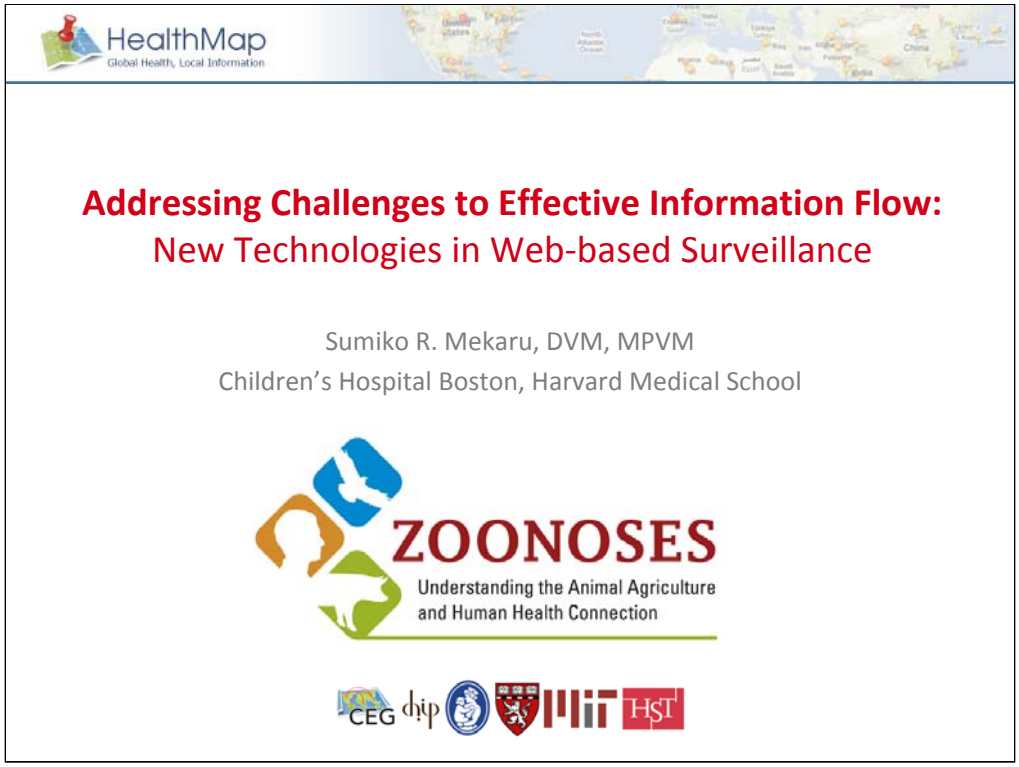


Surveillance sans frontières:
Internet-based emerging
infectious disease intelligence

HealthMap
Global Health, Local Information

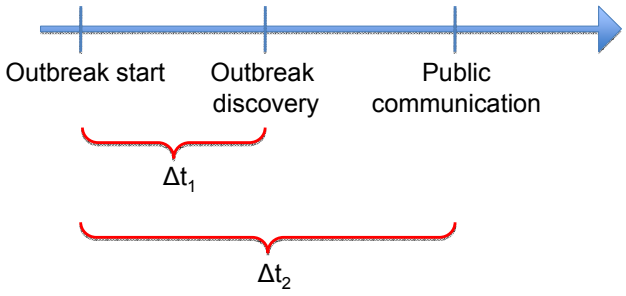
Barriers to effective information flow

- Reluctance by individuals to report disease
- Delays in relaying diagnoses up the hierarchy
- Delay between tentative diagnosis and laboratory confirmation
- Delay in official statements
- Delay in recognizing a new, emerging, or unusual disease

HealthMap
Global Health, Local Information

Global Surveillance Capacity Assessment

Characterize global spatial-temporal trends in the timeliness of outbreak detection and reporting



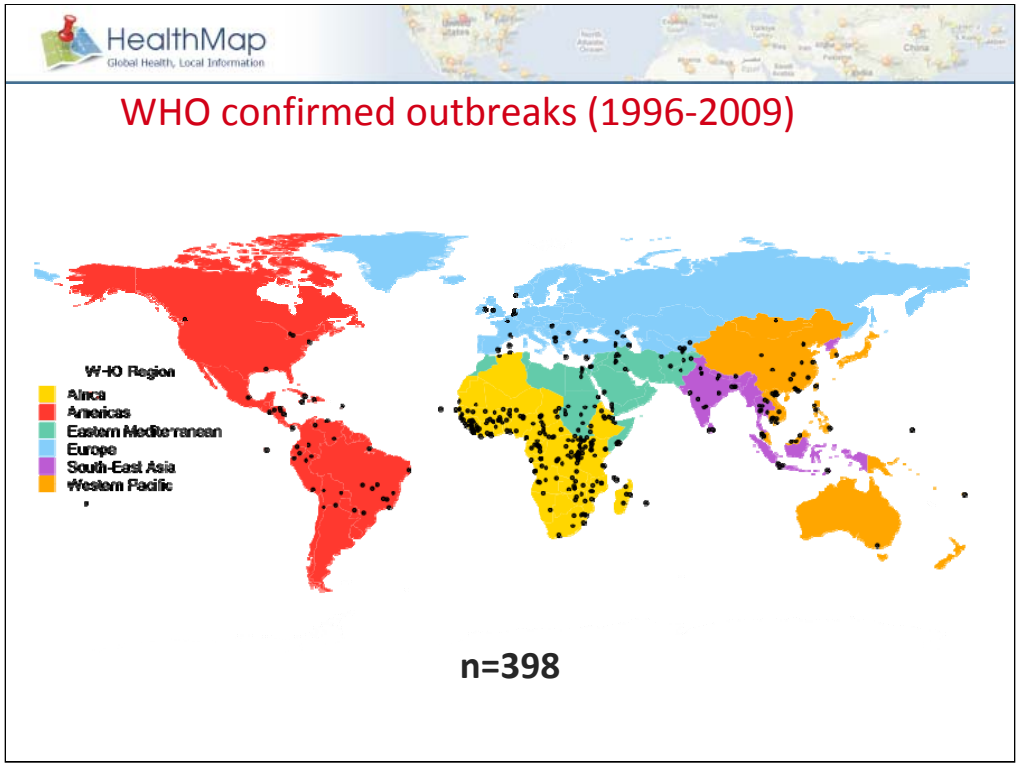
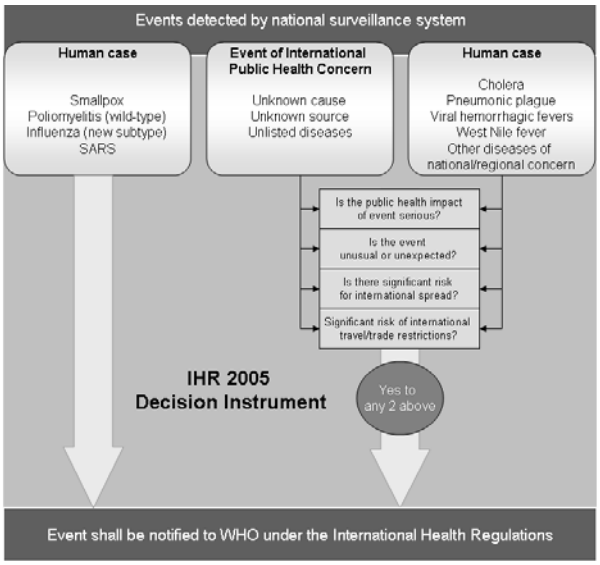


Figure 1. Geographical distribution of a selected subset of outbreaks confirmed by the World Health Organization (WHO) and reported in the "Disease Outbreak News" reports, 1996-2009. Points mark the reported origin of the outbreak, or if unknown, where there were the highest reported morbidity and mortality rates.

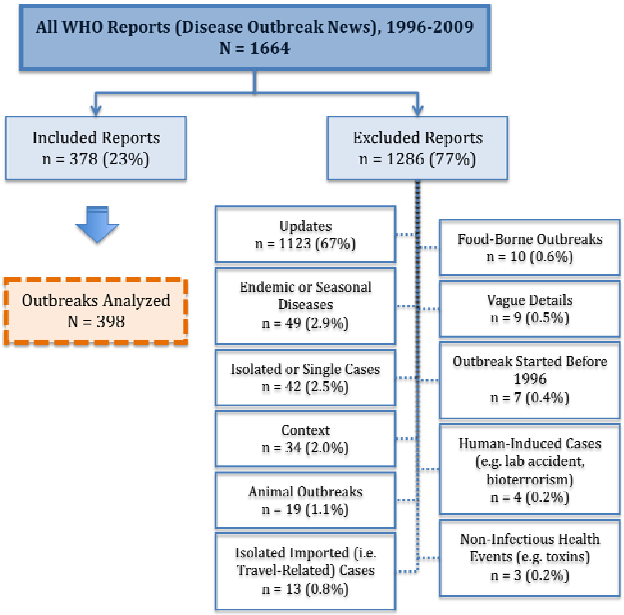
HealthMap
Global Health, Local Information

New International Health Regulations



Sturtevant, Anema, Brownstein. Disaster Med. 2007

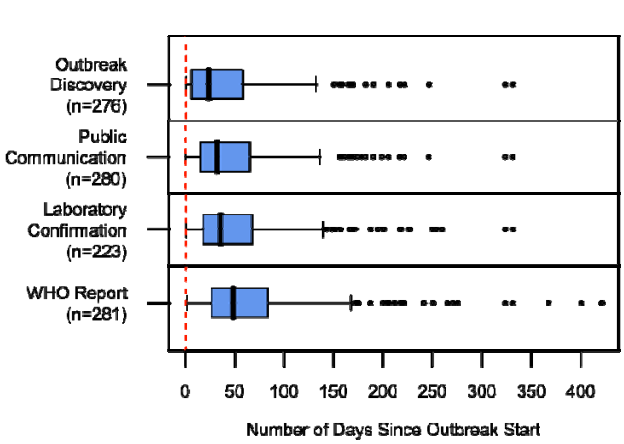
HealthMap
Global Health, Local Information



WHO's "Disease Outbreak News" reports: http://www.who.int/csr/don/en/

HealthMap
Global Health, Local Information

Outbreak Timepoints



MEDIAN

23 days (95% C.I. [18;30])

32 days (95% C.I. [28;38.5])

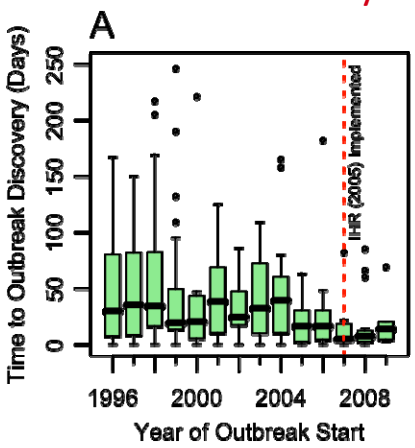
35 days (95% C.I. [32;47])

48 days (95% C.I. [40;56])

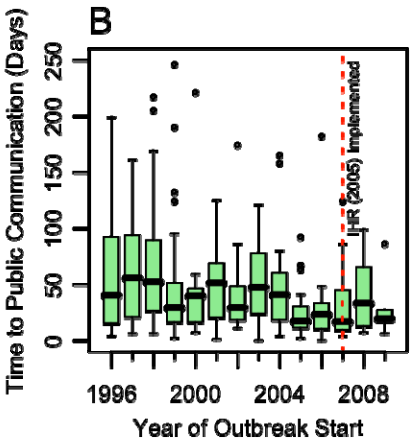
HealthMap
Global Health, Local Information

Time from outbreak start to:

Outbreak Discovery

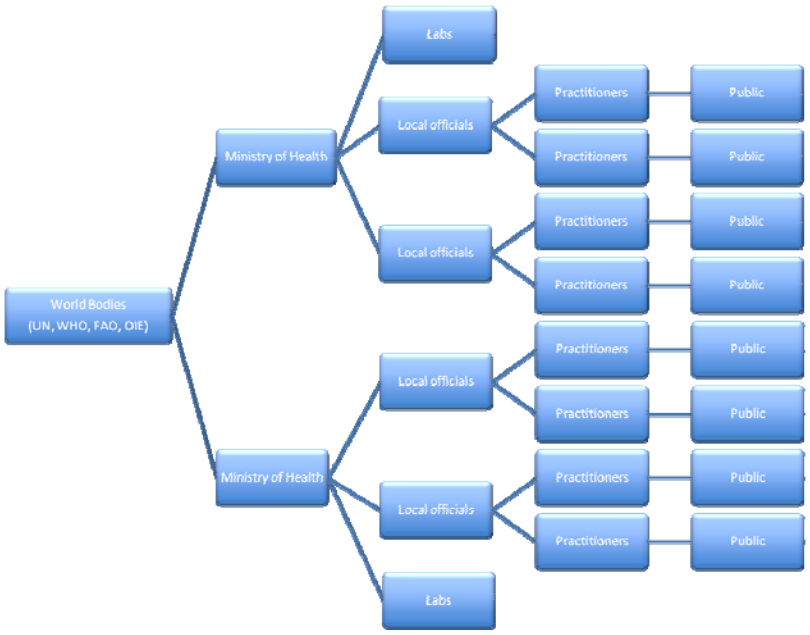


Public Communication



HealthMap
Global Health, Local Information

Traditional public health reporting



HealthMap
Global Health, Local Information

Informal reporting

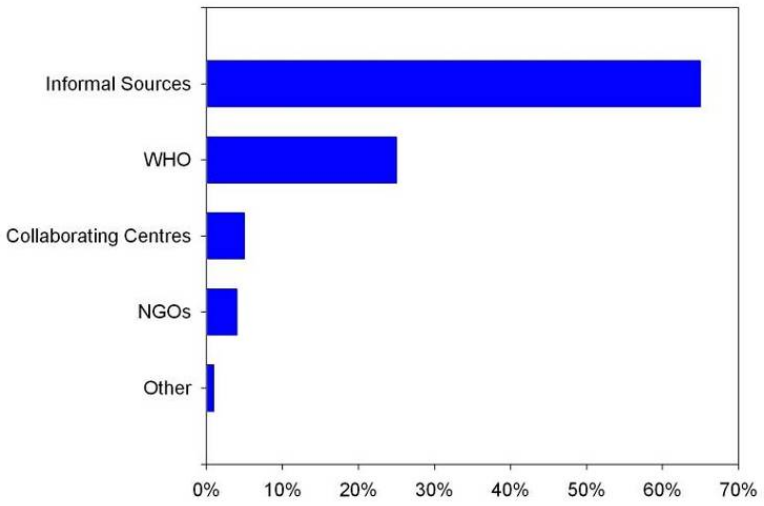
HealthMap
Global Health, Local Information

Barriers to effective information flow

- Reluctance by individuals to report disease
- Delays in relaying diagnoses up the hierarchy
- Delay between tentative diagnosis and laboratory confirmation
- Delay in official statements
- Delay in recognizing a new, emerging, or unusual disease

HealthMap
Global Health, Local Information

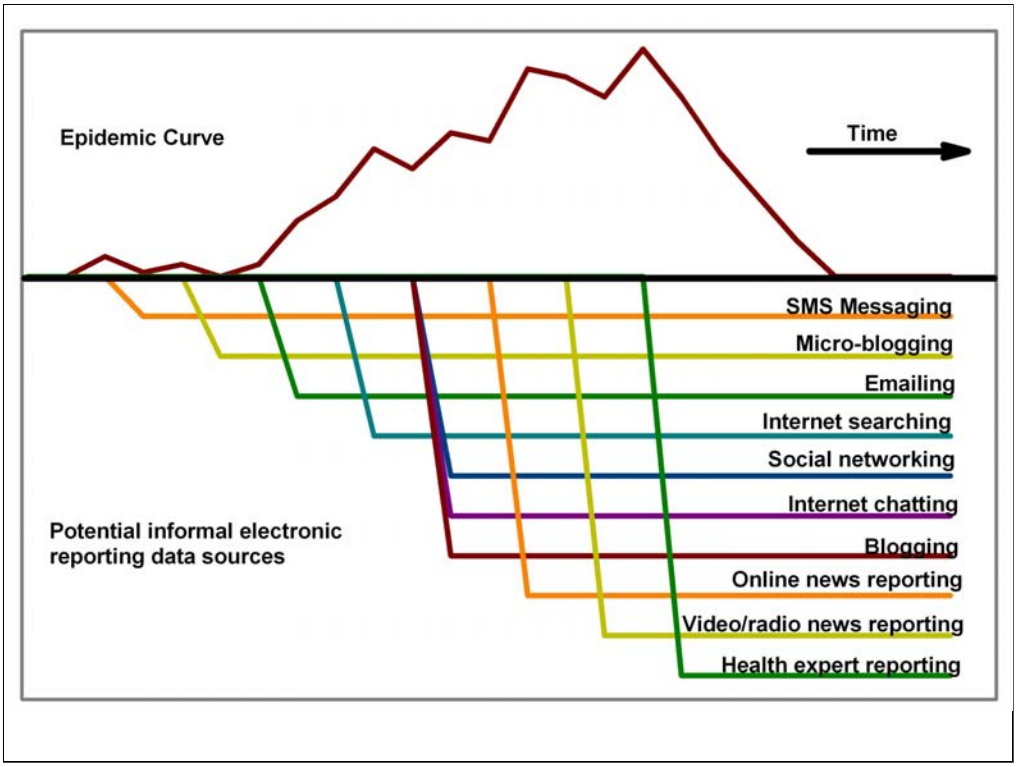
Source of outbreak news verified by WHO



Adapted from Heymann 2001

Initial source of reports of outbreaks 1998–2001.

GPHIN picked up 56% of 578 outbreaks subsequently verified by WHO


Epidemic Curve
Time
SMS Messaging
Micro-blogging
Emailing
Internet searching
Social networking
Internet chatting
Blogging
Online news reporting
Video/radio news reporting
Health expert reporting
Potential informal electronic reporting data sources

HealthMap
Global Health, Local Information

Traditional Surveillance

Mortality Surveillance Form 1*

Site .....
Date from Monday .....To Sunday: .....
Total population at beginning of this week: .....
Births this week: .....Deaths this week: .....
Arrivals this week (if applicable): .....Departures this week .....
Total population at end of week: .....Total under 5 years population: .....

	0–4 yrs		5+ yrs		Total
	male	female	male	female	
Immediate cause					
Acute lower resp. infection					
Cholera (suspected)					
Diarrhoea – bloody					
Diarrhoea – watery					
Injury – non-accidental					
Malaria					
Maternal death – direct					
Measles					
Meningitis (suspected)					
Neonatal (0-28 days)					
Other					
Unknown					
Total by age and sex					
Underlying cause					
AIDS (suspected)					
Malnutrition					
Maternal death – indirect					
Other					

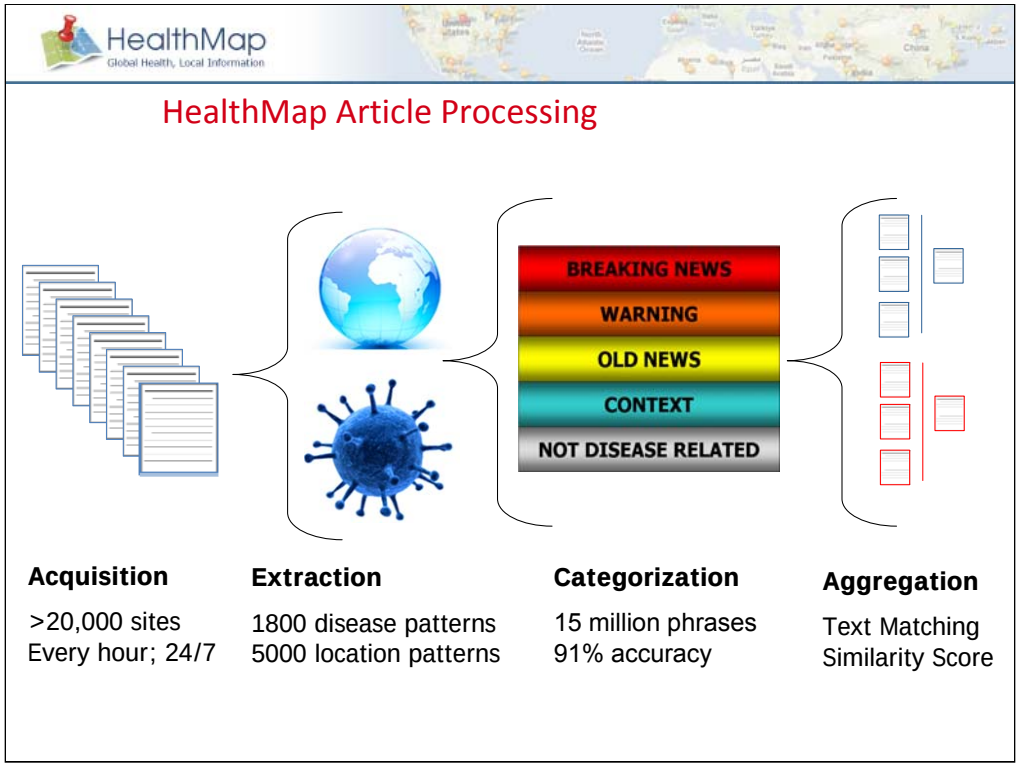
- Lack of infrastructure
- Low level training
- Gaps in coverage
- Poor information flow

Informal Surveillance

- Abundant cheap/free resource
- Detailed local information
- Near real-time reporting
- Less susceptible to political pressure

Zip through this: (1) don't need to sell them on the approach; (2) all the things on the left apply on the right

Just previous interest



Information extraction, syntactic representation of sentences

HealthMap
Global Health, Local Information

Case Study: 2009 H1N1

The NEW ENGLAND JOURNAL of MEDICINE

HealthMap
Global Disease Alert Map

Influenza A (H1N1) Reports

La Jornada

Influenza A (H1N1) Virus, 2009 — Online Monitoring

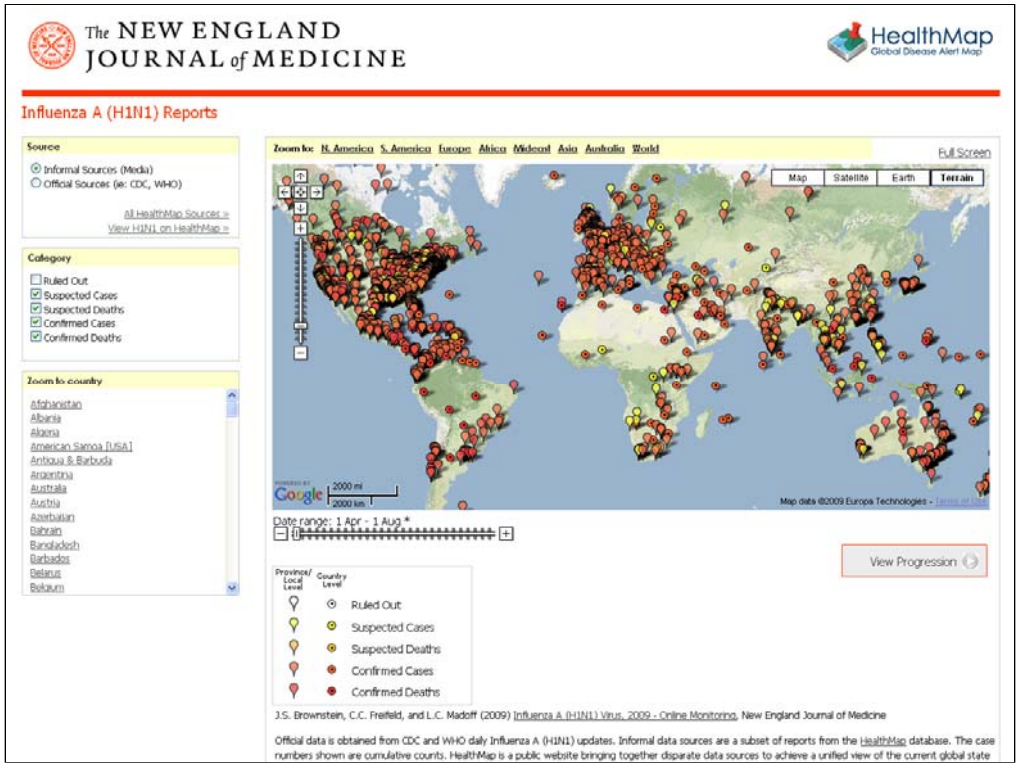
John S. Brownstein, Ph.D., Clark C. Freifeld, B.S., and Lawrence C. Madoff, M.D.

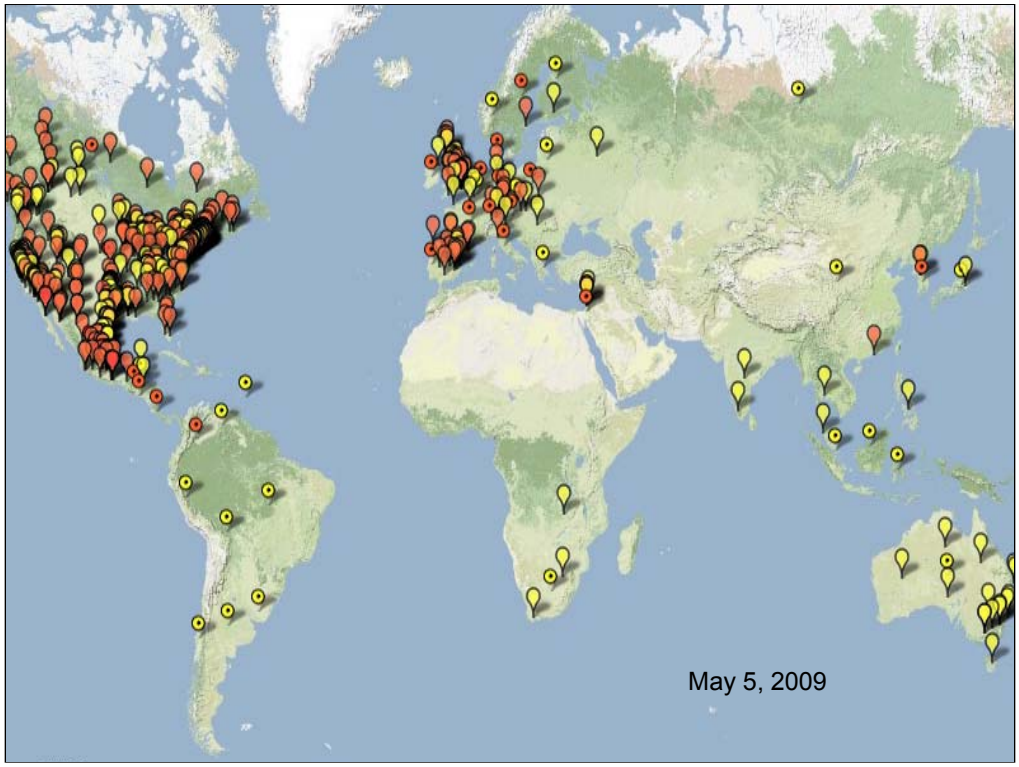
Veracruz: reporta agente municipal extraño brote epidémico que ha cobrado dos vidas

Enviar esta página a alguien
Imprimir esta página

La funcionaria de La Gloria informó que el raro padecimiento ha afectado a 60 por ciento de sus tres mil habitantes con infecciones respiratorias

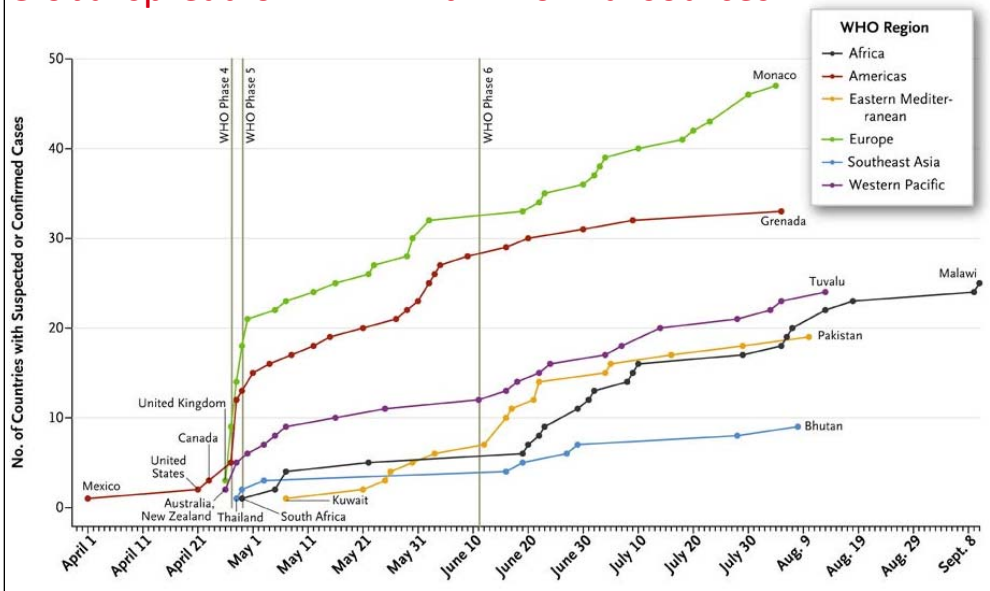
OFFICIAL SELECTION LIBRARY OF CONGRESS


The NEW ENGLAND JOURNAL of MEDICINE
HealthMap
Global Disease Alert Map
Influenza A (H1N1) Reports
Source
Informal Sources (Media)
Official Sources (ie: CDC, WHO)
All HealthMap Sources »
View H1N1 on HealthMap »
Category
Ruled Out
Suspected Cases
Suspected Deaths
Confirmed Cases
Confirmed Deaths
Zoom to country
Afghanistan
Albania
Algeria
American Samoa [USA]
Antigua & Barbuda
Argentina
Australia
Austria
Azerbaijan
Bahrain
Bangladesh
Barbados
Belarus
Belgium
Zoom to: N. America S. America Europe Africa Mideast Asia Australia World
Full Screen
Map Satellite Earth Terrain
Google
2000 mi
2000 km
Map data ©2009 Europa Technologies
Date range: 1 Apr - 1 Aug *
View Progression
Province/ Local Level
Country Level
Ruled Out
Suspected Cases
Suspected Deaths
Confirmed Cases
Confirmed Deaths
J.S. Brownstein, C.C. Freifeld, and L.C. Madoff (2009) Influenza A (H1N1) Virus, 2009 - Online Monitoring, New England Journal of Medicine
Official data is obtained from CDC and WHO daily Influenza A (H1N1) updates. Informal data sources are a subset of reports from the HealthMap database. The case numbers shown are cumulative counts. HealthMap is a public website bringing together disparate data sources to achieve a unified view of the current global state


May 5, 2009

HealthMap
Global Health, Local Information

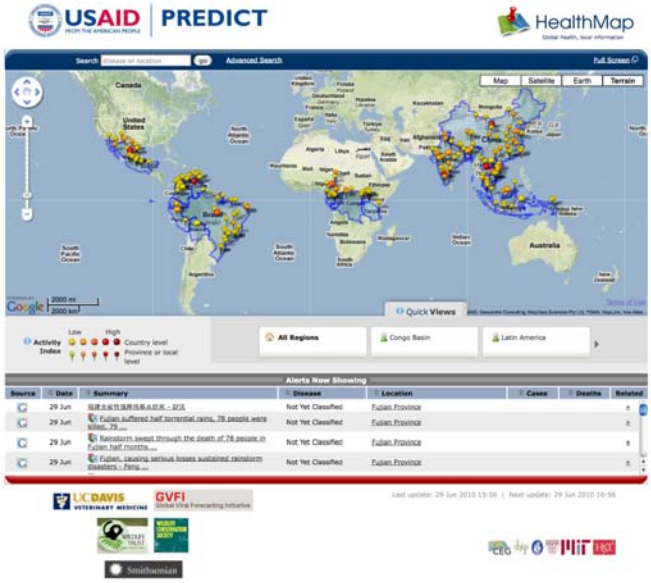
Global spread of H1N1 with informal sources



Brownstein et al. 2010. New England Journal of Medicine.

HealthMap
Global Health, Local Information

USAID: PREDICT Project



HealthMap
Global Health, Local Information

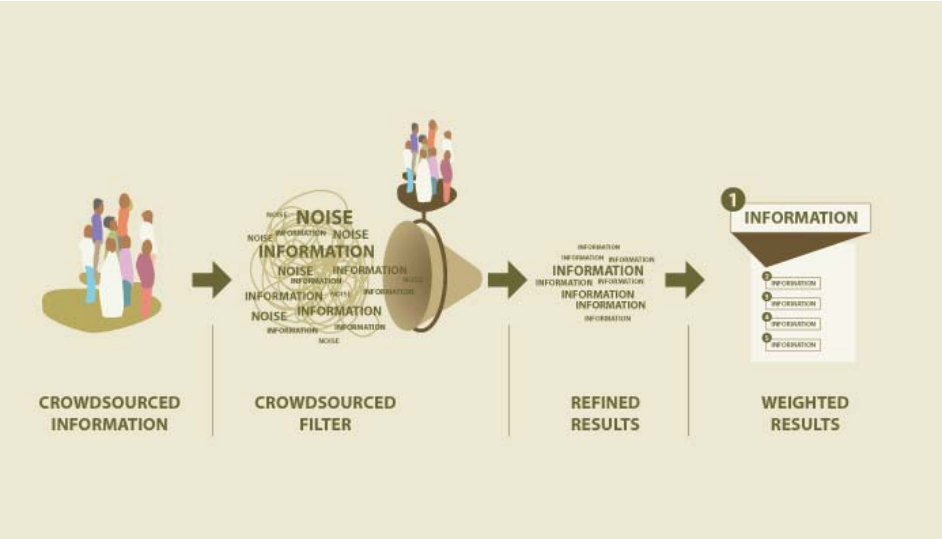
Barriers to effective information flow

- Reluctance by individuals to report disease
- Delays in relaying diagnoses up the hierarchy
- Delay between tentative diagnosis and laboratory confirmation
- Delay in official statements
- Delay in recognizing a new, emerging, or unusual disease

From Sue. Stats run in August 2010

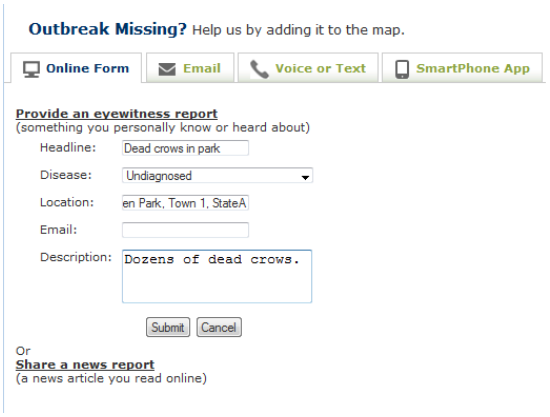
HealthMap
Global Health, Local Information

Participatory Epidemiology



HealthMap
Global Health, Local Information

Reporting through the website



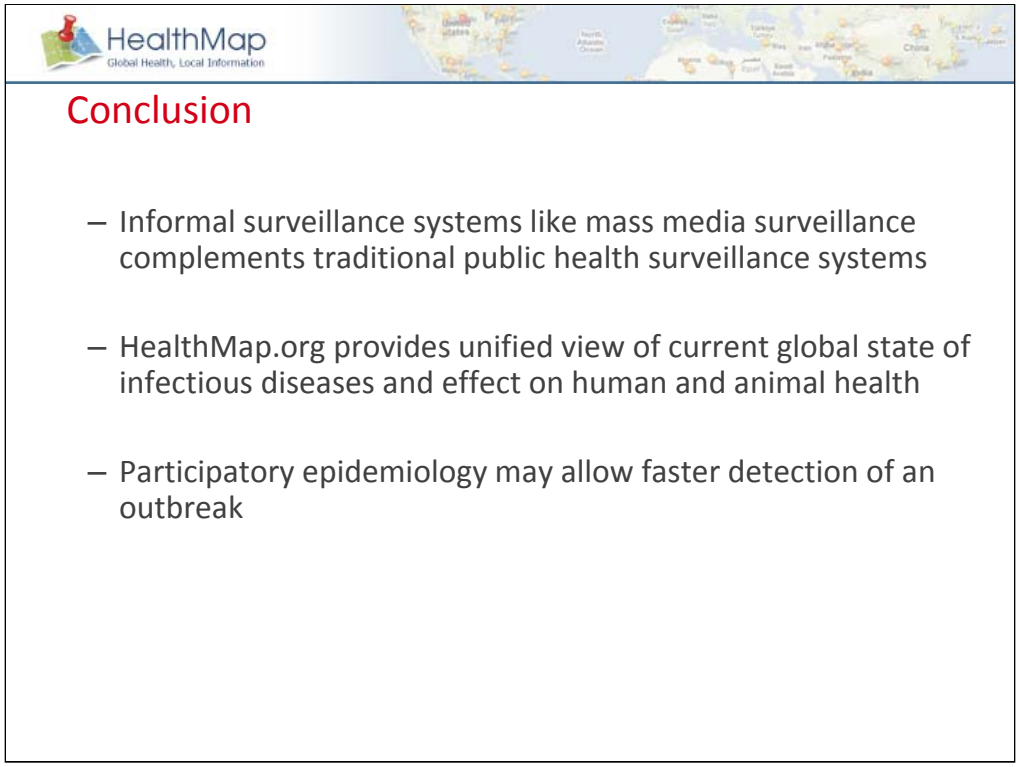
HealthMap
Global Health, Local Information

Outbreaks Near Me – iPhone App

- Set location where you want to receive reports
- See all current outbreaks in your selected location
- Search and browse outbreak reports on the interactive map
- Set up the app to alert you with a notice automatically whenever an outbreak is occurring in your area.
- If you know of an outbreak not yet on the map, be the first to report it using the app's unique outbreak reporting feature. You will be credited and your report will be featured on the website.

HealthMap
Global Health, Local Information

Outbreaks Near Me – iPhone App



HealthMap works to overcome many limitations of Internet-based surveillance:

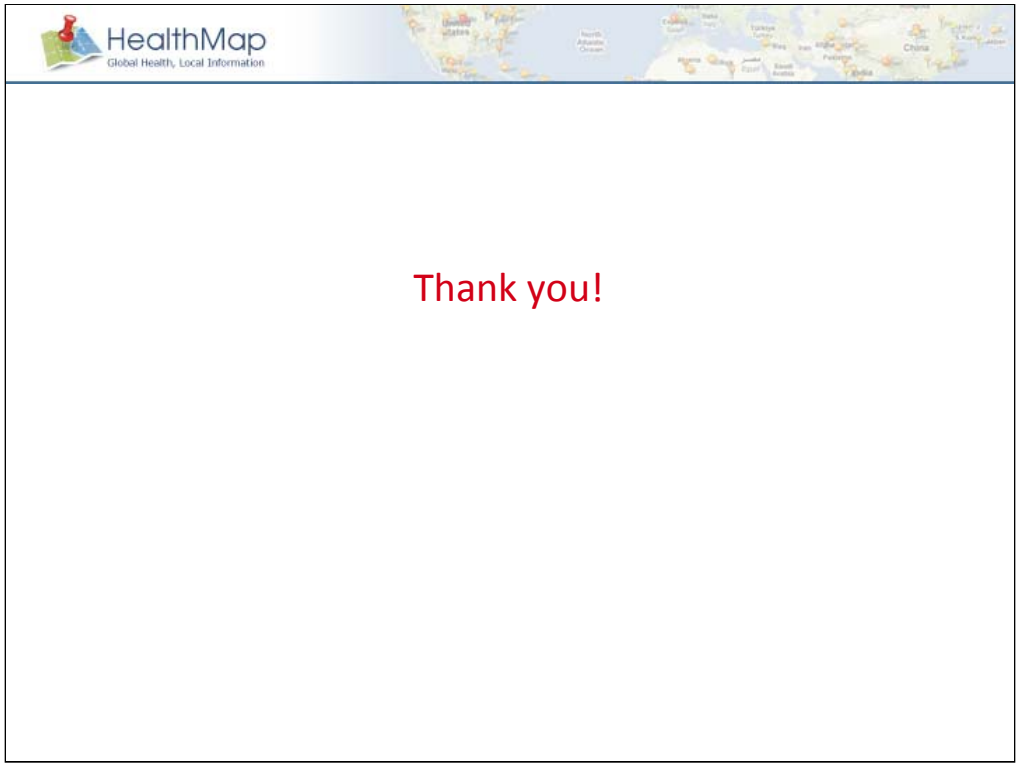
Data can also be leverage for epidemiological studies

Internationalization → Localization

Useful because of a new context for public health issues

Further supports English report bias

greater population, numbers of media outlets, public health resources, and availability of electronic communication infrastructure.


HealthMap
Global Health, Local Information
Thank you!