

Session 8: On and Just Beyond the Horizon

**Intersection of Healthcare and
Earth Science Technology
Geospatial Information Systems**

September 13, 2011

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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





detain two security guards in connection with missing Alabama teenager Natalie Holloway, who was on a high school graduation trip ■ 3A



By Chris Pizzello, AP

'Breakfast Club' at 20
 From the 1985 movie reunite for MTV Movie Awards, including An-Michael Hall, left, Molly Ringwald, Eedy and Paul Gleason ■ 2D

Plans haul
 quarterly
 ce 1992
 season
 motive
 rethinking
 s ■ 1B



USA TODAY

ury to resume deliberating
 ers aren't expecting a fast verdict in M...
 molarization case. Meanwhile, pop star
 agency room for back problem. 3A.

ase gets narrower focus
 ns will winnow nearly 500 potential crim...
 against former Iraq leader to a dozen well-...
 ed team to avoid more delays in trial. 8A.

Scrusby panel told to try again

Quick action may stop global bird flu epidemic

By J. P. Moczulski, Reuters



Many animals destroyed: A health officer collects ducks to be killed at a farm north of Bangkok last year.

Millions may die if H5N1 virus spreads, agency says

quickly, and the world is not yet prepared to take advantage of it, researchers say. Rich countries are stockpiling anti-viral drugs, but there is little available in the impoverished backwaters of Southeast Asia where the outbreak is spreading.

U.S. step up nuke detection at ports

Critics say money to buy faulty mon

By Mimi Hall
 USA TODAY

WASHINGTON — The federal government is stepping up efforts to stop terrorists from smuggling nuclear or radiological material into the USA, even as critics fault it for poor planning and outdated equipment.

The government is spending hundreds of millions of dollars to screen more cargo at the nation's ports, test next-generation radiation detectors and develop intricate plans to track deadly weapons if they are brought across the borders.

Just last week, the departments of Homeland Security and Energy broke ground on a \$30 million nuclear and radiologic



Busy
 Rising
 in 200
 Low A
 1,100
 Long
 2.7
 New
 1,000
 Chart
 72.7
 North
 67.5

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

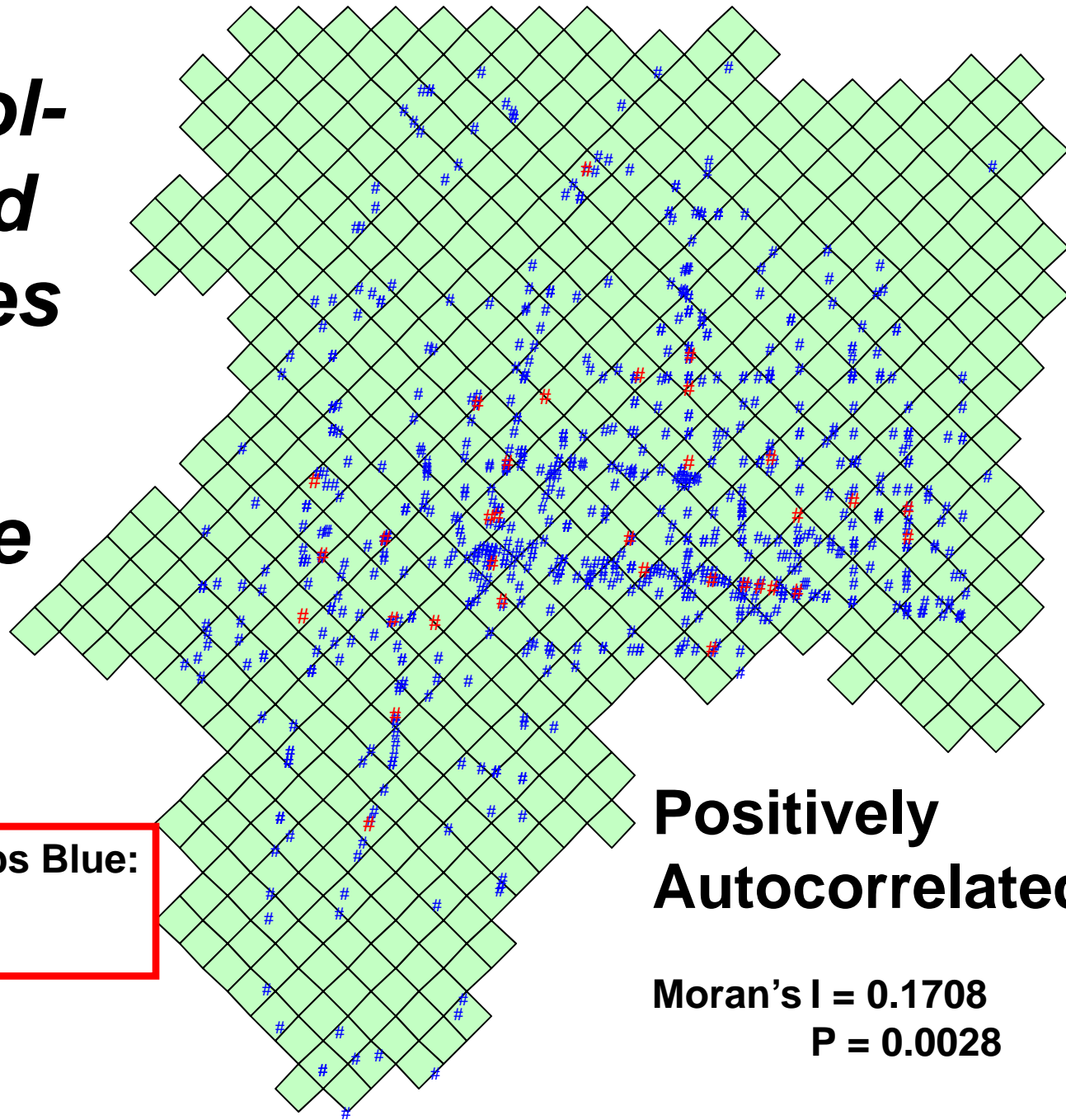
The article and images of the GIS study of drive-up liquor window sales and DWI arrests. It was a major policy event for N.M. when released just prior to 1998 Legislative session



Prior to closure NM had about 200 drive-up liquor windows

Alcohol- Related Crashes

Pre- closure



**Red: drive-ups Blue:
crashes**

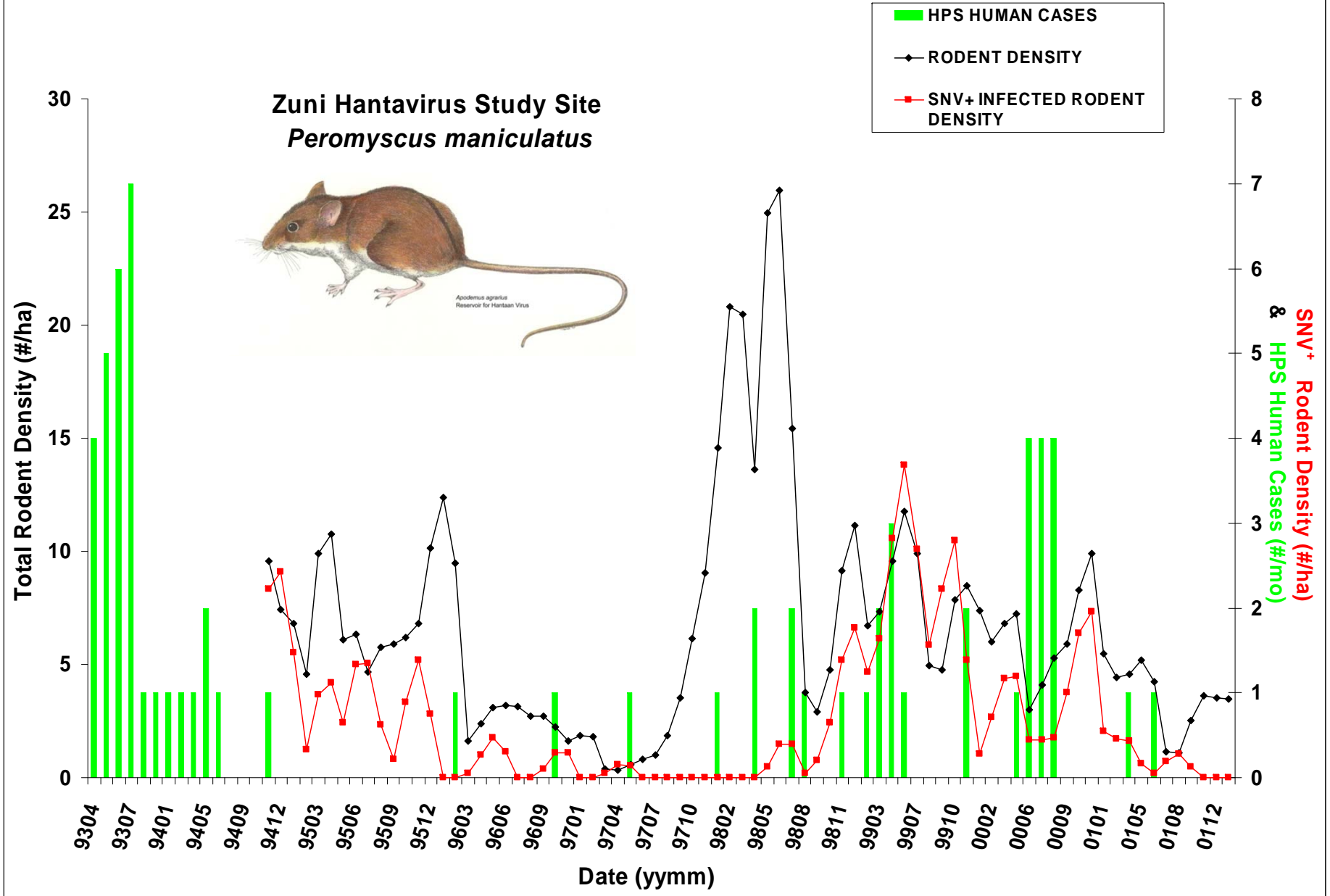
**Positively
Autocorrelated**

**Moran's I = 0.1708
P = 0.0028**

Ref: Yates, et.al., The Ecology and Evolutionary
History of an Emergent Disease:

Hantavirus Pulmonary Syndrome, BioScience,
Nov. (2002): Vol. 52, Issue 11, pg(s) 989-998

Zuni Hantavirus Study Site *Peromyscus maniculatus*



GIS and Telehealth Going International



Reasons to do it

Most health issues are global!





HEPATITIS

EPIDEMIA SILENCIOSA



¿Sufre de hemofilia o es insuficiente renal crónico en programa de diálisis?
 ¿Recibió transfusiones de sangre antes de 1993 en Quito y 1997 en Guayaquil o en el extranjero antes de 1990?
 ¿Es trabajador de la salud y se ha pinchado accidentalmente o ha manipulado derivados de la sangre?
 ¿Se ha realizado tatuajes en condiciones sospechosas?
 ¿Se ha inyectado con agujas compartidas?
 ¿Se ha perforado las orejas o se ha colocado "piercing" en cualquier parte del cuerpo?
 ¿Ha compartido cuchillas de afeitado o cepillos de dientes?
 ¿Ha tenido múltiples compañeros sexuales o ha padecido de Hepatitis B o SIDA?

Conózcala, hágase la prueba, solicite información sobre tratamiento.

Si usted está dentro de alguno de estos grupos de riesgo, consulte a su médico e insista en que le realicen un examen de laboratorio para Hepatitis por Virus C (HVC).
COMUNIQUESE PARA MAYOR INFORMACION: 022505607 ext 144 / 158

Schering-Plough del Ecuador S.A. División Oncología y Biotecnología  Cruz Roja Ecuatoriana

ALGODON PUMA - TUBERCULOSIS

IMAUARAS "ALGODON - PUMANISHKA" UNKUY, SHUK
 ALI-MIKUSHTIAK RUNA AICHAY IKUSHA MANA MIRARINCHO
 CHAIKA ANMI ALGODON PUMA PUNURAY
 CHASNA TUNUY TIANA USHAN QUILLAUNARA HUATAUNARA
 SHINCHI RUNA AKPIKA CHAY UNKUY MANA
 IMAURASPAS LIKCHARINKACHU

SHU RUNA MANA ALI MIKUSHA SHINCHITA TARABAKPI
 MANA ALI HUASITA CHARIKPI, SHUK SHAMI HUAKLICHIK
 SAMPAYACHIK UNKUKUNATA CHARIKPI CHAY UNKUI
 ZHAS MIRARIK O LIKCHARISHAKA ASHAGA
 UNKUCHIN, HUAKLICHINMI PAIHUA SILLUKUNAHUA .

ALGODON PUMA NISHKA UNKUITA CHARIKPIKA SINTICHINMI:

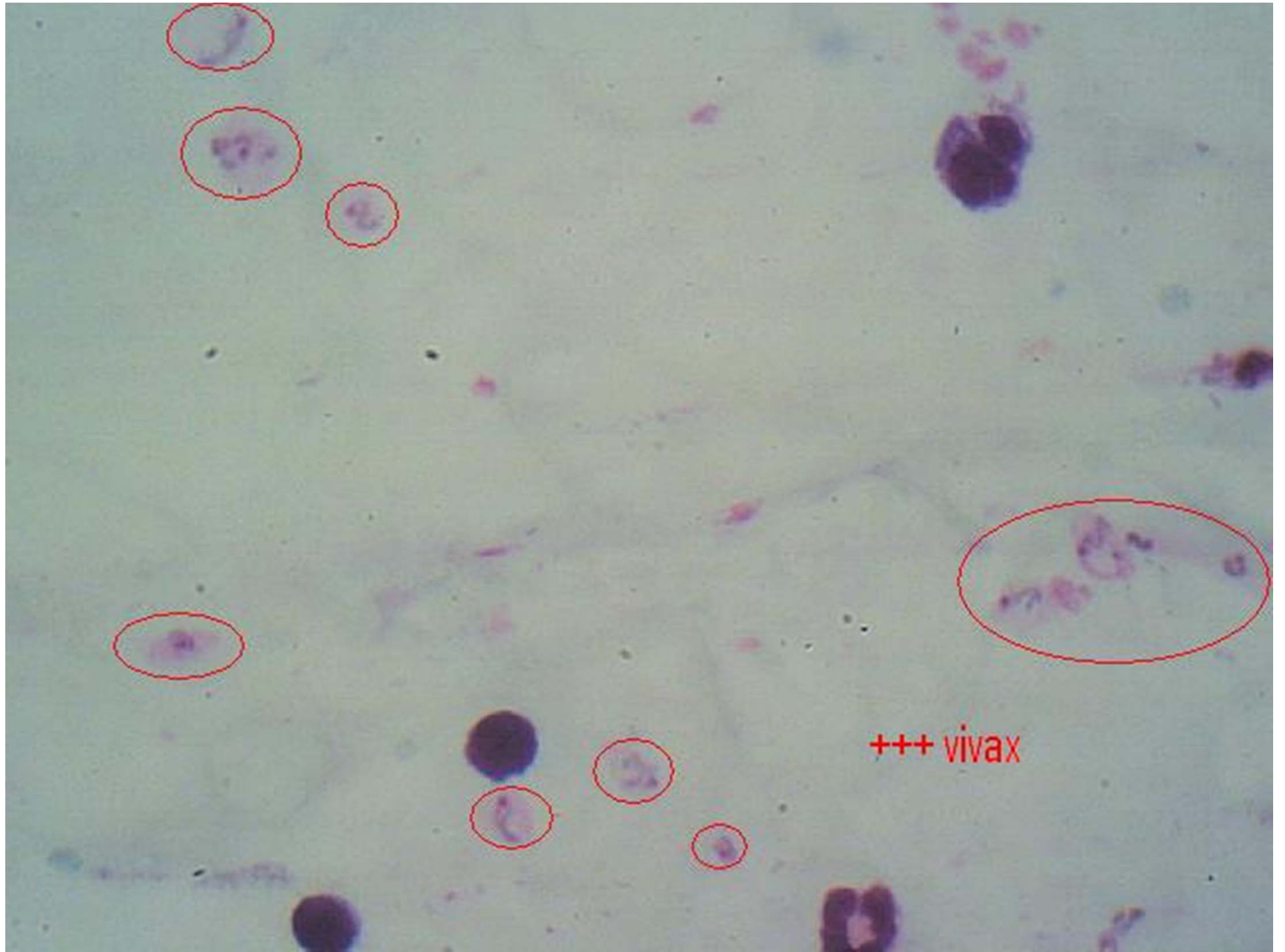
- MANA ALI YACHIN SAMPAYACHIN
- TUTAUNA UMPICHIN
- ANSA CALENTURA SHAMUNTUTAUNA
- IRQUTUCUN
- UTUCHIN VERDE SAMIRIKURIK LUMA RISURA CACHAMUN
- CHAI UNKUY SHINCHIMATIGRASHAGA YAHUARDA TUKACHIN.

¿IMATA RANANKA SHUK UNKUSHA RUNAHUA?
 SHUK RUNA ALGODON PUMA NISHKA UNKUYTA CHARIK TUNU
 RIKURIKPIKA, PROMOTOR DE SALUDPANKA O SUBCENTRO SALUDMA
 RINA USHAN, MANASHKA EKAMENKUNATA RURANKAPAK.



UNION
 International
 Union
 Against TB





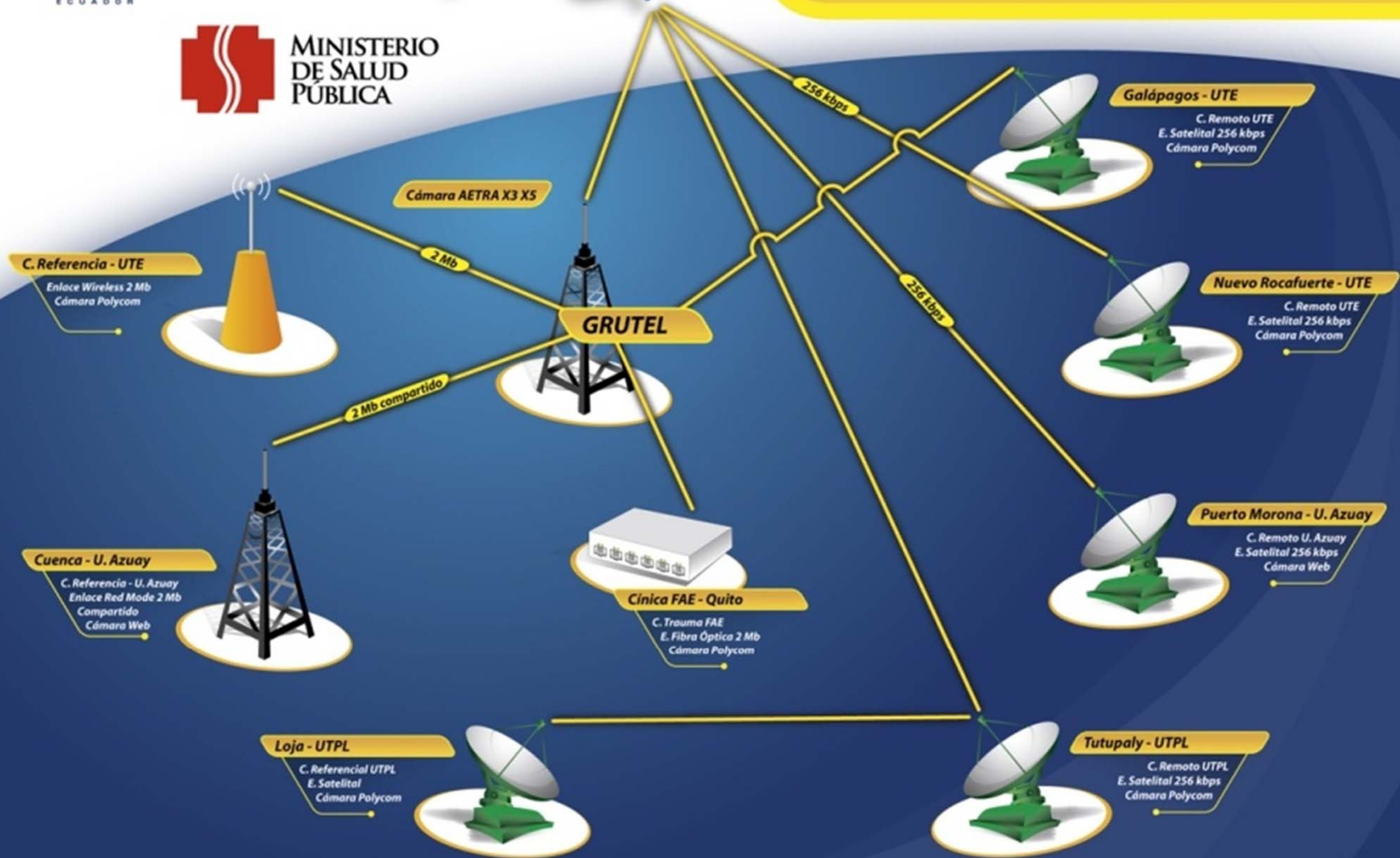








Programa Nacional de Telemedicina





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.

A Central Theme

El cáncer del petróleo

© International Epidemiological Association 2002 Printed in Great Britain

International Journal of Epidemiology 2002;31:1021-1027

CANCER

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 Sucumbios, 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.







Floating Clinics in the Amazon







Faculty/Student Exchange and Research Projects













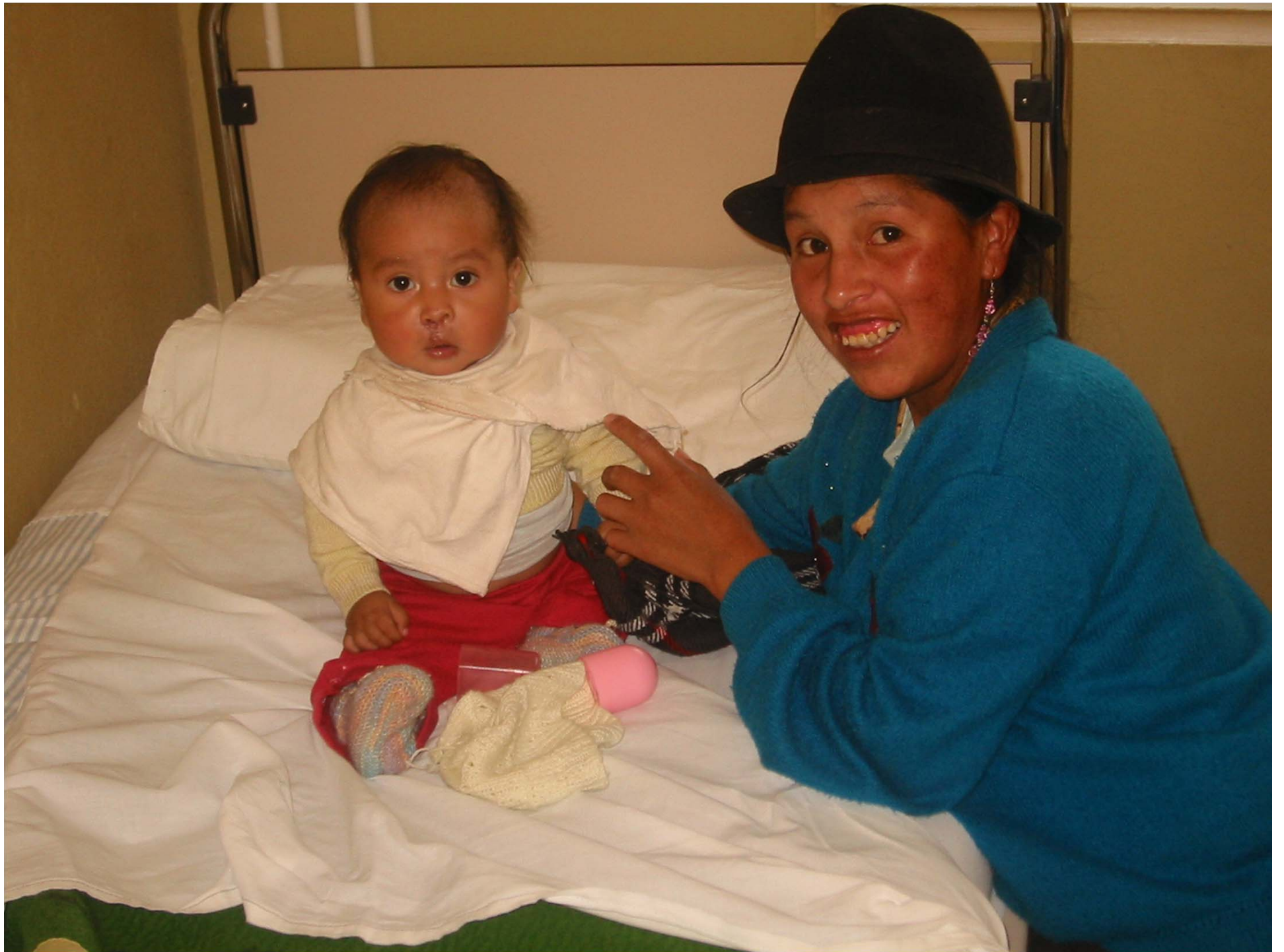
**Zumbahua (Cotopaxi)
Culturas diferentes
y problemas distintos**



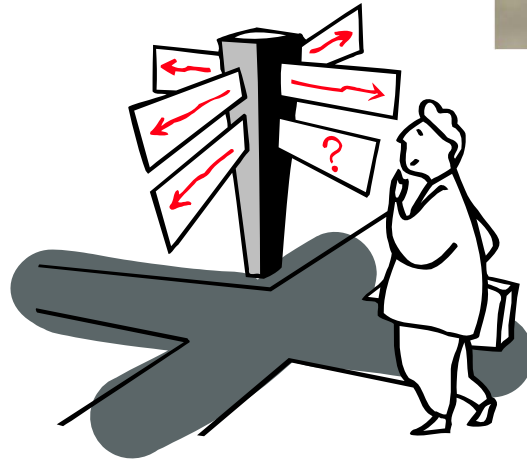
Towards Web-based Representation And Processing Of Health Information

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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