Session 8: On and Just Beyond the Horizon

Intersection of Healthcare and Earth Science Technology Geospatial Information Systems

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GIS and Public Health

• Earth Science Technology and the associated Geospatial Information Systems (GIS) offer the opportunity to support:
  – improved situational awareness and consequence management of many public health issues
  – Use of enhanced visualization of the distribution of health data, population or community demographics, and
  – subsequent effective application of health related resources over local, regional, national or international boundaries.
GIS and Public Health

• Those concepts can be applied to chronic disease, acute public health outbreaks such as pandemic influenza, events secondary to terrorism, or disaster response.
World braces for flu siege
Quick action may stop global bird flu epidemic
GIS and Public Health

• GIS can better represent the interaction of environmental factors and disease, such as seasonal or temporal changes related to weather, temperature, precipitation, contamination, or other natural events and disasters.
Risk Factors for Human Infection With West Nile Virus in Connecticut:

• Their longitudinal analysis of risk factors for human WNV infection found that a number of environmental variables including climate and population density, as well as the occurrence of WNV infection in mosquitoes and birds detected in active and passive surveillance efforts showed predictive value for human risk over a six-year time period.

From *International Journal of Health Geographics*

Risk Factors for Human Infection with West Nile Virus in Connecticut: A Multi-year Analysis
Ann Liu; Vivian Lee; Deron Galusha; Martin D Slade; Maria Diuk-Wasser; Theodore Andreadis; Matthew Scotch; Peter M Rabinowitz
GIS and Public Health

- GIS data superimposed on high fidelity maps can allow better understanding of distribution of disease, vulnerable populations, often linked to the social determinants of health, and tracking of the impact of interventions.
Drive Up Liquor Windows and Convicted Drunk Drivers: A Comparative Analysis of Place of Purchase
NO Lewis, S Lapham, and BJ Skipper
Accident Analysis and Prevention, 30:763-772, 1998

The article and images of the GIS study of drive-up liquor window sales and DWI arrests. It was a major policy event for N.M. when released just prior to 1998 Legislative session
Prior to closure NM had about 200 drive-up liquor windows
Alcohol-Related Crashes

Pre-closure

Red: drive-ups Blue: crashes

Positively Autocorrelated

Moran’s I = 0.1708
P = 0.0028
Zuni Hantavirus Study Site
*Peromyscus maniculatus*

- Total Rodent Density (#/ha)
- SNV+ Rodent Density (#/ha)
- HPS Human Cases (#/mo)

Date (yy/mm)

![Graph showing data on rodent density and human cases.](image)
GIS and Telehealth
Going International
Reasons to do it

*Most health issues are global!*
Programa Nacional de Telemedicina
San Cristóbal, Galápagos

1350 Km.

UTE

NUEVO ROCAFUERTE

850 Km.
Distributed Medical Intelligence

- Knowledge Sharing Networks/Just in Time/On Demand
- Best Practices
- Evidence based
GIS and Public Health

- A transdisciplinary collaborative approach between experts in GIS, such as the University of New Mexico Earth Data Analysis Center (EDAC), modeling and simulation, public health, and health providers can create a robust and meaningful system that can be applied in a manner to improve distribution of resources in a more targeted manner, better mitigate consequences, and improve outcomes.
Geographical differences in cancer incidence in the Amazon basin of Ecuador in relation to residence near oil fields

Anna Karin Hurtig and Miguel San Sebastián

Background
Since 1972, oil companies have extracted more than 2 billion barrels of crude oil from the Ecuadorian Amazon, releasing billions of gallons of untreated wastes and oil directly into the environment. This study aimed to determine if there was any difference in overall and specific cancer incidence rates between populations living in proximity to oil fields and those who live in areas free from oil exploitation.

Methods
Cancer cases from the provinces of Sucumbíos, Orellana, Napo and Pastaza during the period 1985–1998 were included in the study. The exposed population was defined as those living in a county (n = 4) where oil exploitation had been ongoing for a minimum of 20 years up to the date of the study. Non-exposed counties were identified as those (n = 11) without oil development activities. Relative risks (RR) along with 95% CI were calculated for men and women as ratios of the age-adjusted incidence rates in the exposed versus non-exposed group.

Results
The RR of all cancer sites combined was significantly elevated in both men and women in exposed counties. Significantly elevated RR were observed for cancers of the stomach, rectum, skin melanoma, soft tissue and kidney in men and for cancers of the cervix and lymph nodes in women. An increase in haematopoietic cancers was also observed in the population under 10 years in the exposed counties in both males and females.
350 KILÓMETROS
Perú
250 KILÓMETROS
Floating Clinics in the Amazon
Faculty/Student Exchange and Research Projects
Zumbahua (Cotopaxi)
Culturas diferentes
y problemas distintos
Towards Web-based Representation And Processing Of Health Information

Sheng Gao; Darka Mioc; Xiaolun Yi; Francois Anton; Eddie Oldfield; David J Coleman
University of New Brunswick, Fredericton, New Brunswick, Canada
From International Journal of Health Geographics, 2009

• There is great concern within health surveillance, on how to grapple with environmental degradation, rapid urbanization, population mobility and growth.

• The Internet has emerged as an efficient way to share health information, enabling users to access and understand data at their fingertips. Increasingly complex problems in the health field require increasingly sophisticated computer software, distributed computing power, and standardized data sharing.

• To address this need, Web-based mapping is now emerging as an important tool to enable health practitioners, policy makers, and the public to understand spatial health risks, population health trends and vulnerabilities.

• Today several web-based health applications generate dynamic maps; however, for people to fully interpret the maps they need data source description and the method used in the data analysis or statistical modeling.
Questions?

http://hsc.unm.edu/som/telehealth

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