healthyGIS

Esri • Summer 2011

GIS for Health and Human Services

Steps toward Smart Health Information

Bill Davenhall, Global Manager, Esri Health and Human Services

In fiscally uncertain times, we see an increase in the information needs of government policy makers, health care providers, and citizen advocates. Decision makers want to understand how reforms will impact local communities. The risks involved in decision making provide compelling reasons to extract greater value from any existing data. The use of health geographic information systems (GIS) is one of the most affordable ways to generate smart information from the data that's already available.

So how do you generate smart health information? Smart health information comes from augmenting transactional data with an expert classification system. Health GIS can convert a patient's address or the location of an event or a doctor's office into a specific geographic code that allows linking to other data associated with the same location. Associated data includes disease rates, proximity to toxic exposures, bus routes, demographic and household characteristics, and accessibility to community resources such as diagnostic and treatment facilities.

Geostatistical calculations within health GIS allow you to identify disease clusters and determine unacceptable variations in the cost, quality, and outcomes of various policies and interventions.

To determine whether your transactional data systems are capable of creating smart information, you can conduct a data audit on the geographic information you have already collected. By geocoding, you can quickly assess the quality of the data that your information systems capture. The geocoder attempts to determine whether an address or locational reference is accurate. Having a street address that is capable of being accurately geocoded at the most finite levels means you can expect to receive optimal value from your geographic information.

Once you have determined the geographic data accuracy that your workflows require, you should establish more useful ways to aggregate your data and produce meaningful, smart information. By identifying how decision makers need information organized and displayed, you can make data available for analysis and reporting.

Hospitals and social care agencies have some of the largest and most complex transactional data systems in the world, yet they also contain vast hidden value that can be easily extracted by health GIS. Generating smart information—especially information that is geographically relevant—from any transactional data systems is worth the effort.

For more information on health GIS, visit esri.com/geomedicine.

Spatial Epidemiology, Hot-Spot Analyses Target Eligible WIC Recipients

By Thomas J. Stopka, Epidemiologist, California Department of Public Health; Pat Gradziel, Research and Evaluation Specialist, California Department of Public Health; and Christopher Krawczyk, Chief, EEDO Section, California Department of Public Health

The California Department of Public Health's Women, Infants, and Children (WIC) Program and Maternal, Child, and Adolescent Health (MCAH) Program are working together to use GIS, spatial epidemiology, and hot-spot analyses to identify geographic locations of people who are eligible for but not receiving WIC services.

Results of these efforts are used to guide resource allocation decisions, target outreach efforts, assess program outcomes, and guide public health policy and program enhancement decisions.

In California, WIC agencies provide services to nearly 1.45 million women, infants, and children each month at 650 sites statewide. WIC, the special supplemental nutrition program for women, infants, and children, is a fully federally funded nutrition and health program that provides education and food to low-to-moderate-income families with nutritionally at-risk pregnant and breastfeeding women and infants and children up to the age of five.

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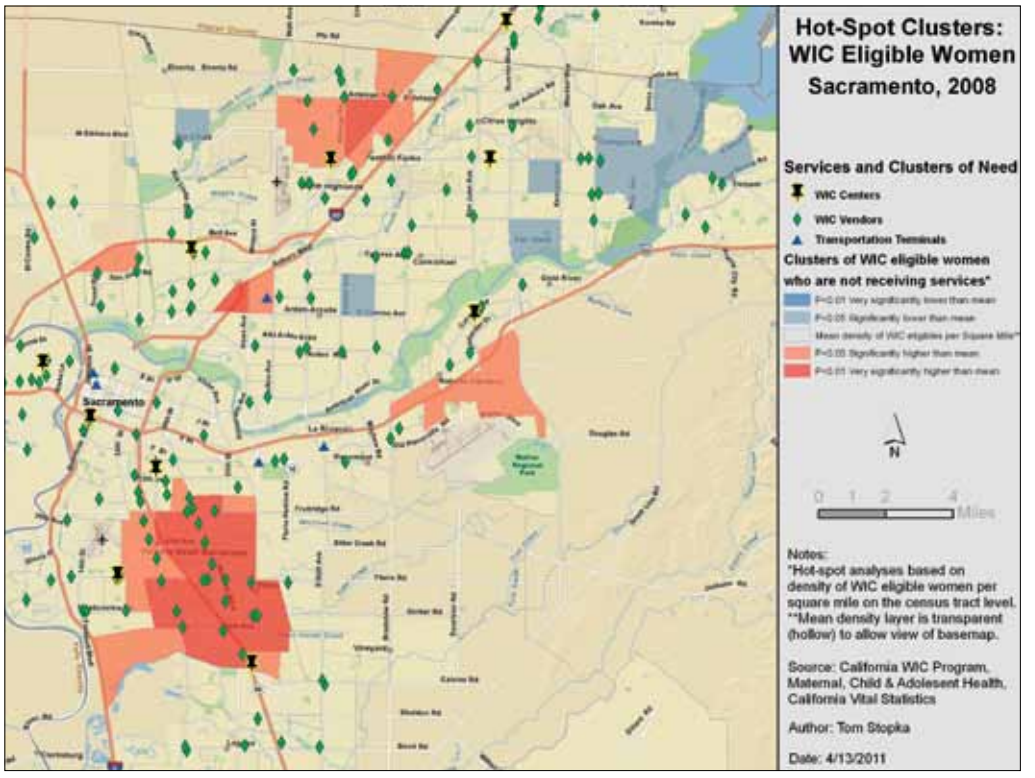


More Industry News

- You will find more news and information specific to GIS for health in *ArcNews*, a quarterly magazine for the Esri community. Please visit esri.com/arcnews.
- To learn more about GIS for health, visit esri.com/health.
- To submit an article, subscribe, unsubscribe, or change your mailing address, visit *HealthyGIS* online at esri.com/healthygis.
- My Place History for iOS is now available on the App Store. Learn more at esri.com/geomedicine.

More GIS News

- Keep up with breaking GIS news, watch the latest videos, access ArcGIS resources, and connect to social media outlets at the newly launched esri.com/news.

Food Environments Affect Community Health

View a video presentation that showcases the latest research on food environments. This work explores challenges and concerns regarding accessibility to healthy food, areas with an abundance of unhealthy food, and places with food insecurity. It also looks at the strong link between health issues such as diabetes, obesity, and hypertension and the food environments within which people make dietary choices.

"GIS has a lot to contribute to discussions about how people access food, recreation, and other human needs," said Jim Herries, the Esri product engineer for cartography who is conducting much of the work. "It's a very useful thing to draw a map of where people are and the types of food available around them. You look at that map and wonder, are people getting what they need?"

View the video at esri.com/foodenvironments.

NGO Maps and Monitors Swaziland Efforts in Fight against HIV/AIDS

Swaziland, a rural, landlocked nation located between South Africa and Mozambique, is home to 1.1 million people and the world's most severe HIV/AIDS epidemic. According to the Joint United Nations Program on HIV/AIDS's Epidemic Update 2009, one in four adults aged 15 to 49 years in Swaziland is HIV positive.

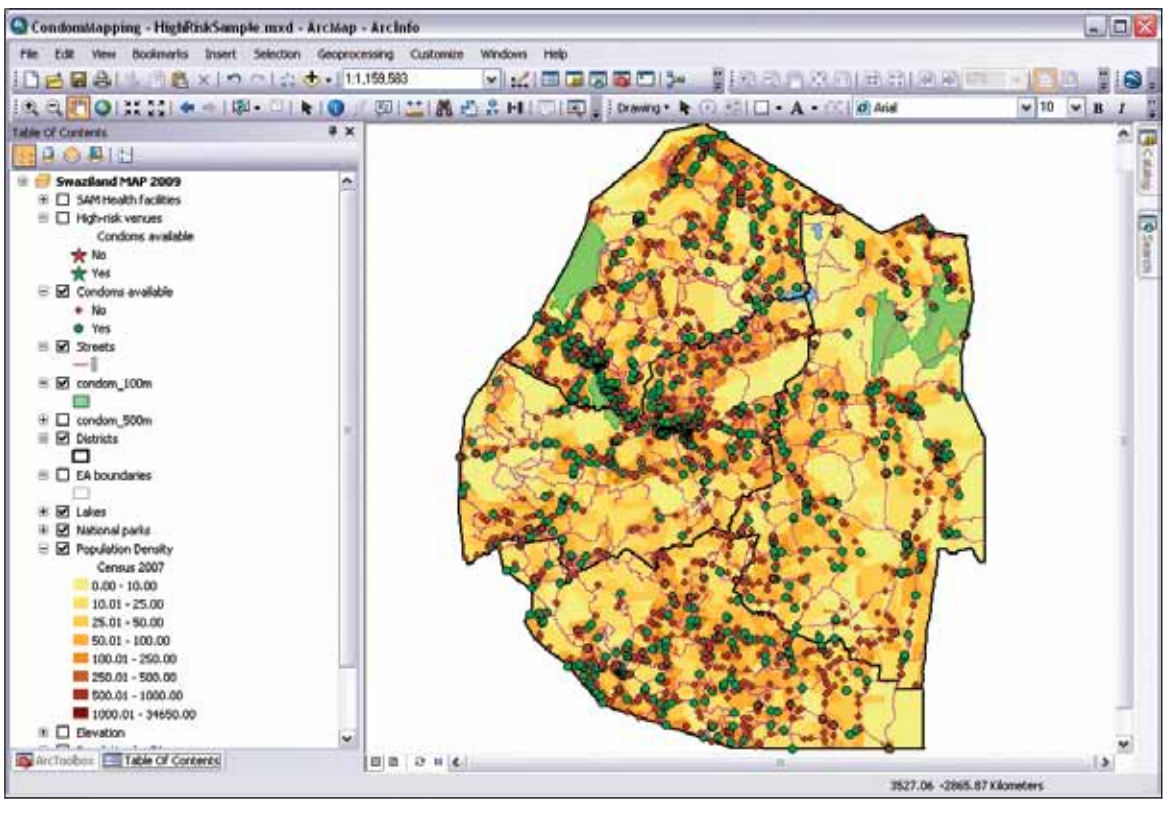
Population Services International (PSI), a leading global health organization, is responding to the crisis with efforts to increase the demand for and access to condoms in Swaziland. PSI began implementing health programs in Swaziland in 2001 in partnership with the kingdom's Ministry of Health, with donor support from the US president's Emergency Plan for AIDS Relief and the Netherlands government.

Recently, PSI sent researchers from village to village to conduct a nationwide census of condom outlets. Using handheld devices and ArcPad software, PSI crews were able to collect and compile accurate condom inventory data for the entire country.

Once the inventory data was loaded into a geodatabase, PSI staff could use an interactive map in ArcGIS to view supply levels at clinics, pharmacies, bars, hotels, kiosks, and brothels. Staff members could analyze condom availability data along with population distribution and accessibility. This allowed staff to weigh the effectiveness of condom usage promotion through mass media and interpersonal communication campaigns.

For ongoing research, PSI adopted a GIS-based methodology for analyzing condom outlet data in relation to other data collected about surrounding areas and neighborhoods.

"To increase access to condoms, the sales and distribution team of PSI Swaziland needed a more complete picture of where condoms were available," said Bram Piot, a geographer with PSI. "Accurate point location data is about so much more than just making a map. It builds the foundation for evidence-based analysis and more effective program planning."



Health workers identify high-risk areas along with available resources.

PSI programs worldwide have been conducting what is known as measuring access and performance (MAP) studies since 2004. MAP is now PSI's standard tool for monitoring the coverage, its quality, and the access to and equity of availability of social marketing products and service delivery systems. GIS was originally introduced as a tool for measuring access in MAP studies and is now a well-established technology for PSI programs in many countries.

"PSI country offices are increasingly using tools like ArcGIS for research and program planning," Piot said. "Providing our staff with the relevant GIS skills is also a priority for PSI over the coming years so we can make use of GIS for project planning, management, and reporting."

For more information on PSI, visit www.psi.org.

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Spatial Epidemiology, Hot-Spot Analysis Target Eligible WIC Recipients

Finding Those in Need

Staff members at the California Department of Public Health were faced with several important tasks. They first had to develop indicators to identify populations and areas that would benefit from additional assistance. The next step was to create thematic maps indicating which counties and subcounty locations were in need of additional funds and increased access to WIC services. Finally, MCAH staff needed to quantitatively describe population characteristics at the subcounty level.

As the collaboration moved forward, it became evident that more complex spatial analyses and statistics would provide essential information to guide program decisions.

"Portrayal of counts and percentages of WIC eligible women who were not receiving services told us only part of the story," said Thomas Stopka, an epidemiologist from the California Department of Public Health. "We were interested in locating regions with higher densities of unmet need and statistically significant clusters of need on the state, county, and local levels."

The team used incremental spatial autocorrelation analyses, refined spatial weighting techniques, and hot-spot analyses. This allowed them to determine the distance at which clustering of WIC unmet need peaked and subsequently determine the geographic locations of significant clusters of need.

Analyses via Interactive Maps

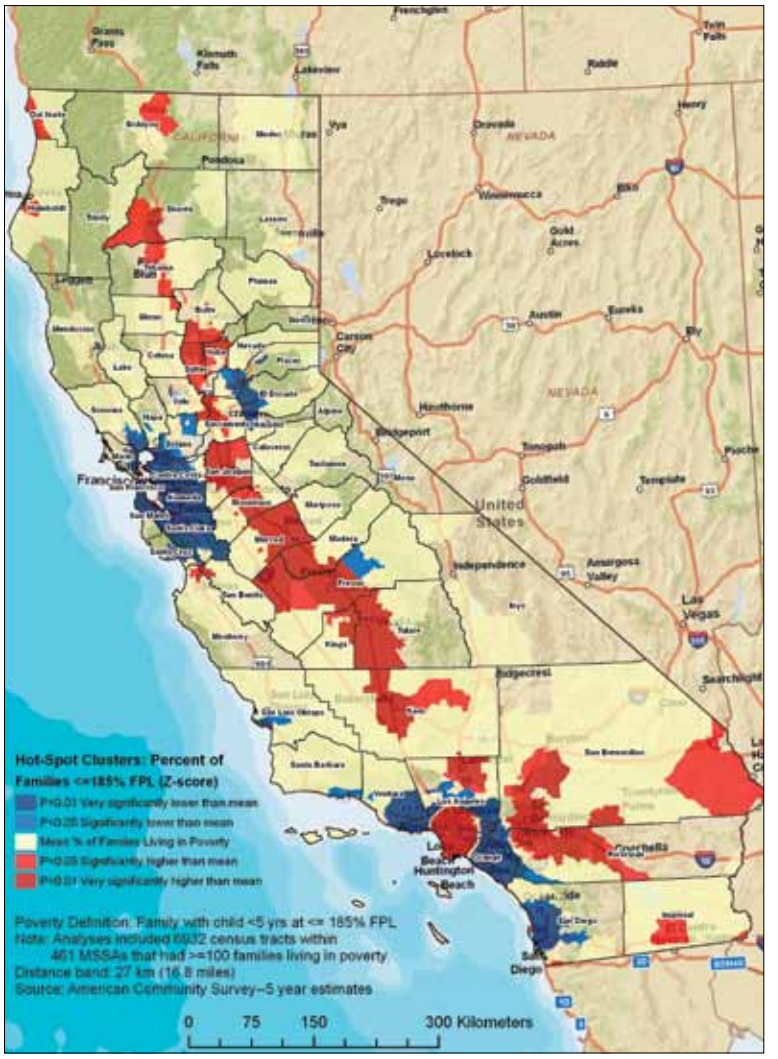
The results of GIS-based spatial and statistical analyses were presented to WIC directors, WIC and MCAH staff, health care providers, advisory bodies, and stakeholder groups through GIS maps, interactive presentations, and reports that combined GIS maps, spatial analysis results, and statistical results.

This information has been used to guide funding decisions at the state, county, and local levels. The work has also provided information to local WIC directors to determine whether new or expanded clinic services were needed.

As more recent US Census data has become available and through linkage to other datasets, such as the MCAH Maternal and Infant Health Assessment (MIHA) Survey, the team has been working to conduct more complex spatial analyses to assess sociodemographic and contextual factors that may be associated with geographic regions and populations in need of enhanced WIC services.

Through web-based applications and Python coding, the WIC-MCAH collaborative group anticipates moving toward automated map production and interactive sharing of GIS and spatial analysis results.

For more information, visit cdph.ca.gov/programs/wicworks.



Areas of California are shown with the density of families living in poverty.

Esri Health GIS Conference: Understanding the Power of Place

The 2011 Esri Health GIS Conference, scheduled for September 7–9 in Washington, D.C., is your opportunity to learn about cutting-edge GIS tools, network with peers across the health continuum, and gain perspective from industry leaders.

"This event is a chance for us to explore innovative ways to visualize, report, and analyze volumes of health-related information; develop methods for sharing crucial health data with the public; and connect with experts and peers about best practice applications of GIS," said Bill Davenhall, Esri health and human services.

Professionals working in public health, hospitals and health systems, human services, managed care, and academic health organizations are encouraged to be part of this unique forum, regardless of GIS experience.

Todd Park, chief technology officer, US Department of Health and Human Services, will keynote the conference with a speech entitled New Incentives + Information Liberation = Rocket Fuel for Innovation.

Park's presentation will describe why there has never been a better time to be a health care innovator than right now. He will discuss how incentives in the health care system are shifting to reward improvements in quality, health, and value and how key information to power these improvements is being liberated at multiple levels. He will discuss the growing "ecosystem" of innovators who are embracing this historic opportunity to help reinvent American health care and improve health.

Technical Sessions include

- Working with Temporal Data in ArcGIS
- Web GIS—Leveraging ArcGIS Online and Web Viewers
- Routing with ArcLogistics and Location-Allocation with Network Analyst
- Spatial Pattern Analysis: Mapping Trends and Clusters
- Modeling Spatial Relationships Using Regression Analysis
- Spatial Statistics: Best Practices
-

User Presentation tracks will cover

- Preparedness and Response
- Influencing Health Policy
- Improving Population Health
- Hospitals and Health Care Delivery
- Environmental Health
- Defense Health
- Disease Surveillance and Control
- Workforce Development
- Managed Health Care

- Human (Social) Services
- Health Information Exchange
- Clinical Trials

Regular registration includes all scheduled sessions, refreshment breaks, the GIS Solutions EXPO and social, Map Gallery, Academic Health Fair, networking luncheons, and the Health User Group Meeting.

Visit esri.com/events/health.

On the Road

National Association of County and City Health Officials
July 20–22, 2011
Hartford, Connecticut, USA
www.naccho.org

Medicaid Management Information Systems
July 31–August 4, 2011
Austin, Texas, USA
www.mmisconference.org

International Conference on HealthGIS India
August 5–6, 2011
New Delhi, India
www.e-geoinfo.net/healthgis2011/

American Public Human Services Association IT Solutions Management
August 14–16, 2011
Austin, Texas, USA
www.aphsa-ism.org

Public Health Informatics
August 21–24, 2011
Atlanta, Georgia, USA
www.cdc.gov/phin

Esri Health GIS Conference
September 7–9, 2011
Washington, D.C., USA
esri.com/healthgis

Healthcare and Information Management Systems Society (HIMSS AsiaPac)
September 20–23, 2011
Melbourne, Australia
www.himssasiapac.org

Online

Free Live Training Seminars
training.esri.com

Spatial Statistics Resources
esri.com/spatialstats

Esri Video
video.esri.com

Esri Technical Certification Program
esri.com/certification

Healthy Communities by Design Summit Proceedings
esri.com/healthycommunities

Esri Health GIS Conference 2010 Proceedings
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Disease Maps: Epidemics on the Ground

In a sense, *Disease Maps: Epidemics on the Ground* is the prequel to Tom Koch's 2005 book *Cartographies of Disease: Maps, Mapping, and Medicine*. In the first book, Koch examined the relationship between medical mapmaking and medicine and GIS.

Now, Koch advances the idea that physicians, scientists, public health proponents, and others, use maps as a "workbench" to develop and test theories of disease.

Understanding disease begins with the visualization of its occurrence not as a personal event but as a public one that must be considered in context and responded to through communal action. This premise is discussed using maps of disease outbreaks on scales from local to international and from the seventeenth to the twenty-first centuries.

Read a more complete explanation of the theme of this book in "Visualizing Disease: Understanding epidemics through maps" in the Spring 2011 issue of *ArcUser* magazine at esri.com/arcuser.