeneously distributed population to calculate displacement distances, leading to possible under-protection of individuals when this condition is not met. Using household data from 2007, we evaluated the performance of donut geomasking in Orange County, North Carolina. We calculated the estimated k-anonymity for every household based on the assumption of uniform household distribution. We then determined the actual k-anonymity by revealing household locations contained in the county E911 database. Census block groups in mixed-use areas with high population distribution heterogeneity were the most likely to have privacy protection below selected criteria. For heterogeneous populations, we suggest tripling the minimum displacement area in the donut to protect privacy with a less than 1% error rate.

[Apparicio P](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Apparicio%20P%22%5BAuthor%5D), [Abdelmajid M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Abdelmajid%20M%22%5BAuthor%5D), [Riva M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Riva%20M%22%5BAuthor%5D), [Shearmur R](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Shearmur%20R%22%5BAuthor%5D). **Comparing alternative approaches to measuring the geographical accessibility of urban health services: Distance types and aggregation-error issues.** [Int J Health Geogr.](http://www.ncbi.nlm.nih.gov/pubmed/18282284) 2008 Feb 18;7:7.

BACKGROUND: Over the past two decades, geographical accessibility of urban resources for population living in residential areas has received an increased focus in urban health studies. Operationalising and computing geographical accessibility measures depend on a set of four parameters, namely definition of residential areas, a method of aggregation, a measure of accessibility, and a type of distance. Yet, the choice of these parameters may potentially generate different results leading to significant measurement errors. The aim of this paper is to compare discrepancies in results for geographical accessibility of selected health care services for residential areas (i.e. census tracts) computed using different distance types and aggregation methods. RESULTS: First, the comparison of distance types demonstrates that Cartesian distances (Euclidean and Manhattan distances) are strongly correlated with more accurate network distances (shortest network and shortest network time distances) across the metropolitan area (Pearson correlation greater than 0.95). However, important local variations in correlation between Cartesian and network distances were observed notably in suburban areas where Cartesian distances were less precise. Second, the choice of the aggregation method is also important: in comparison to the most accurate aggregation method (population-weighted mean of the accessibility measure for census blocks within census tracts), accessibility measures computed from census tract centroids, though not inaccurate, yield important measurement errors for 5% to 10% of census tracts. CONCLUSION: Although errors associated to the choice of distance types and aggregation method are only important for about 10% of census tracts located mainly in suburban areas, we should not avoid using the best estimation method possible for evaluating geographical accessibility. This is especially so if these measures are to be included as a dimension of the built environment in studies investigating residential area effects on health. If these measures are not sufficiently precise, this could lead to errors or lack of precision in the estimation of residential area effects on health.

[Astell-Burt T](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Astell-Burt,%20T), [Flowerdew R,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Flowerdew,%20R) [Boyle PJ](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Boyle,%20PJ)[.](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Dillon,%20JF) **Does geographic access to primary healthcare influence the detection of hepatitis C?** [Soc Sci Med.](http://www.ncbi.nlm.nih.gov/pubmed?term=Does%20geographic%20access%20to%20primary%20healthcare%20influence%20the%20detection%20of%20hepatitis%20C%3F) 2011 May;72(9): 1472-81.

Recent work in France has suggested that poor geographic access to primary healthcare may have a negative influence upon detection rates of the hepatitis C virus. Topography and poor infrastructure can exacerbate geographic remoteness, while the stigma surrounding hepatitis C and intravenous drug use may also discourage healthcare-seeking behaviour in rural communities with limited choice of general practitioner. No similar study has been conducted in the UK, where detection rates of hepatitis C are also low. Moreover, the previous French findings did not adjust for the uneven spatial distribution of HCV prevalence and associated risk factors, which raises the possibility that the reported travel-time associations were a reflection of greater hepatitis C prevalence in urban areas (where the travel-times to primary healthcare are short) and not an effect of geographic access to primary healthcare. Using geographic information systems, Poisson regression and a dataset from Tayside (Scotland), we explored whether lower rates of hepatitis C detection were associated with higher travel-times to primary healthcare. We tested whether any travel-time effects remained once the models were adjusted for deprivation, by controlling for the spatial variation of some of the known risk factors of hepatitis C infection. Separate models were calculated according to patient history of opiate substitution therapy to take account of people likely to have been infected through intravenous drug use. Rates of detected hepatitis C were highest among males aged between 25 and 39 years. A statistically significant travel-time-decay effect was observed, though with notable attenuation for all patients after adjusting for deprivation. Further modeling identified a travel-time effect only for those who had received opiate substitution therapy. The absence of a similar effect in the non-opiate substitution therapy group indicates that selection effects, not causation, are the most likely explanation for the initial travel-time-decay effects. Thus, future studies of hepatitis C detection and geographic access to primary healthcare will need to consider ways of controlling for the uneven spatial distribution of HCV prevalence and associated risk factors beyond ecological measures of socioeconomic deprivation.

[Badland HM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Badland%20HM%22%5BAuthor%5D), [Opit S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Opit%20S%22%5BAuthor%5D), [Witten K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Witten%20K%22%5BAuthor%5D), [Kearns RA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Kearns%20RA%22%5BAuthor%5D), [Mavoa S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Mavoa%20S%22%5BAuthor%5D). **Can virtual streetscape audits reliably replace physical streetscape audits?** [J Urban Health.](http://www.ncbi.nlm.nih.gov/pubmed/21104331) 2010 Dec;87(6):1007-16.

There is increasing recognition that the neighborhood-built environment influences health outcomes, such as physical activity behaviors, and technological advancements now provide opportunities to examine the neighborhood streetscape remotely. Accordingly, the aims of this methodological study are to: (1) compare the efficiencies of physically and virtually conducting a streetscape audit within the neighborhood context, and (2) assess the level of agreement between the physical (criterion) and virtual (test) audits. Built environment attributes associated with walking and cycling were audited using the New Zealand Systematic Pedestrian and Cycling Environment Scan (NZ-SPACES) in 48 street segments drawn from four neighborhoods in Auckland, New Zealand. Audits were conducted physically (on-site) and remotely (using Google Street View) in January and February 2010. Time taken to complete the audits, travel mileage, and Internet bandwidth used were also measured. It was quicker to conduct the virtual audits when compared with the physical audits (χ = 115.3 min (virtual), χ = 148.5 min (physical)). In the majority of cases, the physical and virtual audits were within the acceptable levels of agreement (ICC ≥  0.70) for the variables being assessed. The methodological implication of this study is that Google Street View is a potentially valuable data source for measuring the contextual features of neighborhood streets that likely impact on health outcomes. Overall, Google Street View provided a resource-efficient and reliable alternative to physically auditing the attributes of neighborhood streetscapes associated with walking and cycling. Supplementary data derived from other sources (e.g., Geographical Information Systems) could be used to assess the less reliable streetscape variables.

Batsche CJ, Reader S. [**Using GIS to enhance programs serving emancipated youth leaving foster care.**](http://www.ncbi.nlm.nih.gov/pubmed/22054521) Eval Program Plann. 2012 Feb;35(1):25-33. Epub 2011 Jun 24.

This article describes a GIS prototype designed to assist with the identification and evaluation of housing that is affordable, safe, and effective in supporting the educational goals and parental status of youth transitioning from foster care following emancipation. Spatial analysis was used to identify rental properties based on three inclusion criteria (affordability, proximity to public transportation, and proximity to grocery stores), three exclusion criteria (areas of high crime, prostitution, and sexual predator residence), and three suitability criteria (proximity to health care, mental health care, and youth serving organizations). The results were applied to four different scenarios to test the utility of the model. Of the 145 affordable rental properties, 27 met the criteria for safe and effective housing. Of these, 19 were located near bus routes with direct service to post-secondary education or vocational training programs. Only 6 were considered appropriate to meet the needs of youth who had children of their own. These outcomes highlight the complexities faced by youth when they attempt to find affordable and suitable housing following emancipation. The LEASE prototype demonstrates that spatial analysis can be a useful tool to assist with planning services for youth making the transition to independent living.

[Bazemore A,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=Bazemore,%20A) [Diller P,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=Diller,%20P) [Carrozza M.](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=Carrozza,%20M) **The Impact of a Clinic Move on Vulnerable Patients with Chronic Disease: A Geographic Information Systems (GIS) Analysis**. J Am Board Fam Med. 2010;23:128-130.

Changing locations disrupts the populations served by primary health care clinics, and such changes may differentially affect access to care for vulnerable populations. Online geographic information systems mapping tools were used to define how the relocation of a family medicine center impacted access to care for black and Hispanic patients with chronic disease. Results: Maps created from practice management data revealed a distinct shift in black and Hispanic patients with chronic disease being served in the new location. Geographic information systems tools are valuable aids in defining changing service areas of primary health care clinics.

[Becker KM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Becker%20KM%22%5BAuthor%5D), [Glass GE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Glass%20GE%22%5BAuthor%5D), [Brathwaite W](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Brathwaite%20W%22%5BAuthor%5D), [Zenilman JM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Zenilman%20JM%22%5BAuthor%5D). **Geographic epidemiology of gonorrhea in Baltimore, Maryland, using a geographic information system.** [Am J Epidemiol.](http://www.ncbi.nlm.nih.gov/pubmed/9554611) 1998 Apr 1;147(7):709-16.

The epidemiology of gonorrhea is characterized by geographically defined hyperendemic areas, or "cores." Geographic information system (GIS) technology offers new opportunities to evaluate these patterns. The authors developed a GIS system linked to the disease surveillance database at the Baltimore Health Department and used this system to evaluate the geographic epidemiology of gonorrhea in Baltimore, Maryland, during 1994. There were 7,330 reported cases, of which 87.4% were in persons aged 15-39 years; 56.6% were of the cases were in males; and 60.5% of the cases were reported from the nonsexually transmitted disease (STD) clinic sector. Valid residential addresses were available for 6,831 (93.5%) of cases. In the GIS system, gonorrhea cases were geocoded by reported address using digitized maps, and assigned to census tract. Census tract-specific rates for persons aged 15-39 years were calculated using 1990 census data. Gonorrhea was reported from 196/202 (97%) of census tracts, of which 90 census tracts had >30 cases. For these 90 census tracts, rates were ranked. The core was considered as the top rate quartile, consisting of 13 geographically contiguous census tracts with rates 4,370-6,370 per 100,000; adjacent areas were 19 census tracts in the second quartile (rates: 3,730-4,370 per 100,000). As radial distance from the core areas increased, incidence rates decreased and male/female ratio increased, which is consistent with previous definitions of the core theory of STD transmission. Mapping of cases by provider showed that cases reported from STD clinics had similar geographic distribution to those from the non-STD clinic sector. From an operational perspective, GIS can be effectively integrated with clinical data systems to provide epidemiologic analysis.



[Bersamin M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Bersamin%20M%22%5BAuthor%5D), [Todd M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Todd%20M%22%5BAuthor%5D), [Remer L](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Remer%20L%22%5BAuthor%5D). **Does distance matter? Access to family planning clinics and adolescent sexual behaviors.** [Matern Child Health J.](http://www.ncbi.nlm.nih.gov/pubmed?term=Does%20Distance%20Matter%3F%20Access%20to%20Family%20Planning%20Clinics%20and%20Adolescent%20Sexual%20Behaviors) 2011 Jul;15(5):652-9.

The study examines the relationship between adolescent geographic access (distance, travel time, density) to Family Planning Clinics and adolescent sexual behaviors, including sexual initiation, number of partners and condom use. This cross-sectional study, conducted in 2005 in 10 California counties, utilized data from NICHD-funded study on adolescent sexual behavior (n = 921), geospatial coordinates of publicly-funded FPCs, and neighborhood characteristics. A series of regression models were used to assess the relationship between FPC distance, and density (number of FPCs within 1- and 3- mile radii of each adolescent's home), and adolescent sexual behaviors. Significant main effects between access measures of FPC and sexual behavior did not emerge. However, among older youth a significant inverse relationship emerged between number of FPCs within a 1-mile radius and initiating sexual intercourse. While not significant at α = .10, the results also indicate a negative relationship between density of FPCs and sexual partners (b = -.22, p < .15) among older youth. Access to FPCs was not associated with condom use. Conclusions: Results suggest that increased options for family planning services may lead to less risky sexual behaviors among older youth. This finding has significant implications with regards to making family planning resources more readily available to older adolescents.

# [Beyer KM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Beyer%20KM%22%5BAuthor%5D), [Rushton G](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Rushton%20G%22%5BAuthor%5D). Mapping cancer for community engagement. [Prev Chronic Dis.](http://www.ncbi.nlm.nih.gov/pubmed/19080009) 2009 Jan;6(1):A03.

Two research strategies may reduce health disparities: community participation and the use of geographic information systems. When combined with community participation, geographic information systems approaches, such as the creation of disease maps that connect disease rates with community context, can catalyze action to reduce health disparities. However, current approaches to disease mapping often focus on the display of disease rates for political or administrative units. This type of map does not provide enough information on the local rates of cancer to engage community participation in addressing disparities. We collaborated with researchers and cancer prevention and control practitioners and used adaptive spatial filtering to create maps that show continuous surface representations of the proportion of all colorectal cancer cases diagnosed in the late stage. We also created maps that show the incidence of colorectal cancer. Our maps show distinct patterns of cancer and its relationship to community context. The maps are available to the public on the Internet and through the activities of Iowa Consortium for Comprehensive Cancer Control partners. Community-participatory approaches to research are becoming more common, as are the availability of geocoded data and the use of geographic information systems to map disease. If researchers and practitioners are to engage communities in exploring cancer rates, maps should be made that accurately represent and contextualize cancer in such a way as to be useful to people familiar with the characteristics of their local areas.

# [Beyer KM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Beyer%20KM%22%5BAuthor%5D), [Comstock S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Comstock%20S%22%5BAuthor%5D), [Seagren R](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Seagren%20R%22%5BAuthor%5D). Disease maps as context for community mapping: a methodological approach for linking confidential health information with local geographical knowledge for community health research. [J Community Health.](http://www.ncbi.nlm.nih.gov/pubmed/20352481) 2010 Dec;35(6):635-44.

Health is increasingly understood as a product of multiple levels of influence, from individual biological and behavioral influences to community and societal level contextual influences. In understanding these contextual influences, community health researchers have increasingly employed both geographic methodologies, including Geographic Information Systems (GIS), and community participatory approaches. However, despite growing interest in the role for community participation and local knowledge in community health investigations, and the use of geographical methods and datasets in characterizing community environments, there exist few examples of research projects that incorporate both geographical and participatory approaches in addressing health questions. This is likely due in part to concerns and restrictions regarding community access to confidential health data. In order to overcome this barrier, we present a method for linking confidential, geocoded health information with community-generated experiential geographical information in a GIS environment. We use sophisticated disease mapping methodologies to create continuously defined maps of colorectal cancer in Iowa, then incorporate these layers in an open source GIS application as the context for a participatory community mapping exercise with participants from a rural Iowa town. Our method allows participants to interact directly with health information at a fine geographical scale, facilitating hypothesis generation regarding contextual influences on health, while simultaneously protecting data confidentiality. Participants are able to use their local, geographical knowledge to generate hypotheses about factors influencing colorectal cancer risk in the community and opportunities for risk reduction. This work opens the door for future efforts to integrate empirical epidemiological data with community generated experiential information to inform community health research and practice.

# [Beyer KM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Beyer%20KM%22%5BAuthor%5D), [Comstock S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Comstock%20S%22%5BAuthor%5D), [Seagren R](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Seagren%20R%22%5BAuthor%5D), [Rushton G](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Rushton%20G%22%5BAuthor%5D). Explaining place-based colorectal cancer health disparities: evidence from a rural context. [Soc Sci Med.](http://www.ncbi.nlm.nih.gov/pubmed/20974515) 2011 Feb;72(3):373-82.

A growing body of work examines geographical setting as a source of health disparity, hypothesizing individual as well as larger, environmental sources of risk. However, mechanisms by which this influence operates, especially in rural settings, are not well understood. This study investigates the problem of colorectal cancer in a rural US community through the lens of geographical setting. Statewide maps of colorectal cancer burdens show a place-based disparity in colorectal cancer in the region surrounding a small, diverse Iowa community. Within a research partnership framework, we use these maps to engage community residents in discussions of high colorectal cancer rates. We ask how a rural community experiencing higher than expected rates of colorectal cancer late-stage diagnosis and mortality perceives and explains their increased risk, interpreting available epidemiological evidence based on their lived experience. We use concept mapping to organize these perceptions and situate our findings in the context of previous work. Our findings reveal a complex understanding of risk that should be taken into account in crafting effective public health interventions and messages. Our work informs the growing literature on how context influences individual experiences of health problems, with specific relevance for rural populations.

[Billi JE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Billi%20JE%22%5BAuthor%5D), [Pai CW](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Pai%20CW%22%5BAuthor%5D), [Spahlinger DA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Spahlinger%20DA%22%5BAuthor%5D). **The effect of distance to primary care physician on health care utilization and disease burden.**  [Health Care Manage Rev.](http://www.ncbi.nlm.nih.gov/pubmed/17245199) 2007 Jan-Mar;32(1):22-9.

BACKGROUND: The relationship of distance to care with total health care utilization and disease burden is not well understood among the managed care population. PURPOSES: The aim of this study was to examine the relationship between the distance from a patient's home to his or her primary care physician (PCP) and the patient's health characteristics. METHODOLOGY: This was a population-based study of commercial health maintenance organization (HMO) members enrolled in one medium-sized health plan in Michigan in 2001. This study measured health care utilization from all settings (per member per year [PMPY]). Disease burden measure was based on the Adjusted Clinical Group (ACG) system. Distance was defined as straight-line distance between a member's residency and his or her PCP. Both direct standardization and regression modeling were used to assess the effect of distance on utilization. FINDINGS: Both utilization and disease burden increased as distance increased, especially among members selecting PCPs in an academic health system (AHS). The difference in observed utilization between local (0-10 miles) and distant (>30 miles) members was 973 dollars (PMPY) for the AHS and 193 dollars (PMPY) for the community independent practice associations (IPA). Compared with age-sex adjustment, ACG adjustment reduced local-distant difference within the same practice group to a greater extent (281 dollars and 59 dollars remaining for the academic and community groups, respectively). Distance as a whole exerted a statistically significant positive effect on either disease burden score or utilization in regression modeling. PRACTICE IMPLICATIONS: HMO members consume more health care and had higher disease burden as their distance from their PCPs increased. The distance traveled by the individuals to their PCPs could be incorporated when adjusting managed care financial risk models. Other remedies include negotiating higher capitation rates for distant patients, carving out distant patients from any financial risk model, or excluding such patients from provider performance assessment.

Bliss RL, Katz JN, Wright EA, Losina E. [**Estimating proximity to care: are straight line and zipcode centroid distances acceptable proxy measures?**](http://www.ncbi.nlm.nih.gov/pubmed/22167065) Med Care. 2012 Jan;50(1):99-106.

BACKGROUND: Spatial accessibility of healthcare may be measured by proximity of patient residence to health services, typically in driving distance or driving time. Precise driving distances and times are rarely available. Although straight line distances between zipcode centroids and between precise address locations are used as proxy measures for distance to care, the accuracy of these measures has received little study. METHODS: Among a cohort of Medicare beneficiaries, actual driving distances and times between patient residence and clinic were obtained from commercial software (MapQuest). We used a split-sample design to build and validate linear regression models that predict actual driving distances and times from estimated distances between zipcode centroids and between precise residential and hospital locations, adjusting for urban/suburban/rural residential status. RESULTS: On average, predicted driving distances and times were larger than actual values. Zipcode centroid distances alone predicted longer driving distances than observed values: rural +19% (3.2 miles), suburban +23% (3.7 miles), and urban +27% (2.0 miles). Predicted time was 36% (9.4 min) longer in rural, 32% (6.8 min) longer in suburban, and 38% (4.7 min) longer in urban areas than observed values. Including urban/suburban/rural categorization of residence improved the accuracy of predicted driving distance and time for suburban and urban areas but diminished accuracy for rural areas. Similar trends were observed for distance estimates from precise locations. CONCLUSIONS: Distances between zipcode centroids and precise residential/hospital locations provide reasonable estimates of driving distance and time for epidemiologic research. Estimates are improved for suburban and urban residences when data are augmented by urban categorization.

[Boulos DNK](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Boulos,%20DNK), [Ghali RR,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Ghali,%20RR) [Ibrahim EM](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Ibrahim,%20EM), [Boulos MNK,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=Boulos,%20MNK) [AbdelMalik P.](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4BfHGdiGgd7hioD51Ph&field=AU&value=AbdelMalik,%20P) **An eight-year snapshot of geospatial cancer research (2002-2009): clinico-epidemiological and methodological findings and trends.** Medical Oncology. 2011 Dec; 28(4): 1145-62.

Geographic information systems (GIS) offer a very rich toolbox of methods and technologies, and powerful research tools that extend far beyond the mere production of maps, making it possible to cross-link and study the complex interaction of disease data and factors originating from a wide range of disparate sources. Despite their potential indispensable role in cancer prevention and control programmes, GIS are underrepresented in specialised oncology literature. The latter has provided an impetus for the current review. The review provides an eight-year snapshot of geospatial cancer research in peer-reviewed literature (2002-2009), presenting the clinico-epidemiological and methodological findings and trends in the covered corpus (93 papers). The authors concluded that understanding the relationship between location and cancer/cancer care services can play a crucial role in disease control and prevention, and in better service planning, and appropriate resource utilisation. Nevertheless, there are still barriers that hinder the wide-scale adoption of GIS and related technologies in everyday oncology practice.

[Carman M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Carman%20M%22%5BAuthor%5D), [Grierson J](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Grierson%20J%22%5BAuthor%5D), [Pitts M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Pitts%20M%22%5BAuthor%5D), [Hurley M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Hurley%20M%22%5BAuthor%5D), [Power J](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Power%20J%22%5BAuthor%5D). **Trends in the location of the HIV-positive population in Australia: implications for access to healthcare services and delivery.** [Sex Health.](http://www.ncbi.nlm.nih.gov/pubmed/20465979) 2010 Jun;7(2):154-8.

Examining existing and potential trends in the HIV-positive population in Australia is important for current and future healthcare service development and delivery. A new analysis of existing data on this population from the HIV Futures 5 survey was based on linking a geographic breakdown of respondents based on 'area type'--capital city or inner suburban, outer suburban, regional centre and rural--with patterns of healthcare service access. In addition, the distance between the postcode of the respondent's residence and the postcode of the doctor seen for HIV-related treatment was calculated. An analysis of 'area type' by income and age was also conducted. The 'area type' analysis showed important differences in patterns of access to antiretroviral prescriptions and choice of provider for HIV-related and general healthcare. The median distance travelled to see a doctor for HIV-related treatment was higher for those living in outer suburbs than those living in regional centres. Differences in service use appear to be related to geographic accessibility of different service types. However, there may be other important social, economic and cultural factors involved. Ageing and socio-economic pressures may be influencing a move away from inner suburban areas where most HIV-specific care is located. This new analysis assists in finding the right balance between increasing the accessibility of HIV-specific services and 'mainstreaming'. Longitudinal data collection would further assist in tracking trends in geographic location, and how often and at what intervals people living with HIV utilise healthcare services.

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Objective: Some characteristics of the built environment have been associated with obesity in youth. Our aim was to determine whether individual and environmental socio-economic characteristics modulate the relation between youth overweight and spatial accessibility to physical activity (PA) facilities and to food outlets. Design: Cross-sectional study.Subjects:3293 students, aged 12±0.6 years, randomly selected from eastern France middle schools. Measurements and Methods: Using geographical information systems (GIS), spatial accessibility to PA facilities (urban and nature) was assessed using the distance to PA facilities at the municipality level; spatial accessibility to food outlets (general food outlets, bakeries and fast-food outlets) was calculated at individual level using the student home address and the food outlets addresses. Relations of weight status with spatial accessibility to PA facilities and to food outlets were analysed using mixed logistic models, testing potential direct and interaction effects of individual and environmental socio-economic characteristics. Results: Individual socio-economic status modulated the relation between spatial accessibility to PA facilities and to general food outlets and overweight. The likelihood of being overweight was higher when spatial accessibility to urban PA facilities and to general food outlets was low, but in children of blue-collar-workers only. The odds ratio (OR) (95% confidence interval) for being overweight of blue-collar-workers children compared with non-blue-collar-workers children was 1.76 (1.25-2.49) when spatial accessibility to urban PA facilities was low. This OR was 1.86 (1.20-2.86) when spatial accessibility to general food outlets was low. There was no significant relationship of overweight with either nature PA facilities or other food outlets (bakeries and fast-food outlets). Conclusion: These results indicate that disparities in spatial accessibility to PA facilities and to general food outlets may amplify the risk of overweight in socio-economically disadvantaged youth. These data should be relevant for influencing health policies and urban planning at both a national and local level.

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BACKGROUND: This paper analyses the relationship between public perceptions of access to general practitioners (GPs) surgeries and hospitals against health status, car ownership and geographic distance. In so doing it explores the different dimensions associated with facility access and accessibility. METHODS: Data on difficulties experienced in accessing health services, respondent health status and car ownership were collected through an attitudes survey. Road distances to the nearest service were calculated for each respondent using a GIS. Difficulty was related to geographic distance, health status and car ownership using logistic generalized linear models. A Geographically Weighted Regression (GWR) was used to explore the spatial non-stationarity in the results. RESULTS: Respondent long term illness, reported bad health and non-car ownership were found to be significant predictors of difficulty in accessing GPs and hospitals. Geographic distance was not a significant predictor of difficulty in accessing hospitals but was for GPs. GWR identified the spatial (local) variation in these global relationships indicating locations where the predictive strength of the independent variables was higher or lower than the global trend. The impacts of bad health and non-car ownership on the difficulties experienced in accessing health services varied spatially across the study area, whilst the impacts of geographic distance did not. CONCLUSIONS: Difficulty in accessing different health facilities was found to be significantly related to health status and car ownership, whilst the impact of geographic distance depends on the service in question. GWR showed how these relationships were varied across the study area. This study demonstrates that the notion of access is a multi-dimensional concept, whose composition varies with location, according to the facility being considered and the health and socio-economic status of the individual concerned.

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BACKGROUND: Previous research shows associations of geographical density of alcohol outlets with a range of alcohol-related harms. Socioeconomic conditions that are associated with both outlet density and alcohol-related outcomes may confound many studies. We examined the association of outlet density with both consumption and harm throughout New Zealand while controlling for indicators of area deprivation and individual socioeconomic status (SES). METHODS: Individual alcohol consumption and drinking consequences were measured in a 2007 national survey of 18-70 year olds (n=1925). All alcohol outlets in New Zealand were geocoded. Outlet density was the number of outlets of each type (off-licences (stores that sell alcoholic beverages for consumption elsewhere), bars, clubs, restaurants) within 1 km of a person's home. We modelled the association of outlet density with total consumption, binge drinking, risky drinking (above New Zealand guidelines) and two measures of effects ('harms' and 'troubles' due to drinking) in the previous year. Logistic regression and zero-inflated Poisson models were used, adjusting for sex, educational level, a deprivation index (NZDep06) and a rurality index. RESULTS: No statistically significant association was seen between outlet density and either average alcohol consumption or risky drinking. Density of off-licences was positively associated with binge drinking, and density of all types of outlet was associated with alcohol-related harm scores, before and after adjustment for SES. Associations of off-licences and clubs with trouble scores were no longer statistically significant in the adjusted analysis. CONCLUSIONS: The positive associations seen between alcohol outlet density and both individual level binge drinking and alcohol-related problems appear to be independent of individual and neighbourhood SES. Reducing density of alcohol outlets may reduce alcohol-related harm among those who live nearby.

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Timely and optimal HIV primary care is a key tenet of the Ryan White CARE Act, a safety net programme for vulnerable and marginalized people living with HIV in the USA. Health services researchers, local providers and policy makers suspect that ancillary services are necessary to improve entry into and retention in HIV primary care for vulnerable populations experiencing barriers to HIV services, including access to antiretroviral therapies. This paper provides background to the eight studies featured in this special supplement to AIDS Care. The eight studies examine retrospectively ancillary (support) services data collected after 1996 in six HIV epicenters (New York and Chicago, plus four sites included in the Client Demonstration project-Los Angeles, San Francisco, Orange County [California] and Washington, DC), three smaller hard-hit cities (Boston, New Orleans and St Louis) and several states (California, plus Michigan and Virginia from the Client Demonstration Projects). These varied delivery settings serve racial and ethnic minority populations, men who have sex with men, injection drug users, women and mothers. The studies use a range of analytic approaches to understand whether receipt of certain enabling services correlated with early entry into and retention in care. Ancillary services (support services such as case management, housing, food, transportation, mental health and substance abuse treatment) are used by local HIV medical and community-based organizations in facilitative strategies directed to populations that have difficulty entering or staying in HIV primary care. Understanding the contribution of ancillary services to timely entry into and consistent use of primary care, including the expanding range of HIV therapeutics, is important to service delivery system planners and resource allocation decision-makers.

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Patient choice and access to health care is compromised by many barriers including travel distance. Individuals with the human immunodeficiency virus (HIV) can seek free specialist care in Britain, without a referral, providing flexible access to care services. Willingness to travel beyond local services for preferred care has funding and service implications. Data from an enhanced HIV surveillance system were used to explore geodemographic and clinical factors associated with accessing treatment services. We extracted data on the location, type and frequency of care services utilized by HIV positive persons (n = 3983) accessing treatment in north west England between January 1st 2005 and June 30th 2006. Individuals were allocated a deprivation score and grouped by urban/rural residence, and distance to care services was calculated. Analysis identified independent predictors of distance travelled (general linear modelling) and, for those bypassing their nearest clinic, the probability of accessing a specialist service (logistic regression, SPSS ver 14). Inter-relationships between variables and distance travelled were visualised using detrended correspondence analysis (PC-ORD ver 4.1). HIV infected persons travelled an average of 4.8 km (95% confidence intervals (CI) 4.6-4.9) per trip and had on average 6 visits (95% CI 5.9-6.2) annually for care. Longer trips were made by males (4.8 km vs 4.5 km), white people (6.2 km), the young (>15 years, 6.8 km) and elderly (60+ years, 6.3 km), those on multiple therapy (5.3 km vs 4.0 km), and the more affluent living in rural areas (16.1 km, P < 0.05). Half the individuals bypassed their nearest clinic to visit a more distant facility, and this was associated with being aged under 20 years, multiple therapy, being a male infected by sex between men, relative wealth, and living in rural areas (P < 0.05). Of those bypassing local facilities, poorer people were more likely to access a specialist centre but did not have as far to travel to do so (3.6 km) compared to those from less deprived areas (8.6 km). Distance travelled, and type of HIV services used, were associated with socioeconomic status, even after accounting for ethnicity, route of infection and age. Thus despite offering an 'equitable' service, travel costs may advantage those with higher income.

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Access to appropriate and timely healthcare is critical to the overall health and well-being of patients with chronic diseases. In this study, we used geographic information system (GIS) tools to map Veterans Health Administration (VHA) patients with multiple sclerosis (MS) and their access to MS specialty care. We created six travel-time bands around VHA facilities with MS specialty care and calculated the number of VHA patients with MS who resided in each time band and the number of patients who lived more than 2 hours from the nearest specialty clinic in fiscal year 2007. We demonstrate the utility of using GIS tools in decision-making by providing three examples of how patients' access to care is affected when additional specialty clinics are added. The mapping technique used in this study provides a powerful and valuable tool for policy and planning personnel who are evaluating how to address underserved populations and areas within the VHA healthcare system.

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Many persons with HIV infection do not receive consistent ambulatory medical care and are excluded from studies of patients in medical care. However, these hard-to-reach groups are important to study because they may be in greatest need of services. This study compared the sociodemographic, clinical, and health care utilization characteristics of a multisite sample of HIV-positive persons who were hard to reach with a nationally representative cohort of persons with HIV infection who were receiving care from known HIV providers in the United States and examined whether the independent correlates of low ambulatory utilization differed between the 2 samples. We compared sociodemographic, clinical, and health care utilization characteristics in 2 samples of adults with HIV infection: 1286 persons from 16 sites across the United States interviewed in 2001-2002 for the Targeted HIV Outreach and Intervention Initiative (Outreach), a study of underserved persons targeted for supportive outreach services; and 2267 persons from the HIV Costs and Services Utilization Study (HCSUS), a probability sample of persons receiving care who were interviewed in 1998. We conducted logistic regression analyses to identify differences between the 2 samples in sociodemographic and clinical associations with ambulatory medical visits. Compared with the HCSUS sample, the Outreach sample had notably greater proportions of black respondents (59% vs. 32%, P = 0.0001), Hispanics (20% vs. 16%), Spanish-speakers (9% vs. 2%, P = 0.02), those with low socioeconomic status (annual income < Dollars 10,000 75% vs. 45%, P = 0.0001), the unemployed, and persons with homelessness, no insurance, and heroin or cocaine use (58% vs. 47%, P = 0.05). They also were more likely to have fewer than 2 ambulatory visits (26% vs. 16%, P = 0.0001), more likely to have emergency room visits or hospitalizations in the prior 6 months, and less likely to be on antiretroviral treatment (82% vs. 58%, P = 0.0001). Nearly all these differences persisted after stratifying for level of ambulatory utilization (fewer than 2 vs. 2 or more in the last 6 months). In multivariate analysis, several variables showed significantly different associations in the 2 samples (interacted) with low ambulatory care utilization. The variables with significant interactions (P values for interaction shown below) had very different adjusted odds ratios (and 95% confidence intervals) for low ambulatory care utilization: age greater than 50 (Outreach 0.55 [0.35-0.88], HCSUS 1.17 [0.65-2.11)], P = 0.05), Hispanic ethnicity (Outreach 0.81 [0.39-1.69], HCSUS 2.34 [1.56-3.52], P = 0.02), low income (Outreach 0.73 [0.56-0.96], HCSUS 1.35 [1.04-1.75], P = 0.002), and heavy alcohol use (Outreach 1.74 [1.23-2.45], HCSUS 1.00 [0.73-1.37], P = 0.02). Having CD4 count less than 50 was associated with elevated odds of low ambulatory medical visits in the Outreach sample (1.53 [1.00-2.36], P = 0.05). Compared with HCSUS, the Outreach sample had far greater proportions of traditionally vulnerable groups, and were less likely to be in care if they had low CD4 counts. Furthermore, heavy alcohol use was only associated with low ambulatory utilization in Outreach. Generalizing from in care populations may not be warranted, while addressing heavy alcohol use may be effective at improving utilization of care for hard-to-reach HIV-positive populations.

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OBJECTIVE: Since 2003, the New York City Department of Health and Mental Hygiene has distributed nicotine replacement therapy nicotine replacement therapy to adult smokers through annual large-scale distribution programs. METHODS: In 2008, the New York City Department of Health and Mental Hygiene formally integrated geographic information system analyses to track program enrollment, map the geographic density of enrollees, and assess the effects of outreach strategies. RESULTS: Geographic information system analyses provided a unique, near real-time visual method of assessing participation patterns as well as the impact of media and outreach strategies. Among neighborhoods with high smoking prevalence, lower income neighborhoods had higher enrollment compared to higher income neighborhoods. Mapping before and after a press release demonstrated that program interest increased over 700% in one area. CONCLUSION: Although geographic information system analysis is traditionally utilized for large-scale infectious disease surveillance, the New York City Department of Health and Mental Hygiene used GIS to inform and improve an annual large-scale smoking cessation program. These analyses provide unique feedback that can aid public health program planners in improving efficiency and efficacy of service delivery.

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Objective: To examine the association between geographic access to alcohol outlets and serious violent crime in New Zealand. Methods: A national study of alcohol outlet access and serious violent crime used a cross-sectional ecological analysis. Serious violence offences recorded between 2005 and 2007 were aggregated for 286 police station areas. Using Geographical Information Systems (GIS), 9,320 licensed premises were geocoded and road travel distances to the closest alcohol outlet type/category were calculated for each area. Negative binomial regression models measured the association between the distance to the closest alcohol outlet and the number of serious violent offences in each police station area, controlling for area-level measures of social deprivation, Māori population, young males 15-29 years and population density. Results: There were significant negative associations between distance (access) to licensed outlets and the incidence of serious violent offences with greater levels of violent offending recorded in areas with close access to any licensed premises compared to those areas with least access (IRR 1.5, 95% CI 1.10-2.03); with on-licensed premises (IRR 1.6, 95% CI 1.16-2.08); and off-licensed premises (IRR 1.4, 95% CI 1.05-1.93). Conclusion: Having greater geographic access to alcohol outlets was associated with increased levels of serious violent offending across study areas. Implications: Alcohol availability and access promoted under the current liberalised licensing regime are important contextual determinants of alcohol-related harm within New Zealand communities.

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Maps and mapping tools through geographic information systems (GIS) are highly valuable for turning data into useful information that can help inform decision-making and knowledge translation (KT) activities. However, there are several challenges involved in incorporating GIS applications into the decision-making process. We highlight the challenges and opportunities encountered in implementing a mapping innovation as a KT strategy within the non-profit (public) health sector, reflecting on the processes and outcomes related to our KT innovations. A case study design, whereby the case is defined as the data analyst and manager dyad (a two-person team) in selected Ontario Early Year Centres (OEYCs), was used. Working with these paired individuals, we provided a series of interventions followed by one-on-one visits to ensure that our interventions were individually tailored to personal and local decision-making needs. Data analysis was conducted through a variety of qualitative assessments, including field notes, interview data, and maps created by participants. Data collection and data analysis have been guided by the Ottawa Model of Research Use (OMRU) conceptual framework. Despite our efforts to remove all barriers associated with our KT innovation (maps), our results demonstrate that both individual level and systemic barriers pose significant challenges for participants. While we cannot claim a causal association between our project and increased mapping by participants, participants did report a moderate increase in the use of maps in their organization. Specifically, maps were being used in decision-making forums as a way to allocate resources, confirm tacit knowledge about community needs, make financially-sensitive decisions more transparent, evaluate programs, and work with community partners. This project highlights the role that maps can play and the importance of communicating the importance of maps as a decision support tool. Further, it represents an integrated knowledge project in the community setting, calling to question the applicability of traditional KT approaches when community values, minimal resources, and partners play a large role in decision making. The study also takes a unique perspective--where research producers and users work as dyad-pairs in the same organization--that has been under-explored to date in KT studies.

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Physical activity and public health recommendations now emphasize the creation of activity-friendly neighborhoods. Mixed land use in a neighborhood is important in this regard, as it reflects the availability of destinations to which residents can walk or ride bicycles, and thus is likely to contribute to residents' active lifestyles that in turn will influence their overall health. Relationships between land use mix (LUM) and physical activity have not been apparent in some studies, which may be because geographical scale and the specificity of hypothesized environment-behavior associations are not taken into account. We compared the strength of association of four Geographic Information Systems-derived LUM measures with walking for transport and perceived proximity to destinations. We assessed physical activity behaviors of 2,506 adults in 154 Census Collection Districts (CCDs) in Adelaide, Australia, for which ''original'' LUM measures were calculated, and then refined by either: accounting for the geographic scale of measurement; including only the most-relevant land uses; or, both. The refined (but not the ''original'') LUM measures had significant associations with the frequency of walking for transport (p < 0.05) and area-corrected measures had significant associations with the duration of walking for transport. All LUM measures had significant associations with perceived proximity to destinations, but stronger associations were seen when using the refined measures compared with the original LUM. Identifying the LUM attributes most strongly associated with walking for transport is a priority and can inform environmental and policy initiatives that are needed to promote health-enhancing physical activity.

[Frank LD](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Frank%20LD%22%5BAuthor%5D), [Saelens BE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Saelens%20BE%22%5BAuthor%5D), [Powell KE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Powell%20KE%22%5BAuthor%5D), [Chapman JE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Chapman%20JE%22%5BAuthor%5D). **Stepping towards causation: do built environments or neighborhood and travel preferences explain physical activity, driving, and obesity?** [Soc Sci Med.](http://www.ncbi.nlm.nih.gov/pubmed/17644231) 2007 Nov;65(9):1898-914.

Evidence documents associations between neighborhood design and active and sedentary forms of travel. Most studies compare travel patterns for people located in different types of neighborhoods at one point in time adjusting for demographics. Most fail to account for either underlying neighborhood selection factors (reasons for choosing a neighborhood) or preferences (neighborhoods that are preferred) that impact neighborhood selection and behavior. Known as self-selection, this issue makes it difficult to evaluate causation among built form, behavior, and associated outcomes and to know how much more walking and less driving could occur through creating environments conducive to active transport. The current study controls for neighborhood selection and preference and isolates the effect of the built environment on walking, car use, and obesity. Separate analyses were conducted among 2056 persons in the Atlanta, USA based Strategies for Metropolitan Atlanta's Regional Transportation and Air Quality (SMARTRAQ) travel survey on selection factors and 1466 persons in the SMARTRAQ community preference sub-survey. A significant proportion of the population are "mismatched" and do not live in their preferred neighborhood type. Factors influencing neighborhood selection and individual preferences, and current neighborhood walkability explained vehicle travel distance after controlling for demographic variables. Individuals who preferred and lived in a walkable neighborhood walked most (33.9% walked) and drove 25.8 miles per day on average. Individuals that preferred and lived in car dependent neighborhoods drove the most (43 miles per day) and walked the least (3.3%). Individuals that do not prefer a walkable environment walked little and show no change in obesity prevalence regardless of where they live. About half as many participants were obese (11.7%) who prefer and live in walkable environments than participants who prefer car dependent environments (21.6%). Findings suggest that creating walkable environments may result in higher levels of physical activity and less driving and in slightly lower obesity prevalence for those preferring walkability.

[Fulcher C](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Fulcher%20C%22%5BAuthor%5D), [Kaukinen C](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Kaukinen%20C%22%5BAuthor%5D). **Mapping and visualizing the location HIV service providers: an exploratory spatial analysis of Toronto neighborhoods.** [AIDS Care.](http://www.ncbi.nlm.nih.gov/pubmed/15832887) 2005 Apr;17(3):386-96.

Efforts have been made to identify, reduce and ultimately eliminate health disparities, yet variation in access to health services continues to be an important concern. As with large American cities, Toronto has been particularly hard hit by the AIDS epidemic, representing 68% of Ontario's HIV diagnoses (Health Canada, 2000). The accessibility of healthcare in terms of the geographic location and spatial distribution of health services are important factors in healthcare utilization. In this descriptive paper we map the location of HIV-related services and use exploratory spatial data analysis to visualize and examine the distribution of HIV service providers. In examining the location of HIV service providers we map the minimum distance to the nearest service provider. Our analyses also map and analyze five separate categories of HIV-related services. These include: (1) Diagnostic and preventive services; (2) Health and social services for initial HIV diagnosis; (3) Emotional and social support; (4) Emergency services; and (5) Medical and end-of-life services. While our findings point to significant clustering of some types of HIV-related services (such as emergency and preventive services), other services are more evenly distributed across Toronto (this includes medical and end-of-life services). Our findings point to the need for policy makers and researchers to integrate mapping, GIS and spatial analytic techniques into their analyses of the neighborhoods and subsequently the populations in those neighborhoods that are underserved in terms of accessibility of some categories of HIV-related services.

Geanuracos CG, Cunningham SD, Weiss G, Forte D, Reid LM, Ellen JM. [**Use of geographic information systems for planning HIV prevention interventions for high-risk youths.**](http://www.ncbi.nlm.nih.gov/pubmed/17901452) Am J Public Health. 2007 Nov;97(11):1974-81.

Geographic information system (GIS) analysis is an emerging tool for public health intervention planning. Connect to Protect, a researcher-community collaboration working in 15 cities to reduce HIV infection among youths, developed GIS databases of local health, crime, and demographic data to evaluate the geographic epidemiology of sexually transmitted infections and HIV risk among adolescents. We describe the process and problems of data acquisition, analysis, and mapping in the development of structural interventions, demonstrating how program planners can use this technology to inform and improve planning decisions. The Connect to Protect project's experience suggests strategies for incorporating public data and GIS technology into the next generation of public health interventions.

[Gebel K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gebel%20K%22%5BAuthor%5D), [Bauman A](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Bauman%20A%22%5BAuthor%5D), [Owen N](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Owen%20N%22%5BAuthor%5D). **Correlates of non-concordance between perceived and objective measures of walkability.** [Ann Behav Med.](http://www.ncbi.nlm.nih.gov/pubmed/19396503) 2009 Apr;37(2):228-38.

BACKGROUND: Objective and self-reported physical environmental attributes have been related to physical activity. PURPOSE: We examined the characteristics of adults who are resident in objectively identified high walkable neighborhoods but whose perceptions of neighborhood attributes are not concordant with objective attributes relating to high walkability. METHODS: Neighborhood built-environment attributes relating to walkability (dwelling density, intersection density, land use mix, and net retail area) were determined objectively, using Geographic Information System databases; data on corresponding perceptions of local environment attributes (from the Neighborhood Environment Walkability Scale) were derived from a self-completion survey of a socially diverse sample of 2,650 adults aged 19 to 65. Objective and perceived walkability attributes were categorized using median splits, and correlates of non-concordance were determined using multiple logistic regression models. RESULTS: There was a fair overall agreement between objectively determined walkability and perceived walkability (Kappa = 0.35, 95% CI = 0.31-0.39). Among those resident in objectively assessed high walkable areas (n = 1,063), 32.1% perceived them to be low walkable; conversely, 32.7% (n = 1,021) resident in objectively determined low walkability areas perceived them to be high. For residents of objectively determined high walkable areas, the characteristics that differentiated those with perceptions of low walkability (non-concordant perceptions) from those with concordant perceptions of high walkability were: not being university-educated (OR = 1.47, 95% CI = 1.06-2.04); having lower household incomes (OR = 1.54, 95% CI = 1.09-2.17); being overweight (OR = 1.46, 95% CI = 1.03-2.07); and walking fewer days per week for transport (OR = 1.75, 95% CI = 1.11-2.70). Higher walking times and more positive cognitive variables were noted among participants who lived in a neighborhood with low walkability that was perceived as high compared to those who lived in a high walkable environment that was perceived as low walkable. CONCLUSION: Adults with lower educational attainment and lower incomes, who were overweight, or who were less physically active for transportation purposes, were more likely to misperceive their high walkable neighborhood as low walkable. There is the potential for physical activity promotion and persuasion strategies to address non-concordant perceptions, especially among those who live in high walkable environments but perceive them to be low and also among those who are socially disadvantaged and are less active. Perceptions of environmental attributes may be more strongly correlated with cognitive antecedents and with behavior than are objective measures.

[Gebel K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gebel%20K%22%5BAuthor%5D), [Bauman AE](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Bauman%20AE%22%5BAuthor%5D), [Sugiyama T](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Sugiyama%20T%22%5BAuthor%5D), [Owen N](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Owen%20N%22%5BAuthor%5D). **Mismatch between perceived and objectively assessed neighborhood walkability attributes: prospective relationships with walking and weight gain.** [Health Place.](http://www.ncbi.nlm.nih.gov/pubmed/21233002) 2011 Mar;17(2):519-24.

We examined prospectively whether persons who perceive their objectively measured high walkable environment as low walkable decrease their walking more and gain more weight than those with matched perceptions. Walkability was measured objectively using GIS. Corresponding perceptions were collected using the Neighborhood Environment Walkability Scale from 1027 urban Australian adults. Objective and perceived measures were dichotomized and categories of match and mismatch were created. Overall, walking levels decreased and BMI increased significantly over the four year follow-up period. Those who perceived high walkability, dwelling density or land use mix as low decreased their walking for transport significantly more than those with matched perceptions. Those who perceived high walkability, land use mix or retail density as low increased their BMI significantly more than those with concordant perceptions. These prospective findings corroborate recommendations from previous cross-sectional studies. Interventions to improve negative perceptions of walkability among those living in high walkable areas may be a relevant public health intervention to increase physical activity and support weight maintenance.

[Gobalet JG,](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=Gobalet,%20JG) [Thomas RK.](http://apps.webofknowledge.com/OneClickSearch.do?product=WOS&search_mode=OneClickSearch&colName=WOS&SID=4FfHgDLC84@CIOE448p&field=AU&value=Thomas,%20RK) **Demographic data and geographic information systems for decision making: The case of public health**. Population Research and Policy Review. 1996 Dec;15(5-6):537-

Recent changes in the United States health care system include a broadened definition of health and renewed focus on public health. Increasingly, demographic analyses are incorporated into public health decision-making. Analysts also are using geographic information more routinely, because Geographic Information System (GIS) software is becoming easier to use. The paper describes three cases in which demographers used GIS to analyze the spatial distribution of public health data. The first case, from Santa Clara County, California, focuses on adolescent sexually transmitted diseases in secondary school districts. The second case, also from Santa Clara County, maps preventable hospitalizations of senior citizens. The third examines the distribution of premature births in Tennessee counties. The researchers applied demographic techniques and perspectives in each case, and each case produced information that is being used by officials who plan health education campaigns and services.

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CONTEXT: Environmental factors are suggested to play a major role in physical activity (PA) and other obesity-related behaviors, yet there is no national research on the relationship between disparity in access to recreational facilities and additional impact on PA and overweight patterns in US adolescents. OBJECTIVE: In a nationally representative cohort, we sought to assess the geographic and social distribution of PA facilities and how disparity in access might underlie population-level PA and overweight patterns. DESIGN, SETTING, AND PARTICIPANTS: Residential locations of US adolescents in wave I (1994-1995) of the National Longitudinal Study of Adolescent Health (N = 20745) were geocoded, and a 8.05-km buffer around each residence was drawn (N = 42857 census-block groups [19% of US block groups]). PA facilities, measured by national databases and satellite data, were linked with Geographic Information Systems technology to each respondent. Logistic-regression analyses tested the relationship of PA-related facilities with block-group socioeconomic status (SES) (at the community level) and the subsequent association of facilities with overweight and PA (at the individual level), controlling for population density. MAIN OUTCOME MEASURES: Outcome measures were overweight (BMI > or = 95th percentile of the Centers for Disease Control and Prevention/National Center for Health Statistics growth curves) and achievement of > or = 5 bouts per week of moderate-vigorous PA. RESULTS: Higher-SES block groups had a significantly greater relative odds of having 1 or more facilities. Low-SES and high-minority block groups were less likely to have facilities. Relative to zero facilities per block group, an increasing number of facilities was associated with decreased overweight and increased relative odds of achieving > or = 5 bouts per week of moderate-vigorous PA. CONCLUSIONS: Lower-SES and high-minority block groups had reduced access to facilities, which in turn was associated with decreased PA and increased overweight. Inequality in availability of PA facilities may contribute to ethnic and SES disparities in PA and overweight patterns.

[Goswami ND](http://www.ncbi.nlm.nih.gov/pubmed?term=Goswami%20ND%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Hecker EJ](http://www.ncbi.nlm.nih.gov/pubmed?term=Hecker%20EJ%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Vickery C](http://www.ncbi.nlm.nih.gov/pubmed?term=Vickery%20C%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Ahearn MA](http://www.ncbi.nlm.nih.gov/pubmed?term=Ahearn%20MA%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Cox GM](http://www.ncbi.nlm.nih.gov/pubmed?term=Cox%20GM%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Holland DP](http://www.ncbi.nlm.nih.gov/pubmed?term=Holland%20DP%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Naggie S](http://www.ncbi.nlm.nih.gov/pubmed?term=Naggie%20S%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Piedrahita C](http://www.ncbi.nlm.nih.gov/pubmed?term=Piedrahita%20C%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Mosher A](http://www.ncbi.nlm.nih.gov/pubmed?term=Mosher%20A%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Torres Y](http://www.ncbi.nlm.nih.gov/pubmed?term=Torres%20Y%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Norton BL](http://www.ncbi.nlm.nih.gov/pubmed?term=Norton%20BL%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Suchindran S](http://www.ncbi.nlm.nih.gov/pubmed?term=Suchindran%20S%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Park PH](http://www.ncbi.nlm.nih.gov/pubmed?term=Park%20PH%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Turner D](http://www.ncbi.nlm.nih.gov/pubmed?term=Turner%20D%5BAuthor%5D&cauthor=true&cauthor_uid=23056227), [Stout JE](http://www.ncbi.nlm.nih.gov/pubmed?term=Stout%20JE%5BAuthor%5D&cauthor=true&cauthor_uid=23056227). [**Geographic Information System-based Screening for TB, HIV, and Syphilis (GIS-THIS): A Cross-Sectional Study.**](http://www.ncbi.nlm.nih.gov/pubmed/23056227) PLoS One. 2012;7(10):e46029. doi: 10.1371/journal.pone.0046029. Epub 2012 Oct 2.

#### OBJECTIVE: To determine the feasibility and case detection rate of a geographic information systems (GIS)-based integrated community screening strategy for tuberculosis, syphilis, and human immunodeficiency virus (HIV). DESIGN: Prospective cross-sectional study of all participants presenting to geographic hot spot screenings in Wake County, North Carolina. METHODS: The residences of tuberculosis, HIV, and syphilis cases incident between 1/1/05-12/31/07 were mapped. Areas with high densities of all 3 diseases were designated "hot spots." Combined screening for tuberculosis, HIV, and syphilis were conducted at the hot spots; participants with positive tests were referred to the health department. RESULTS AND CONCLUSIONS: Participants (N = 247) reported high-risk characteristics: 67% previously incarcerated, 40% had lived in a homeless shelter, and 29% had a history of crack cocaine use. However, 34% reported never having been tested for HIV, and 41% did not recall prior tuberculin skin testing. Screening identified 3% (8/240) of participants with HIV infection, 1% (3/239) with untreated syphilis, and 15% (36/234) with latent tuberculosis infection. Of the eight persons with HIV, one was newly diagnosed and co-infected with latent tuberculosis; he was treated for latent TB and linked to an HIV provider. Two other HIV-positive persons had fallen out of care, and as a result of the study were linked back into HIV clinics. Of 27 persons with latent tuberculosis offered therapy, nine initiated and three completed treatment. GIS-based screening can effectively penetrate populations with high disease burden and poor healthcare access. Linkage to care remains challenging and will require creative interventions to impact morbidity.

[**Hampton KH**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Hampton%20KH%22%5BAuthor%5D)**,** [**Fitch MK**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Fitch%20MK%22%5BAuthor%5D)**,** [**Allshouse WB**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Allshouse%20WB%22%5BAuthor%5D)**,** [**Doherty IA**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Doherty%20IA%22%5BAuthor%5D)**,** [**Gesink DC**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gesink%20DC%22%5BAuthor%5D)**,** [**Leone PA**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Leone%20PA%22%5BAuthor%5D)**,** [**Serre ML**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Serre%20ML%22%5BAuthor%5D)**,** [**Miller WC**](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Miller%20WC%22%5BAuthor%5D)**.** Mapping health data: improved privacy protection with donut method geomasking.[**Am J Epidemiol.**](http://www.ncbi.nlm.nih.gov/pubmed/20817785) **2010 Nov 1;172(9):1062-9.**

A major challenge in mapping health data is protecting patient privacy while maintaining the spatial resolution necessary for spatial surveillance and outbreak identification. A new adaptive geomasking technique, referred to as the donut method, extends current methods of random displacement by ensuring a user-defined minimum level of geoprivacy. In donut method geomasking, each geocoded address is relocated in a random direction by at least a minimum distance, but less than a maximum distance. The authors compared the donut method with current methods of random perturbation and aggregation regarding measures of privacy protection and cluster detection performance by masking multiple disease field simulations under a range of parameters. Both the donut method and random perturbation performed better than aggregation in cluster detection measures. The performance of the donut method in geoprivacy measures was at least 42.7% higher and in cluster detection measures was less than 4.8% lower than that of random perturbation. Results show that the donut method provides a consistently higher level of privacy protection with a minimal decrease in cluster detection performance, especially in areas where the risk to individual geoprivacy is greatest.

# Hampton KH, Serre ML, Gesink DC, Pilcher CD, Miller WC. [Adjusting for sampling variability in sparse data: geostatistical approaches to disease mapping.](http://www.ncbi.nlm.nih.gov/pubmed/21978359) Int J Health Geogr. 2011 Oct 6;10:54.

Disease maps of crude rates from routinely collected health data indexed at a small geographical resolution pose specific statistical problems due to the sparse nature of the data. Spatial smoothers allow areas to borrow strength from neighboring regions to produce a more stable estimate of the areal value. Geostatistical smoothers are able to quantify the uncertainty in smoothed rate estimates without a high computational burden. In this paper, we introduce a uniform model extension of Bayesian Maximum Entropy (UMBME) and compare its performance to that of Poisson kriging in measures of smoothing strength and estimation accuracy as applied to simulated data and the real data example of HIV infection in North Carolina. The aim is to produce more reliable maps of disease rates in small areas to improve identification of spatial trends at the local level. In all data environments, Poisson kriging exhibited greater smoothing strength than UMBME. With the simulated data where the true latent rate of infection was known, Poisson kriging resulted in greater estimation accuracy with data that displayed low spatial autocorrelation, while UMBME provided more accurate estimators with data that displayed higher spatial autocorrelation. With the HIV data, UMBME performed slightly better than Poisson kriging in cross-validatory predictive checks, with both models performing better than the observed data model with no smoothing. Smoothing methods have different advantages depending upon both internal model assumptions that affect smoothing strength and external data environments, such as spatial correlation of the observed data. Further model comparisons in different data environments are required to provide public health practitioners with guidelines needed in choosing the most appropriate smoothing method for their particular health dataset.

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The HIV/AIDS epidemic in St Petersburg, as in much of Russia, is concentrated among injection drug users (IDU) in whom prevalence reached 30% in 2003. Understanding the dynamics of the epidemic is important in developing appropriate responses in the resource-constrained context of Russian cities such as St Petersburg. IDU were contacted and screened to create a seronegative cohort for prevention and vaccine studies. At screening, individuals provided sociodemographic, drug use, and injection and sex-related risk behavior data. Seronegative individuals who enrolled in the cohort were followed for one year and tested for HIV semiannually. Residential addresses were entered into a geographical information system programme and analysed for spatial clustering using Moran's I and nearest-neighbor analysis. We mapped 788 of the 900 study participants to discrete locations within St Petersburg; 236 (29.9%) were HIV seropositive at baseline. Although there was no clustering of the study population as a whole, HIV-infected individuals were tightly clustered and prevalence co-clustered with high frequency of heroin injection, receptive syringe sharing, being younger than 24 years, and living with parents. These clusters were restricted to 5% of populated areas of the city. We mapped 18 of 20 incident cases detected among the cohort, and more than half were located within or adjacent to the clusters. Spatial analysis identified linkages between disease prevalence and risky injection behaviors that were not evident using traditional epidemiological analysis. The analysis also identified where resources might be allocated geographically for maximum impact in slowing the HIV epidemic among IDU.

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OBJECTIVE: To examine associations between students' time spent in moderate to vigorous physical activity (MVPA) and the school built environment while also considering features of the schools' social environment and student-level characteristics. METHODS: Using surveys and GIS measures, multilevel linear regression analysis was applied to examine the environment- and student-level characteristics associated with time spent in MVPA among grade 9-12 students (n = 22,117) attending 76 secondary schools in Ontario, Canada as part of the SHAPES-Ontario study. RESULTS: Statistically significant between-school random variation in student MVPA was identified [[Formula: see text] = 9,065.22 (250.64)]; school-level differences accounted for 3.0% of the variability in student MVPA. Students attending a school that offered daily physical education or provided an alternate room for physical activity spent more time in MVPA than students attending a school without these resources. Moreover, as land-use mix diversity and walkability of the school neighbourhood increased, students' time spent in MVPA decreased. CONCLUSION: Developing a better understanding of the environment- and student-level characteristics associated with students' time spent in MVPA is critical for informing school-based physical activity intervention programmes and policies.

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Many studies have found cross-sectional associations between characteristics of the neighborhood built environment and physical activity (PA) behavior. However, most are based on self-reported PA, which is known to result in overestimation of PA and differential misclassification by demographic and biological characteristics. Cardiorespiratory fitness (CRF) is an objective marker of PA because it is primarily determined by PA. Furthermore, it is causally related to long-term health outcomes. Therefore, analyses of the association between CRF and built environment could strengthen arguments for the importance of built environment influences on health. We examined the association between neighborhood walkability and CRF and body-mass index (BMI). This cross-sectional analysis included 16,543 adults (5017 women, 11,526 men) aged 18-90 years with home addresses in Texas who had a comprehensive clinical examination between 1987 and 2005. Outcomes included CRF from total duration on a maximal exercise treadmill test and measured BMI. Three neighborhood walkability factors emerged from principal components analyses of block-group measures derived from the U.S. Census. In multilevel adjusted analyses, the neighborhood walkability factors were significantly associated with CRF and BMI among men and women in the expected direction. An interaction between one of the neighborhood factors and age was also observed. The interaction suggested that living in neighborhoods with older homes and with residents traveling shorter distances to work was more strongly positively associated with CRF among younger adults and more strongly negatively associated with BMI among older adults. In conclusion, neighborhood characteristics hypothesized to support more PA and less driving were associated with higher levels of CRF and lower BMI. Demonstration of an association between built environment characteristics and CRF is a significant advance over past studies based on self-reported PA. Nevertheless, stronger causal evidence depends on more robust study designs and sophisticated measures of the environment, behavior, and their physiological consequences.

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BACKGROUND: Information technologies are employed to evaluate health program and better target recruitment of health care workforce for underserved communities, where needs for providers are greatest. With increased resources in reducing human immunodeficiency virus (HIV)/AIDS disparities and provider training, it may be important to know whether training is delivered in geographic areas where HIV/AIDS demonstrates high prevalence. The present study employs an informatics approach to identifying effectiveness of AIDS educational intervention in minority populations adversely affected by the disease. We seek to assess the National Minority AIDS Education and Training Center (NMAETC) on whether training activities are delivered appropriately in areas with high AIDS prevalence. METHODS: A geographic information systems application was developed to relate NMAETC provider training activities to its spatial relationship of AIDS prevalence of 4 major US racial/ethnic groups (fiscal years 2005-2006). Trainees' locations were geocoded by zip code. We overlaid AIDS prevalence of major demographic communities by state with the US Census region and division boundaries to visually inspect the patterns of distribution and potential spatial association. RESULTS: NMAETC training better targeted providers in 3 US Census regions and census divisions. The regions with higher provider training level generally corresponded to geographic areas with high AIDS prevalence for some minority populations. Additional efforts could be extended to recruit providers in the areas where the incidences were high for some communities. CONCLUSIONS: Most NMAETC provider training activities occurred in the states with a high AIDS prevalence. Additional efforts could be extended to recruit the providers in those regions where HIV/AIDS are more prevalent for some minority populations.

Kandwal R, Garg PK, Garg RD. [**Health GIS and HIV/AIDS studies: Perspective and retrospective.**](http://www.ncbi.nlm.nih.gov/pubmed/19426832) J Biomed Inform. 2009 Aug;42(4):748-55.

GIS (Geographic Information System) is a useful tool that aids and assists in health research, health education, planning, monitoring and evaluation of health programmes that are meant to control and eradicate certain life threatening diseases and epidemics. HIV/AIDS is one such epidemic that poses a serious challenge and threatens the overall human welfare. This communication is an attempt to link and understand the health scenario in a GIS context with emphasis on HIV/AIDS. Various GIS based functionalities for health studies and their scope in analyzing and controlling epidemiological diseases are explored. Overall scenario of the spread of HIV/AIDS around the world is presented along with the Indian perspective. Finally, we conclude with the general management problems, issues and challenges related to HIV/AIDS prevailing in India.

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In this paper we map the location and distribution of HIV service providers across Toronto neighbourhoods. Our analysis identified an uneven distribution of services across Toronto and a number of communities that are less accessible to HIV-related services. We subsequently identified three neighbourhood-level characteristics of the populations living within these communities (i.e. concentrated economic disadvantage, concentrated immigration, and residential instability). Our findings suggest a significant overlap in the location of HIV service providers and the clustering of neighbourhood-level demographic and socioeconomic factors. Some inaccessible neighbourhoods overlap with clusters of neighbourhoods with higher levels of concentrated disadvantage, immigration and percentage of black Canadians. Accessible neighbourhoods are located within the downtown core of Toronto and overlap with clusters of highly dense, younger neighbourhoods (with a high proportion of 15- to 34-year-olds who are unmarried). Our findings point to the need for policy-makers to integrate spatial analytic techniques into their examination of the types of neighbourhoods, and subsequently the community members that live within those neighbourhoods, that are potentially underserved with respect to health and social services.

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AIMS: To assess the association between access to off-premises alcohol outlets and harmful alcohol consumption. DESIGN, SETTING AND PARTICIPANTS: Multi-level study of 2334 adults aged 18-75 years from 49 census collector districts (the smallest spatial unit in Australia at the time of survey) in metropolitan Melbourne. MEASUREMENTS: Alcohol outlet density was defined as the number of outlets within a 1-km road network of respondents' homes and proximity was the shortest road network distance to the closest outlet from their home. Using multi-level logistic regression we estimated the association between outlet density and proximity and four measures of harmful alcohol consumption: drinking at levels associated with short-term harm at least weekly and monthly; drinking at levels associated with long-term harm and frequency of consumption. FINDINGS: Density of alcohol outlets was associated with increased risk of drinking alcohol at levels associated with harm. The strongest association was for short-term harm at least weekly [odds ratio (OR) 1.10, 95% confidence interval (CI) 1.04-1.16]. When density was fitted as a categorical variable, the highest risk of drinking at levels associated with short-term harm was when there were eight or more outlets (short-term harm weekly: OR 2.36, 95% CI 1.22-4.54 and short-term harm monthly: OR 1.80, 95% CI 1.07-3.04). We found no evidence to support an association between proximity and harmful alcohol consumption. CONCLUSIONS: The number of off-premises alcohol outlets in a locality is associated with the level of harmful alcohol consumption in that area. Reducing the number of off-premises alcohol outlets could reduce levels of harmful alcohol consumption.

# [Kim AA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Kim%20AA%22%5BAuthor%5D), [Martinez AN](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Martinez%20AN%22%5BAuthor%5D), [Klausner JD](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Klausner%20JD%22%5BAuthor%5D), [Goldenson J](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Goldenson%20J%22%5BAuthor%5D), [Kent C](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Kent%20C%22%5BAuthor%5D), [Liska S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Liska%20S%22%5BAuthor%5D), [McFarland W](http://www.ncbi.nlm.nih.gov/pubmed?term=%22McFarland%20W%22%5BAuthor%5D). Use of sentinel surveillance and geographic information systems to monitor trends in HIV prevalence, incidence, and related risk behavior among women undergoing syphilis screening in a jail setting. [J Urban Health.](http://www.ncbi.nlm.nih.gov/pubmed/18785013) 2009 Jan;86(1):79-92.

Innovative methods are needed to systematically track the HIV epidemic and appropriately target prevention and care programs in vulnerable populations of women. We conducted sentinel surveillance among women entering the jail system of San Francisco from 1999 to 2001 to track trends in HIV incidence, HIV prevalence, and related risk behavior. Using geographic information software (GIS), we triangulated findings to examine the spatial distribution of risk and disease. A total of 1,577 female arrestees voluntarily screened for sexually transmitted diseases at intake were included. HIV incidence, estimated using the serologic testing algorithm for recent HIV seroconversion (STARHS), was 0.4% per year (95% confidence interval [95%CI]=0.1-2.1). HIV prevalence was 1.8% (95%CI=1.1-2.4). HIV infection was independently associated with age 30 to 39 years compared to all other ages, African-American race/ethnicity vs. non-African-American, and recent injection drug use. Maps showed that the communities in which arrested women reside are also those with the highest concentrations of newly detected female HIV cases, AIDS cases, and clients of substance use programs. The combined strategy of using sentinel surveillance in the jail setting and GIS to map the spatial distribution of disease provides a useful tool to identify patterns of risk in hard-to-reach, vulnerable populations of women.

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Local Ontario Early Years Centres (OEYCs) collect timely and relevant local data, but knowledge translation is needed for the data to be useful. Maps represent an ideal tool to interpret local data. While geographic information system (GIS) technology is available, it is less clear what users require from this technology for evidence-informed program planning. We highlight initial challenges and opportunities encountered in implementing a mapping innovation (software and managerial decision-support) as a knowledge translation strategy. Using focus groups, individual interviews and interactive software development events, we taped and transcribed verbatim our interactions with nine OEYCs in Ontario, Canada. Research participants were composed of data analysts and their managers. Deductive analysis of the data was based on the Ottawa Model of Research Use, focusing on the innovation (the mapping tool and maps), the potential adopters, and the environment. Challenges associated with the innovation included preconceived perceptions of a steep learning curve with GIS software. Challenges related to the potential adopters included conflicting ideas about tool integration into the organization and difficulty with map interpretation. Lack of funds, lack of availability of accurate data, and unrealistic reporting requirements represent environmental challenges. Despite the clear need for mapping software and maps, there remain several challenges to their effective implementation. Some can be modified, while other challenges might require attention at the systemic level. Future research is needed to identify barriers and facilitators related to using mapping software and maps for decision-making by other users, and to subsequently develop mapping best practices guidelines to assist community-based agencies in circumventing some challenges, and support information equity across a region.

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BACKGROUND: Proximity is an important component of access to healthcare services. Recent changes in generic pricing in Ontario have caused speculation about pharmacy closures. However, there is little information on the current geographic accessibility of pharmacies. Therefore, we studied geographic access to pharmacies and modelled the impact of possible closures. METHODS: We used location data on the 3,352 accredited community pharmacies from the Ontario College of Pharmacists and population estimates at the census dissemination block level. Using network analysis, we determined the share of Ontario's population who reside in a census dissemination block within three road travel distances of a community pharmacy: 800 m (walking), 2 km and 5 km (driving). We then simulated the effects on these measures of 10% to 50% reductions in the number of community pharmacies in Ontario. RESULTS: Approximately 63.6% of the Ontario population reside in a dissemination block located within walking distance of one or more pharmacies; 84.6% and 90.7% reside within 2-km and 5-km driving distances, respectively. Randomly removing 30% of Ontario's community pharmacies reduces these estimates to 56.0%, 81.4% and 89.0% for each distance, respectively; a 50% reduction results in 48.3%, 77.1% and 87.2%, respectively. CONCLUSIONS: Pharmacies are geographically accessible for a majority of the Ontario population. Moreover, it appears that modest closures would have only a small impact on geographic access to pharmacies. However, closures may have other impacts on access, such as cost, waiting time and reduced patient choice.

Leibowitz AA, Mendes AC, Desmond K. [**Public funding of HIV/AIDS prevention, treatment, and support in California.**](http://www.ncbi.nlm.nih.gov/pubmed/21546846) J Acquir Immune Defic Syndr. 2011 Sep 1;58(1):e11-6.

To determine the amount of public financing for HIV/AIDS in California and its distribution among treatment, prevention, and support services. To determine the geographical distribution of public financing for HIV/AIDS within California. Data on HIV/AIDS expenditures were compiled across federal and state agencies supporting HIV/AIDS in fiscal year 2008. Federal and state data on programs that finance HIV/AIDS treatment, prevention, and support services, including the Ryan White Program, the Centers for Disease Control and Prevention, and the California General Fund, were compiled. California-specific expenditures for Medicare and Medicaid were calculated from claims data. Other entitlement program spending was estimated from national HIV/AIDS data. Data on AIDS cases by county were obtained from the California State Office of AIDS. Mapping to California counties was accomplished with Arc-GIS software. Public funders accounted for approximately $1.92 billion in HIV/AIDS services in California in fiscal year 2008. Most (90.4%) supported treatment; prevention accounted for 6.4% and support services for 2.6%. The majority of treatment financing came from 2 Federal health entitlement programs, Medicare (36%), and Medicaid (28%). Counties with the highest case loads had lower expenditures per case, suggesting economies of scale. Treatment expenditures overshadow prevention spending. The dominance of entitlement programs in funding for HIV/AIDS treatment challenges policy makers to monitor the extent and quality of HIV/AIDS care in California. A unified health information system for HIV/AIDS that bridged the fragmented health payment system's data silos would benefit policy makers' efforts to monitor the delivery of HIV/AIDS services.

Leibowitz AA, Taylor SL. [**Distance to public test sites and HIV testing**.](http://www.ncbi.nlm.nih.gov/pubmed/17728197) Med Care Res Rev. 2007 Oct;64(5):568-84.

This article examines how proximity to the nearest publicly funded test site affects HIV testing. Using a sample of 5,361 Los Angeles County adults, multinomial logit models estimated simultaneously the likelihood of (1) obtaining an HIV test in the prior 2 years, and (2) testing in a private physician's office, a publicly funded medical clinic, or in a nonmedical setting, such as a bar or bathhouse. Low-income Los Angeles residents rely on publicly funded sites for HIV testing. When public sites are more distant, poor individuals are less likely to use them and less likely to get tested. Distance from public sites does not affect HIV testing among the nonpoor. To encourage HIV testing among the groups where HIV is growing fastest, public health agencies must keep the time and money costs of HIV testing low.

[Lin SJ](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Lin%20SJ%22%5BAuthor%5D). **Access to community pharmacies by the elderly in Illinois: a geographic information systems analysis.** [J Med Syst.](http://www.ncbi.nlm.nih.gov/pubmed/15446619) 2004 Jun;28(3):301-9.

Community pharmacies play an important role in maintaining population health in the United States. They are large in number, distribute widely across geographic areas, and operate for long hours. Because the elderly population tends to use more medications and have more frequent interaction with pharmacies and pharmacists, this study was carried out to understand the geographic access to community pharmacies by the elderly in Illinois and to estimate the disparity in the access between rural and urban areas. The addresses of all community pharmacies operating in 2001 were geocoded to identify their locations. The Census 2000 data on demographics at the census block group level was used to estimate the geographic distribution of the Illinois population by age group. Using the centroid of each census block group and the locations of community pharmacies, the distance to a nearest pharmacy for each census block group was calculated. The distance was then weighted to compute the aggregated distance required for the elderly to access a pharmacy. There were 1373 community pharmacies operating in Illinois in 2001. Most pharmacies (93.8%) were located in urban areas. On average, there were 1.27 and 0.38 pharmacies per 10,000 people in urban and rural areas, respectively. The average distance for an elderly person in Illinois to locate a community pharmacy was 0.9 miles in urban areas, but it was six times more (5.9 miles) in rural areas. At least 10% of the rural elderly had to travel more than 11.8 miles to find a community pharmacy, but only 0.1% had to travel more than 20 miles. The geographic access to community pharmacies appears to be appropriate in Illinois. However, a small portion of rural elderly who do not have a pharmacy in their nearby areas may warrant special attention.

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OBJECTIVE: This article uses geographic information systems and their related tools to empirically measure and display the geographic accessibility of the aged population to hospital facilities within Illinois. DATA SOURCES AND STUDY SETTING: Geographic accessibility of Illinois' aged population is measured from each of the state's 10,796 census block groups to the state's 214 hospital facilities. Block group demographic compositions and centroids are obtained from 1990 census files. Hospital coordinates are obtained by the authors. STUDY DESIGN: Of five alternative measures of accessibility considered, empirical estimates are obtained for two: choice set and minimum distance. Access to both general hospitals and the subset having specialized geriatric facilities is measured with special attention to differences in accessibility between the aged within metropolitan statistical areas (MSAs) and those outside MSAs. Cumulative accessibility distributions and their summary statistics provide a basis of comparison among subgroups. DATA COLLECTION AND EXTRACTION: Geographic information systems (GIS) and their related tools are used as a means of efficiently capturing, organizing, storing, and retrieving the required data. Hospitals and census block groups are geocoded to specific locations in the database, and aspatial attributes are assigned to the hospitals and block groups. The GIS database is queried to produce shaded isarithm and point distribution maps that show the location of hospitals relative to surrounding aged populations. CONCLUSION: The vast majority of Illinois' aged population is within close proximity to hospital facilities. Eighty percent (1,147,504 persons) of the aged in Illinois are within 4.8 miles (7.7 km) of a hospital and 11.6 miles (18.7 km) of two hospitals. However, geographic accessibility differences between the aged living in MSAs and those living outside MSAs to hospitals offering geriatric services are substantial; but there is no evidence that the aged's geographical accessibility to hospitals is less favorable than that of the general population. Detailed accessibility measures permitted by geographic information system technology call into question the continued use of crude empirical accessibility measures.

# [Macintyre S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Macintyre%20S%22%5BAuthor%5D), [Macdonald L](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Macdonald%20L%22%5BAuthor%5D), [Ellaway A](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Ellaway%20A%22%5BAuthor%5D). Do poorer people have poorer access to local resources and facilities? The distribution of local resources by area deprivation in Glasgow, Scotland. [Soc Sci Med.](http://www.ncbi.nlm.nih.gov/pubmed/18599170) 2008 Sep;67(6):900-14.

It has commonly been suggested that in modern cities individual or household deprivation (for example, low income or education) is amplified by area level deprivation (for example, lack of jobs or good schools), in ways which damage the health of the poorest and increase health inequalities. The aim of this study was to determine the location of a range of resources and exposures by deprivation in a UK city. We examined the location of 42 resources in Glasgow City, Scotland, in 2005-2006, by quintile of small area deprivation. Measures included number per 1000 population, network distance to nearest resource, and percentage of data zones containing at least one of each type of resource. Twelve resources had higher density in, and/or were closer to or more common in, more deprived neighbourhoods: public nurseries, public primary schools, police stations, pharmacies, credit unions, post offices, bus stops, bingo halls, public swimming pools, public sports centres, outdoor play areas, and vacant and derelict land/buildings. Sixteen had higher density in, and/or were closer to, or more common in, more affluent neighbourhoods: public secondary schools, private schools, banks, building societies, museums/art galleries, railway stations, subway stations, tennis courts, bowling greens, private health clubs, private swimming pools, colleges, A & E hospitals, parks, waste disposal sites, and tourist attractions. Private nurseries, Universities, fire stations, general, dental and ophthalmic practices, pawn brokers, ATMs, supermarkets, fast food chains, cafes, public libraries, golf courses, and cinemas showed no clear pattern by deprivation. Thus it appears that in the early 21st century access to resources does not always disadvantage poorer neighbourhoods in the UK. We conclude that we need to ensure that theories and policies are based on up-to-date and context-specific empirical evidence on the distribution of neighbourhood resources, and to engage in further research on interactions between individual and environmental factors in shaping health and health inequalities.

[Mavoa S](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Mavoa%20S%22%5BAuthor%5D), [Oliver M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Oliver%20M%22%5BAuthor%5D), [Witten K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Witten%20K%22%5BAuthor%5D), [Badland HM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Badland%20HM%22%5BAuthor%5D). **Linking GPS and travel diary data using sequence alignment in a study of children's independent mobility.** [Int J Health Geogr.](http://www.ncbi.nlm.nih.gov/pubmed/22142322) 2011 Dec 5;10:64.

BACKGROUND: Global positioning systems (GPS) are increasingly being used in health research to determine the location of study participants. Combining GPS data with data collected via travel/activity diaries allows researchers to assess where people travel in conjunction with data about trip purpose and accompaniment. However, linking GPS and diary data is problematic and to date the only method has been to match the two datasets manually, which is time consuming and unlikely to be practical for larger data sets. This paper assesses the feasibility of a new sequence alignment method of linking GPS and travel diary data in comparison with the manual matching method. METHODS: GPS and travel diary data obtained from a study of children's independent mobility were linked using sequence alignment algorithms to test the proof of concept. Travel diaries were assessed for quality by counting the number of errors and inconsistencies in each participant's set of diaries. The success of the sequence alignment method was compared for higher versus lower quality travel diaries, and for accompanied versus unaccompanied trips. Time taken and percentage of trips matched were compared for the sequence alignment method and the manual method. RESULTS: The sequence alignment method matched 61.9% of all trips. Higher quality travel diaries were associated with higher match rates in both the sequence alignment and manual matching methods. The sequence alignment method performed almost as well as the manual method and was an order of magnitude faster. However, the sequence alignment method was less successful at fully matching trips and at matching unaccompanied trips. CONCLUSIONS: Sequence alignment is a promising method of linking GPS and travel diary data in large population datasets, especially if limitations in the trip detection algorithm are addressed.

McNeill LH, Emmons K. [**GIS Walking Maps to Promote Physical Activity in Low-Income Public Housing Communities: a Qualitative Examination.**](http://www.ncbi.nlm.nih.gov/pubmed/22172184) Prev Chronic Dis. 2012 Jan;9:E17. Epub 2011 Dec 15.

Walking is the most commonly reported leisure-time activity. Members of racial/ethnic minority groups and people of low socioeconomic status disproportionately live in urban environments that are perceived to be unsafe, thereby reducing opportunities for engaging in walking. We examined the use of walking maps for increasing physical activity (PA) among low-income residents of public housing sites in Boston, Massachusetts. PA facilities, local businesses, and destinations in a walkable half-mile radius of the housing community were identified and plotted on maps by using geographic information systems technology. Four focus groups (n = 24) were conducted to learn how the walking maps were used by the residents and to understand map features that promoted use. Maps were used by participants to increase their PA, and use of the maps increased participants' awareness of community resources. Maps changed participants' perception of distances and were discussed as a means of fostering a sense of community. Use of the maps also increased participants' awareness of neighborhood incivilities. Barriers to map use were difficulty in interpreting the maps and lack of access to the maps. Walking maps that display PA opportunities and resources may be useful in increasing walking among residents of public housing sites.

# [Messina JP](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Messina%20JP%22%5BAuthor%5D), [Emch M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Emch%20M%22%5BAuthor%5D), [Muwonga J](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Muwonga%20J%22%5BAuthor%5D), [Mwandagalirwa K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Mwandagalirwa%20K%22%5BAuthor%5D), [Edidi SB](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Edidi%20SB%22%5BAuthor%5D), [Mama N](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Mama%20N%22%5BAuthor%5D), [Okenge A](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Okenge%20A%22%5BAuthor%5D), [Meshnick SR](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Meshnick%20SR%22%5BAuthor%5D). Spatial and socio-behavioral patterns of HIV prevalence in the Democratic Republic of Congo. [Soc Sci Med.](http://www.ncbi.nlm.nih.gov/pubmed/20739108) 2010 Oct;71(8):1428-35.

This study uses a 2007 population-based household survey to examine the individual and community-level factors that increase an individual's risk for HIV infection in the Democratic Republic of Congo (DRC). Using the 2007 DRC Demographic Health Surveillance (DHS) Survey, we use spatial analytical methods to explore sub-regional patterns of HIV infection in the DRC. Geographic coordinates of survey communities are used to map prevalence of HIV infection and explore geographic variables related to HIV risk. Spatial cluster techniques are used to identify hotspots of infection. HIV prevalence is related to individual demographic characteristics and sexual behaviors and community-level factors. We found that the prevalence of HIV within 25 km of an individual's community is an important positive indicator of HIV infection. Distance from a city is negatively associated with HIV infection overall and for women in particular. This study highlights the importance of improved surveillance systems in the DRC and other African countries along with the use of spatial analytical methods to enhance understanding of the determinants of HIV infection and geographic patterns of prevalence, thereby contributing to improved allocation of public health resources in the future.

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OBJECTIVES: Recently, New York City and New York State increased cigarette excise taxes and New York City implemented a smoke-free workplace law. To assess the impact of these policies on smoking cessation in New York City, we examined over-the-counter sales of nicotine replacement therapy (NRT) products. METHODS: Pharmacy sales data were collected in real time as part of nontraditional surveillance activities. We used Poisson generalized estimating equations to analyze the effect of smoking-related policies on pharmacy-specific weekly sales of nicotine patches and gum. We assessed effect modification by pharmacy location. RESULTS: We observed increases in NRT product sales during the weeks of the cigarette tax increases and the smoke-free workplace law. Pharmacies in low-income areas generally had larger and more persistent increases in response to tax increases than those in higher-income areas. CONCLUSIONS: Real-time monitoring of existing nontraditional surveillance data, such as pharmacy sales of NRT products, can help assess the effects of public policies on cessation attempts. Cigarette tax increases and smoke-free workplace regulations were associated with increased smoking cessation attempts in New York City, particularly in low-income areas.

[Nelson MC](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Nelson%20MC%22%5BAuthor%5D), [Gordon-Larsen P](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gordon-Larsen%20P%22%5BAuthor%5D), [Song Y](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Song%20Y%22%5BAuthor%5D), [Popkin BM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Popkin%20BM%22%5BAuthor%5D). **Built and social environments associations with adolescent overweight and activity.** [Am J Prev Med.](http://www.ncbi.nlm.nih.gov/pubmed/16829327) 2006 Aug;31(2):109-17.

BACKGROUND: Little is known about the patterning of neighborhood characteristics, beyond the basic urban, rural, suburban trichotomy, and its impact on physical activity (PA) and overweight. METHODS: Nationally representative data (National Longitudinal Study of Adolescent Health, 1994-1995, n = 20,745) were collected. Weight, height, PA, and sedentary behavior were self-reported. Using diverse measures of the participants' residential neighborhoods (e.g., socioeconomic status, crime, road type, street connectivity, PA recreation facilities), cluster analyses identified homogeneous groups of adolescents sharing neighborhood characteristics. Poisson regression predicted relative risk (RR) of being physically active (five or more bouts/week of moderate to vigorous PA) and overweight (body mass index equal or greater than the 95th percentile, Centers for Disease Control and Prevention/National Center for Health Statistics growth curves). RESULTS: Six robust neighborhood patterns were identified: (1) rural working class; (2) exurban; (3) newer suburban; (4) upper-middle class, older suburban; (5) mixed-race urban; and (6) low-socioeconomic-status (SES) inner-city areas. Compared to adolescents living in newer suburbs, those in rural working-class (adjusted RR[ARR] = 1.38, 95% confidence interval [CI] = 1.13-1.69), exurban (ARR = 1.30, CI = 1.04-1.64), and mixed-race urban (ARR = 1.31, CI = 1.05-1.64) neighborhoods were more likely to be overweight, independent of individual SES, age, and race/ethnicity. Adolescents living in older suburban areas were more likely to be physically active than residents of newer suburbs (ARR = 1.11, CI = 1.04-1.18). Those living in low-SES inner-city neighborhoods were more likely to be active, though not significantly so, compared to mixed-race urban residents (ARR = 1.09, CI = 1.00-1.18). CONCLUSIONS: These findings demonstrate disadvantageous associations between specific rural and urban environments and behavior, illustrating important effects of the neighborhood on health and the inherent complexity of assessing residential landscapes across the United States. Simple classical urban-suburban-rural measures mask these important complexities.

[Neuman MD](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Neuman%20MD%22%5BAuthor%5D), [David G](http://www.ncbi.nlm.nih.gov/pubmed?term=%22David%20G%22%5BAuthor%5D), [Silber JH](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Silber%20JH%22%5BAuthor%5D), [Schwartz JS](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Schwartz%20JS%22%5BAuthor%5D), [Fleisher LA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Fleisher%20LA%22%5BAuthor%5D). **Changing access to emergency care for patients undergoing outpatient procedures at ambulatory surgery centers: evidence from Florida.** [Med Care Res Rev.](http://www.ncbi.nlm.nih.gov/pubmed/20675344) 2011 Apr;68(2):247-58.

The growth of ambulatory surgery centers (ASCs) as a setting for care in the United States raises unique safety concerns. In contrast to hospital-based outpatient departments (HOPDs), ASCs offer care at varying distances from hospital services potentially required to treat complications. To describe changes over time in the accessibility of hospital services for procedural outpatients, this study examined 4.3 million discharges for seven outpatient procedures frequently performed at ASCs and HOPDs. Between 2005 and 2007, the mean patient-to-emergency department (ED) distance increased by 12.4%. This change, which resulted from both an increase in the share of procedures performed at ASCs and an increase in the distance between ASCs and EDs, occurred predominantly within procedures that carried an elevated odds of hospital admission relative to the lowest risk procedures. Further research defining the risks associated with these changes in access to emergency care is needed to inform future ASC policy development and regulation.

# [Nykiforuk CI](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Nykiforuk%20CI%22%5BAuthor%5D), [Flaman LM](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Flaman%20LM%22%5BAuthor%5D). Geographic information systems (GIS) for Health Promotion and Public Health: a review. [Health Promot Pract.](http://www.ncbi.nlm.nih.gov/pubmed/19546198) 2011 Jan;12(1):63-73.

The purpose of this literature review is to identify how geographic information system (GIS) applications have been used in health-related research and to critically examine the issues, strengths, and challenges inherent to those approaches from the lenses of health promotion and public health. Through the review process, conducted in 2007, it is evident that health promotion and public health applications of GIS can be generally categorized into four predominant themes: disease surveillance (n = 227), risk analysis (n = 189), health access and planning (n = 138), and community health profiling (n = 115). This review explores how GIS approaches have been used to inform decision making and discusses the extent to which GIS can be applied to address health promotion and public health questions. The contribution of this literature review will be to generate a broader understanding of how GIS-related methodological techniques and tools developed in other disciplines can be meaningfully applied to applications in public health policy, promotion, and practice.

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BACKGROUND: Physical activity is essential for optimal physical and psychological health but substantial declines in children's activity levels have occurred in New Zealand and internationally. Children's independent mobility (i.e., outdoor play and traveling to destinations unsupervised), an integral component of physical activity in childhood, has also declined radically in recent decades. Safety-conscious parenting practices, car reliance and auto-centric urban design have converged to produce children living increasingly sedentary lives. This research investigates how urban neighborhood environments can support or enable or restrict children's independent mobility, thereby influencing physical activity accumulation and participation in daily life. METHODS/DESIGN: The study is located in six Auckland, New Zealand neighborhoods, diverse in terms of urban design attributes, particularly residential density. Participants comprise 160 children aged 9-11 years and their parents/caregivers. Objective measures (global positioning systems, accelerometers, geographical information systems, observational audits) assessed children's independent mobility and physical activity, neighborhood infrastructure, and streetscape attributes. Parent and child neighborhood perceptions and experiences were assessed using qualitative research methods. DISCUSSION: This study is one of the first internationally to examine the association of specific urban design attributes with child independent mobility. Using robust, appropriate, and best practice objective measures, this study provides robust epidemiological information regarding the relationships between the built environment and health outcomes for this population.

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Recent work in a number of countries has identified growing geographical inequalities in health between deprived and non-deprived neighbourhoods. The health gaps observed cannot be entirely explained by differences in the characteristics of individuals living in those neighbourhoods, which has led to a concerted international public health research effort to determine what contextual features of neighbourhoods matter. This article reports on access to potentially health-promoting community resources across all neighbourhoods in New Zealand. Prevailing international opinion is that access to community resources is worse in deprived neighbourhoods. Geographical Information Systems were used to calculate geographical access to 16 types of community resources (including recreational amenities, and shopping, educational and health facilities) in 38,350 small census areas across the country. The distribution of these access measures by neighbourhood socioeconomic deprivation was determined. For 15 out of 16 measures of community resources, access was clearly better in more deprived neighbourhoods. For example, the travel time to large supermarkets was approximately 80% greater in the least deprived quintile of neighbourhoods compared with the most deprived quintile. These results challenge the widely held, but largely untested, view that areas of high social disadvantage have poorer access to community resources. Poor locational access to community resources among deprived neighbourhoods in New Zealand does not appear to be an explanation of poorer health in these neighbourhoods. If anything, a pro-equity distribution of community resources may be preventing even wider disparities in neighbourhood inequalities in health.

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Access is an important concept in health policy and health services research, yet it is one which has not been defined or employed precisely. To some authors "access" refers to entry into or use of the health care system, while to others it characterizes factors influencing entry or use. The purpose of this article is to propose a taxonomic definition of "access." Access is presented here as a general concept that summarizes a set of more specific dimensions describing the fit between the patient and the health care system. The specific dimensions are availability, accessibility, accommodation, affordability and acceptability. Using interview data on patient satisfaction, the discriminant validity of these dimensions is investigated. Results provide strong support for the view that differentiation does exist among the five areas and that the measures do relate to the phenomena with which they are identified.

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Recently, Geographical Information System (GIS) has emerged as an innovative and important component of many projects in public health and epidemiology. One of the most useful functions of GIS in epidemiology continues to be its utility in basic mapping. GIS may also involve more sophisticated spatial analysis of disease occurrence and contributing environmental factors. Depending on the quantity and quality of data and the methodology used in analysis, a given map may be either useful or misleading. Although visual analyses (mapped evidence) strengthened by exploratory analyses are mostly sufficient for epidemiologists, the formal testing of certain hypotheses or the estimation of relationships between measures of disease incidence and, for example, environmental covariates require quantitative modelling of disease distribution. It is a promising prospect that spatial statistics and GIS technology have slowly started to merge. However, whether GIS will be useful in the model-based approach and the prediction in, for example, epidemiology remains to be seen. The desired future development of GIS requires a switch of emphasis from data and information to knowledge.

# Santilli A, Carroll-Scott A, Wong F, Ickovics J. Urban Youths Go 3000 Miles: Engaging and Supporting Young Residents to Conduct Neighborhood Asset Mapping. Am J Public Health. 2011 Dec; 28(4): 2207-2210.

In 2009, CARE (Community Alliance for Research and Engagement at Yale University) launched a multisectoral chronic disease prevention initiative that conducts baseline data collection, interventions, and follow-up data collection to measure change. Data collection includes asset mapping to assess environmental determinants of chronic disease risk factors in neighborhoods and around schools. CARE hired 7 local high school students to conduct asset mapping; they walked more than 3000 miles and collected 492 data points. Employing youths as community health workers to collect data greatly enriched the community research process and offered many advantages. We were able to efficiently and effectively conduct scientifically rigorous mapping while gaining entry into some of New Haven's most research-wary and skeptical neighborhoods.

# [Shannon K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Shannon%20K%22%5BAuthor%5D), [Rusch M](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Rusch%20M%22%5BAuthor%5D), [Shoveller J](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Shoveller%20J%22%5BAuthor%5D), [Alexson D](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Alexson%20D%22%5BAuthor%5D), [Gibson K](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Gibson%20K%22%5BAuthor%5D), [Tyndall MW](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Tyndall%20MW%22%5BAuthor%5D); [Maka Project Partnership](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Maka%20Project%20Partnership%22%5BCorporate%20Author%5D). Mapping violence and policing as an environmental-structural barrier to health service and syringe availability among substance-using women in street-level sex work. [Int J Drug Policy.](http://www.ncbi.nlm.nih.gov/pubmed/18207725) 2008 Apr;19(2):140-7.

Within street-based sex work and substance-using populations, there is growing evidence to support the role of place, both physical setting and social meanings attached to place, in mediating the effectiveness and reach of health and harm reduction services. Social mapping was used to explore how health service and syringe availability may be impacted at the geographic level by avoidance of physical settings due to violence and policing among women in street-level sex work. Through a community-based research partnership and extensive peer-led outreach over a 6-month period, women were invited to participate in interview-questionnaires and mapping of their community, working conditions, and access to resources. Results were compiled used ArcGIS software and GIS street maps. In secondary analysis, logistic regression was used to model the geographic association (using likelihood ratio and significance at p<0.05) and stratified models were run to assess differential patterns of avoidance based on age, ethnicity and drug use. The findings reveal a significant geographic relationship between a heavily concentrated core area of health and syringe availability and avoidance of physical settings due to violence and policing by 198 women in street-level sex work in Vancouver, Canada. Of particular concern, this correlation is significantly elevated among younger and Aboriginal women, active injection drug users, and daily crack cocaine smokers, suggesting significant environmental-structural barriers to interventions among these vulnerable populations. The resultant displacement of sex work to primarily industrial settings and side streets pushes women further from health and social supports and reduces access to safer injection and drug use paraphernalia. This study offers important evidence for environmental-structural level prevention and safer environment interventions, supported by legal reforms, that facilitate safer sex work environments, including spatial programming, peer-based prevention, outreach and mobile resources, and peer-supervised safer sex work settings.

Shepard CW, Gortakowski HW, Nasrallah H, Cutler BH, Begier EM. [**Using GIS-based density maps of HIV surveillance data to identify previously unrecognized geographic foci of HIV burden in an urban epidemic.**](http://www.ncbi.nlm.nih.gov/pubmed/21886335) Public Health Rep. 2011 Sep-Oct;126(5):741-9.

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Individuals living in deprived neighbourhoods have poor health outcomes, including human immunodeficiency virus (HIV) infection mortality. We assessed the association between individual and neighbourhood characteristics, and HIV testing across Canada. We used logistic regression modelling to evaluate this association in 2219 men and 2815 women, aged 18-54 years, in Canada, using data from the National Population Health Survey (1996/7),. Socio-economic characteristics and presence of a sexually transmitted infection (STI) were the individual level characteristics. Small area of residence was classified according to categories of material and social deprivation; these were the 'neighbourhood' variables in the model. Ethnic minority women were less likely to report an HIV test than white women (OR 0.44, 95% CI: 0.23 to 0.86). Women without a regular doctor were significantly less likely to report ever having had an HIV test (OR 0.57, 95% CI: 0.35 to 0.93). Adjusting for individual level characteristics, we found that men and women living in the most materially deprived neighbourhoods were slightly less likely to report HIV testing than those living in the least deprived neighbourhoods (Men - OR 0.61, 95% CI: 0.34 to 1.08; Women - OR 0.62, 95% CI: 0.38 to 1.00). Thus, living in poor neighbourhoods was associated with poor uptake of an HIV test. These economic disparities should be taken in account while designing future prevention strategies. Ethnic minority women were less likely to go for HIV testing and culturally appropriate messages may be required for prevention in ethnic minorities.

Tanskanen A, Nillos LT, Lehtinen A, Nohynek H, Sanvictores DH, Simoes EA, Tallo VL, Lucero MG, Consortium A. [**Geographic Information System and tools of spatial analysis in a pneumococcal vaccine trial.**](http://www.ncbi.nlm.nih.gov/pubmed/22264271)BMC Res Notes. 2012 Jan 20;5(1):51.

BACKGROUND: The goal of this Geographic Information System (GIS) study was to obtain accurate information on the locations of study subjects, road network and services for research purposes so that the clinical outcomes of interest (e.g., vaccine efficacy, burden of disease, nasopharyngeal colonization and its reduction) could be linked and analyzed at a distance from health centers, hospitals, doctors and other important services. The information on locations can be used to investigate more accurate crowdedness, herd immunity and/or transmission patterns. METHOD: A randomized, placebo-controlled, double-blind trial of an 11-valent pneumococcal conjugate vaccine (11PCV) was conducted in Bohol Province in central Philippines, from July 2000 to December 2004. We collected the information on the geographic location of the households (N = 13,208) of study subjects. We also collected a total of 1982 locations of health and other services in the six municipalities and a comprehensive GIS data over the road network in the area. RESULTS: We calculated the numbers of other study subjects (vaccine and placebo recipients, respectively) within the neighborhood of each study subject. We calculated distances to different services and identified the subjects sharing the same services (calculated by distance). This article shows how to collect a complete GIS data set for human to human transmitted vaccine study in developing country settings in an efficient and economical way. CONCLUSIONS: The collection of geographic locations in intervention trials should become a routine task. The results of public health research may highly depend on spatial relationships among the study subjects and between the study subjects and the environment, both natural and infrastructural.

Taylor DM, Yeager VA, Ouimet C, Menachemi N. [**Using GIS for administrative decision-making in a local public health setting.**](http://www.ncbi.nlm.nih.gov/pubmed/22547869) Public Health Rep. 2012 May-Jun;127(3):347-53.

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In this study we examine how individuals' residential areas relate to their HIV-testing, regardless of individuals' characteristics. Data from a 1999 random probability sample of Los Angeles (LA) County adults (n = 5475) was used to conduct a multi-level analysis of HIV-testing among respondents in (1) all 233 ZIP codes and (2) the subset of regions with higher rates of higher-risk sex. Results showed that HIV-testing rates varied across individuals' residential ZIP codes. Throughout LA and in higher-risk regions, residents of areas containing concentrations of African Americans were more likely to test for HIV than residents of White or Latino areas, regardless of individuals' own race/ethnicity or the number of AIDS cases or testing sites in ZIP codes. However, residents of Latino areas were no more likely to test than residents of White areas. This is a concern because of increasing rates of HIV-infection among Latinos. We conclude that opportunities exist to increase testing in Latino higher-risk areas.

Thomas Y, Richardson D, Cheung I (eds.). ***Geography and Drug Addiction***. Springer Science + Business Media B.V., 2008.

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OBJECTIVE: Obtaining childhood immunization coverage data for small geographic areas is difficult and resource-intensive, especially in the absence of comprehensive immunization registries. To identify factors that are associated with delayed immunization, we collected school-entry immunization records statewide and used geocoding to link to publicly available census tract sociodemographic data. METHODS: Immunization records were reviewed for children who were enrolled in all public and private school kindergarten programs in Hawaii in the 2002-2003 school year; immunization status at the time of the second birthday was determined. The main outcome variable was up-to-date status for the 4:3:1:3:3 vaccination series (4 doses of diphtheria-tetanus-pertussis, 3 doses of polio, 1 dose of measles-mumps-rubella, 3 doses of Haemophilus influenzae type b, and 3 doses of hepatitis B vaccines). Children's home addresses were geocoded to census tracts; coverage rates by tract were mapped, and sociodemographic data from Census 2000 files were used to identify factors that were associated with delays in immunization. RESULTS: Records were obtained for 15,275 of 15,594 children registered in Hawaii kindergartens. Overall, 78% had completed their 4:3:1:3:3 series by their second birthday. Risk factors for delayed immunization included delayed immunization at 3 months of age, living in Maui County, living in a neighborhood where a low proportion of adults had postsecondary education, and living in a neighborhood where a high proportion of households spoke a language other than English at home. The majority (80%) of underimmunized children would have required only 1 additional visit to bring them up-to-date. CONCLUSIONS: Retrospective review of kindergarten-entry immunization data revealed geographic areas with lower immunization coverage, and geocoding to census tracts identified associated sociodemographic risk factors. This is a practical method for state or city health departments to identify pockets of need and to direct resources appropriately.

# [Wieland SC](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Wieland%20SC%22%5BAuthor%5D), [Cassa CA](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Cassa%20CA%22%5BAuthor%5D), [Mandl KD](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Mandl%20KD%22%5BAuthor%5D), [Berger B](http://www.ncbi.nlm.nih.gov/pubmed?term=%22Berger%20B%22%5BAuthor%5D). Revealing the spatial distribution of a disease while preserving privacy. [Proc Natl Acad Sci U S A.](http://www.ncbi.nlm.nih.gov/pubmed/19015533) 2008 Nov 18;105(46):17608-13.

Datasets describing the health status of individuals are important for medical research but must be used cautiously to protect patient privacy. For patient data containing geographical identifiers, the conventional solution is to aggregate the data by large areas. This method often preserves privacy but suffers from substantial information loss, which degrades the quality of subsequent disease mapping or cluster detection studies. Other heuristic methods for de-identifying spatial patient information do not quantify the risk to individual privacy. We develop an optimal method based on linear programming to add noise to individual locations that preserves the distribution of a disease. The method ensures a small, quantitative risk of individual re-identification. Because the amount of noise added is minimal for the desired degree of privacy protection, the de-identified set is ideal for spatial epidemiological studies. We apply the method to patients in New York County, New York, showing that privacy is guaranteed while moving patients 25-150 times less than aggregation by zip code.

Williams CT, Metzger DS. [**Race and distance effects on regular syringe exchange program use and injection risks: a geobehavioral analysis.**](http://www.ncbi.nlm.nih.gov/pubmed/20395589) Am J Public Health. 2010 Jun;100(6):1068-74.

We conducted "geobehavioral" analyses by race to understand how distances among injection drug users' (IDUs') residences, drug purchase and use locations, and syringe exchange programs (SEPs) are associated with injection behaviors. Data were from the HIV Prevention Trial Network 037 (2002-2006) site in Philadelphia, Pennsylvania, a randomized study evaluating the efficacy of a network-oriented HIV prevention intervention for IDUs. At prescreening, participants were asked the nearest intersections to their residence, where they buy and use drugs, and about their injection behaviors. Geographic distances had independent and interactive effects on injection risk behaviors and SEP use. Blacks, regardless of distance, were less likely than Whites to inject in public places (odds ratio [OR] = 0.62; 95% confidence interval [CI] = 0.43, 0.90), to use syringes after someone else (OR = 0.27; 95% CI = 0.19, 0.38), and to access syringes from SEPs (OR = 2.08; 95% CI = 1.48, 2.92). Latinos' injection behaviors were more distance-dependent than Blacks' or Whites'. Distances among IDUs' homes, drug purchase and injecting sites, and prevention resources affected safe injection practices differentially by race. Understanding individuals' geographic relation to the risks and resources that surround them is an important aspect of understanding effects of the environment on health and behavior and the development of targeted interventions.

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OBJECTIVE: Geographic location may be related to the receipt of quality HIV health care services. Clinical outcomes and health care utilization were evaluated in rural, urban, and peri-urban patients seen at high-volume US urban-based HIV care sites. METHODS: Zip codes for 8773 HIV patients followed in 2005 at seven HIV Research Network sites were categorized as rural (population <10,000), peri-urban (10,000-100,000), and urban (>100,000). Clinical and demographic characteristics, inpatient and outpatient (OP) utilization, AIDS-defining illness rates, receipt of highly active antiretroviral therapy (HAART), opportunistic infection (OI) prophylaxis usage, and virologic suppression were compared among patients, using χ(2) tests for categorical variables, t-tests for means, and logistic regression for HAART utilization. RESULTS: HIV-infected rural (n=170) and peri-urban (n=215) patients were less likely to be Black or Hispanic than urban HIV patients. Peri-urban subjects were more likely to report MSM as their HIV risk factor than rural or urban subjects. Age, gender, CD4 or HIV-RNA distribution, virologic suppression, HAART usage, or OI prophylaxis did not differ by geographic location. In multivariate analysis, rural and peri-urban patients were less likely to have four or more annual outpatient visits than urban patients. Rural patients were less likely to receive HAART if they were Black. Overall, geographic location (as defined by home zip code) did not affect receipt of HAART or OI prophylaxis. CONCLUSION: Although demographic and health care utilization differences were seen among rural, peri-urban, and urban HIV patients, most HIV outcomes and medication use were comparable across geographic areas. As with HIV care for urban-dwelling patients, areas for improvement for non-urban HIV patients include access to HAART among minorities and injection drug users.

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Gonorrhea has a focused geographic distribution characterized by high incidence rates in defined "core" areas and decreased incidence as the radial distance from the central core increases. Dense cor group transmission has long been hypothesized. We have previously mapped sexually transmitted disease (STD) rates in Baltimore census tracts using STD morbidity data interfaced with a geographic information system. Core areas were defined using a standard definition based on gonorrhea distribution. We studied spatial distance patterns between sexual partners, using the residential addresses of 572 individuals, representing 286 dyad partnerships recruited as part of an epidemiology and behavioral study. To determine if partners lived closer together than would be expected, a modified bootstrap algorithm using Monte Carlo models was developed to compare the distances between partners' residences and all other possible residences. Two distinct (east and west) core areas were previously identified. Compared with randomly selected Baltimore addresses, partners tended to reside closer to one another than would be expected by chance (z = -1.8), with a median distance of 1.7 kilometers. Within the core areas, women resided a median of 547 meters from their partner, and men resided a median of 339 meters from their reported partners. When all partnerships were considered, the median distance was 1,699 meters. Of the 500 simulation models, the minimum median distance was 4,889 meters. Partners of patients in core areas in Baltimore live remarkably close to one another, and the partner selection patterns in general indicate nonrandom distribution. Geographic information system-determined patterns of STD patients residing in hyperendemic census tracts support the core theory of disease transmission. In these areas, targeted geographically based interventions may be warranted.