

## **Democratizing and Displaying Health Data: Introducing HealthLandscape.org**

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**Abstract:**

Despite the power of geographic information systems(GIS) to interact and display data relating to health, broad adoption of the technology in this sector remains unrealized. To overcome the financial, technical, and temporal hurdles to using GIS in education and advocacy, four partners developed HealthLandscape. This interactive, web-based GIS platform allows health professionals, policy makers, academic researchers and planners to combine, analyze and display information in ways that promote understanding and improvement of health and healthcare. A collaborative effort of the American Academy of Family Physicians, the Robert Graham Center for Policy Studies, the Health Foundation of Greater Cincinnati, and the University of Cincinnati, this site has three components: 1) Community Health View, 2) the Primary Care Atlas, and 3) the Health Center Mapping Tool. We describe the development and applications of this innovative platform, and how HealthLandscape helps its users to understand health and health needs in their community, evaluate programs, and influence policy.

**Background:** The use of geographic information systems(GIS) to understand and display spatial relationships that impact health and health care has been demonstrated, but broad adoption of this powerful technology towards these ends has been limited by the cost, expertise, and time required for implementation.

In 2005, the American Academy of Family Physicians' Robert Graham Center and the Health Foundation of Greater Cincinnati (HFGC) agreed to the joint development of a web-based GIS platform, with the stated intent to allow users to create and display maps and tables of data relevant to health and primary care. This endeavor was undertaken not only as a service to data constituents of both organizations, but as a social enterprise capable of helping both organizations achieve their missions to elevate primary care and public health. Data Management experts from the University of Cincinnati's Institute for Policy Research were also critical to the partnership, and shared a vision of expanding GIS platforms for data holders and their constituents. The site was established with core values in mind, including:

- *Integrity and Reliability:* That platform data would be valid, reliable and consistent.
- *Accessibility:* That data and tools would be accessible to everyone.
- *Functionality:* That the platform would be simple to use correctly.
- *Innovation:* That the platform would bring new dimensions to data.
- *Relevance:* That the platform would be committed to advancing public health policy.

**HealthLandscape.org<sup>1</sup>:** The resulting product, *HealthLandscape*, is an interactive **web atlas** that allows users to upload, geocode, combine, analyze and display information spatially in order to promote understanding and improvement of health and healthcare. Additionally, it offers select users the unique capacity to upload, geocode and map their own data. Once converted, these data may be shared with the *HealthLandscape* community or securely stored for limited user access.

Its components include:

- **Community HealthView:** A home for data relevant to health in communities, where public users can depict populations at risk, health outcomes, and the distribution of health interventions.
- The **Primary Care Atlas:** A place to explore the relationship between primary care, the physician workforce, and the populations and places that these providers serve.
- **Health Center Mapping Tool:** A HIPAA-compliant, secure home for uploading, geocoding, and mapping clinical data and other secure information, and a place to

understand the patient distribution, service areas, market penetration, and relationships to local and regional populations.

**Audience:** The tool was designed to appeal to physicians and other providers, health professional training programs, policy-makers, advocates, community leaders, and to patients. However, the site was also purposefully dynamic, such that not only new data, but new user groups, could be added over time.

### **Sections of HealthLandscape:**

**Community HealthView:** Visualizing mapped data at the community level is increasingly common, as applications from Google Maps to the National Atlas put the power of GIS into in millions of users' hands. Health GIS applications are growing as well among specific data holding communities, be they state health departments, environmental health organizations, or research enterprises. The Health Foundation of Greater Cincinnati conducts frequent surveys of its constituent 20 counties, and saw great potential in GIS to visualize these data and other available public health data..

The *Community HealthView* section of HealthLandscape enters the arena of community mapping as a uniquely scalable GIS delivery platform for *any and all* communities in the United States, irrespective of geographic scale or definition. This dynamic platform gives researchers and policymakers the ability to create custom maps and tables of health in their communities - depicting populations at risk, health outcomes, and the distribution of health interventions. By offering a data upload and geocoding capacity, this ability is made much more widely available, and it creates the potential for virtual collaborations and a learning community. While the site initially offers currently houses health-related data from Greater Cincinnati, the State of Ohio, and the nation, it is specifically designed to grow with time and new users from communities across the nation.

### **The Primary Care Atlas:**

The positive impact of primary care on health outcomes has been clearly demonstrated.<sup>2</sup> However, amidst declining incomes, shrinking practice scope, and rising medical school debt, primary care is in crisis in the United States. The use of geographic information systems(GIS) to

better understand spatial relationships health and health care to primary health care has been demonstrated successfully, but their broad adoption has been limited by the cost, expertise, and time required for implementation. It has also been limited by the isolation of data could otherwise be brought together and associated temporally and geographically to reveal important relationships. Maps offer powerful ways to depict and describe changes in primary care and its workforce, and have been used by the Robert Graham Center and others in pilot research to inform primary care advocacy, education, and the processes of Community Oriented Primary Care (COPC)<sup>3456</sup>. HealthLandscape democratizes the power of mapping these relationships, and, perhaps most importantly, offers the potential to attract relevant data from a variety of sources. HealthLandscape currently offers users the capacity to better understand primary care health professional shortage areas, to assess eligibility of clinics in underserved areas for federal bonus payments, to show the geographies served by training programs in primary care, and to display the distribution of physicians by specialty (primary care and other). One of the most frustrating things about health care workforce analysis and planning is the propensity for various types of health care professionals to plan in isolation from everyone else. This is currently most relevant for states which are wrestling with how to address projected physician shortages but lack sufficient data to understand their options or priorities. In the future, HealthLandscape will permit, through its current data resources and future acquisitions, advocates and planners to interact and display the locations and concentrations of multiple professional types and specialties at once.

### **The Health Center Mapping Tool:**

Despite the pioneering work of Dr. Curtis Hames showing how geography impacted the health of his patients, and the efforts of Farley, Boisseau and Froom to map community access to primary care, GIS has been implemented in a limited fashion in primary care clinical settings<sup>78</sup>. Access to health care is a critical determinant of health, and one whose uneven distribution across U.S. populations has been clearly demonstrated to impact health outcomes<sup>910</sup>. Intersecting clinical data with population access and health measures has been instructive for identifying specific populations with unmet healthcare needs<sup>11</sup>. Thousands of communities and providers currently hold otherwise dormant data that could be used in similar ways to depict unmet need. The federal government helps assure access to health care services by supporting the Community Health Center Program, funded the Public Health Service Act to provide for primary and preventive health care services in medically-underserved areas throughout the U.S. and its territories. Under

the Health Centers Presidential Initiative implemented by President Bush and the Department of Health and Human Services, CHC capacity doubled nationwide between 2002-2006<sup>12</sup>. As such, the development of a tool capable of evaluating current CHC services and guiding future resource allocation is of particular interest. This community of publicly supported healthcare safety net and primary care providers is an ideal test case for whether HealthLandscape can be an effective platform for understanding unmet healthcare need and priority populations. Such a tool would permit the application of GIS to the assessment of clinical service areas, the identification of underserved populations, and to strategic planning and resource allocation within networks of CHC's and their communities.

The *Health Center Mapping Tool* allows health centers to combine their clinical health data with population data in interactive maps. This process of mapping center data and its importance to centers have been demonstrated previously, and described elsewhere, but these processes relied on desktop GIS software<sup>13</sup>. The innovation of the Health Center Mapping Tool is its web-presence and HIPAA compliant uploading/geocoding capacity. Individual health centers will be able to transmit their own patient claims data and produce maps without having in-house GIS expertise or technology. This is the first platform that provides a secure tool for uploading and geocoding clinical and information that users wish to use and store for their own mapping purposes. For example, Community Health Center data can be displayed visually with maps of the patients served, the core neighborhoods that comprise their service area, and areas with the densest concentrations of patients. In pilot studies, CHC leaders have found analytic mapping to be extremely helpful, and identified a number of potential applications of the project. These included strategic planning of future marketing efforts and expansion, grant-seeking, disease surveillance and cluster identification, and community health promotion and outreach. Linkage with other national data sets will only expand the Tool's planning and evaluation capabilities. Exemplary data sets and shape files of interest include census data, Primary Care Service Areas, Health Professional Shortage Areas, and legislative boundaries. Our aim is to eventually develop a virtual community of health centers who will be willing to share their geospatial assessments.

**Next Steps: *My HealthLandscape*:**

Recognizing the power of HealthLandscape as a GIS platform for health, extending beyond the artificial boundaries imposed by its three initial sections, our team is developing a new section of the site. My HealthLandscape will be a place where users – in a secure environment – can upload and geocode their own health-relevant data, display that information with public-use information

already available on *HealthLandscape*, collaborate with others in their organization to create informative visual displays, and nominate pertinent, compelling data to be disseminated publicly through *HealthLandscape*.

### **Conclusions:**

*HealthLandscape* democratizes the use of geographic information systems (GIS) for understanding health. By assembling a web-based architecture, and gathering and preparing cumbersome data, *HealthLandscape* helps users overcome the financial and technological barriers to making customizable maps and tables germane to health. These users will be empowered to explore their own data in ways never open to them and to share it with others. Their visually-compelling products will be used to educate, to enlighten clinical and community health planning, and to inform policymakers and advocates. Additionally, by engaging new users in a dynamic GIS environment that fosters participation and continuous data acquisition, *HealthLandscape* aims to be *the* source for national, state, and local decision-makers and data producers to intersect and interact data for the advancement of primary health care and public health.

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<sup>1</sup> <http://www.healthlandscape.org/>

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<sup>12</sup> Bureau of Primary Care website. Available at: <http://bphc.hrsa.gov>

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