An integrated framework for early detection, prevention and management of infectious diseases

Yahya Abawi
International Centre for Applied Climate Sciences, University of Southern Queensland

Hoda McClymont
School of Management and Enterprise, University of Southern Queensland

David McClymont
DHM Environmental Software Engineering
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases

- Limited dialogue between climate and (health) community
- Climate information not well understood and targeted – community, policy
- Limited provision of climate services in developing countries
- Traditional top-down communication not effective – Feedback is essential
- Health education needs to be sensitive to cultural and social needs
- Use of digital communication not fully utilised
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
An integrated framework for early detection, prevention and management of infectious diseases
**Web Portal**

**Website**
Interface for administration and dissemination

**Web-Service**
Content repository, data feeds, synchronisation of offline content

*Core of all educational communication activity, information assimilation, retrieval, research and feedback activities.*
Health

Disease Database
• Literature, epidemiology, aetiology, mode of transmission
• Risk profile of climate sensitive diseases x country x region

Health Services
• Prevention and control, treatment

Disease Surveillance and Early Warning
• Spread of diseases, rapid diagnostics
• WHO’s Communicable Disease Global Atlas
  • Data Query (reports, charts and maps)
  • Interactive mapping (map of diseases, location of health facility)
  • Maps and Resources (documents, publications, statistics)
• Ethics, national and local laws, cultural sensitivity

Climate and Health impacts
• Direct impacts
• Changing pattern of vector and water born diseases
Climate Resource Centres
Rainfall, temperature, wind, RH, ENSO

Climate Prediction Centres and Services
NHMS, IRI, WMO, ECMWF, BoM
Forecasts of climate extremes, lead-time, forecast skill, drought forecasts

Climate Related Warning
Heat stress, bushfire, air pollution
Specificity, lead-time, literature, distribution and prevalence

Climate Change Projection
Literature, geographic distribution and impact on vector-water borne disease
Targeted forecasts to support adaptation

Climate forecasting can help predict malaria outbreaks

NEW climate forecasting software and help predict outbreaks of malaria, a one-day workshop in Honiara was told.

The workshop, held on Thursday, was organised by the Solomon Islands Meteorological Services.

Priced by Health and Environment Minister James Marape and sponsored by the National University of Solomon Islands, the workshop aimed to make all Solomon Islanders able to determine the link between malaria and weather.

“Our goal is to use the best forecasting tools available, including data from the Ministry of Health and Medical Services, and help others determine the link between climate and malaria outbreaks,” said Dr. Albert Mota, director of the workshop.

According to the World Health Organization, there were 214 million cases of malaria in 2010, with 655,000 deaths, mainly in Africa.

“The goal is to help reduce the number of cases and deaths,” Dr. Mota said.

Participants were encouraged to share their knowledge and experience with others.

“We need a rainforest of people who can share their knowledge and experience with others,” Dr. Mota said.

At the workshop, experts from the Ministry of Health and Medical Services and other organisations were present.

Solomon Star August 2010
Communication

Timely Communication of Warnings
• target audience (health workers, public, government)
• message source (credible, meaningful, appeal)

Platforms
• Traditional media, mobile devices (offline/online, websites, social media, forums, SMS)

Health Promotion Material
Outbreak Communication
• building trust, mitigation of social disruption

Behavioural and Social Communication:
How information is transmitted, perceived, understood and applied by individuals and groups

Feedback
• Rapid two-way and multiple-way communication
Research and Evaluation

Preliminary Analysis
• Surveys, Literature review, Human resources, Organisational capacity to direct resources, health information and intervention

Co-creation
• Data gathering, crowd sourcing, social media, moderated discussion groups (games, information, posters, educational material, cartoons)

Feedback and Evaluation
Effectiveness of engagement, digital analytics (qualitative and quantitative data) economic analysis and behavioural impacts. Feedback to improve outcome
Education

Cultural Pedagogy
Framework for an inclusive education system
Content, knowledge creation, cultural interaction, relevance.

Community Engagement
More likely to participate if needs are addressed
Motivated to take action
Share information with social network, leadership role

Sustainability of Health Intervention
Capacity building, leadership, integration, adaptability, trust and credibility
Governance

Project Management

Monitoring and moderation of content and discussions, coordination of groups, recognition of legal issues, financial support
Web-Portal

**Web-site:** interface for administration and dissemination. **Web-service:** content repository, data feeds, synchronisation of offline content.

**Research & Evaluation**
- Preliminary Analysis
  - political, economic, social, cultural, technological, environmental & legal.
- Co-creation
  - crowd sourcing, social media, moderated discussion groups
- Feedback & Evaluation
  - analysis of feedback, digital analytics, economic outcomes & behavioural impacts.

**Communication**
- Strategy
  - target market, message source, content, channel, timing, frequency and reach.
- Platforms
  - traditional media, mobile-devices (offline/online), websites, social media, forums & games.

**Climate**
- Climate sensitive diseases
  - literature, distribution & prevalence.
- Climate based disease warning
  - specificity, lead time, climate parameters (rain, temperature etc).
- Climate Prediction Services
  - NMHS, IRI, WMO, ECMWF, etc.
- Climate Data
  - climate forecasts & projections, ENSO monitoring.

**Education**
- Cultural Pedagogy
  - content, knowledge creation, cultural interaction, relavance.
- Sustainability of Health Intervention
  - capacity building, leadership, integration, adaptability, trust and credibility.

**Governance**
- Project Management
  - monitoring and moderation of content and discussions, coordination of groups, recognition of legal issues, financial support.

**Health**
- Disease Database
  - literature, epidemiology, aetiology, mode of transportation.
- Health Services
  - prevention & control, treatment & rapid diagnosis.
- Disease Surveillance & Reporting
  - ethics, national & local laws, cultural sensitivity, links with WHO.
An integrated framework for early detection, prevention and management of infectious diseases

Could such a framework prevent future Epidemic and Pandemics? (Ebola Pandemic 2014)

. Was early warning available?
. Does climate has an influence?
. Was intervention timely?
. Cultural Issues
. Communication Issues
Is Ebola outbreaks linked to climate?

• Lack of high quality climate data.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.

• Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
  - Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
  - Outbreaks mostly occur at the beginning of a wet season and possibly after a severe drought.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
  - Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
  - Outbreaks mostly occur at the beginning of a wet season and possibly after a severe drought.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
  - Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
  - Outbreaks mostly occur at the beginning of a wet season and possibly after a severe drought.
  - Animal outbreaks precede human outbreaks.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
  - Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
  - Outbreaks mostly occur at the beginning of a wet season and possibly after a severe drought.
  - Animal outbreaks precede human outbreaks.

Increased animal mortality surveillance prior to and during the onset of a wet season may provide early warning reducing the risk of human outbreaks.
Is Ebola outbreaks linked to climate?

- Lack of high quality climate data.
- Limited research but provides useful leads.
  - Outbreaks likely to occur in remote areas mostly forested than other ecosystems.
  - Outbreaks mostly occur at the beginning of a wet season and possibly after a severe drought.
  - Animal outbreaks precede human outbreaks.

Increased animal mortality surveillance prior to and during the onset of a wet season may provide early warning reducing the risk of human outbreaks.

The web-portal can provide a medium for disease surveillance, reporting, and risk factor monitoring through integration of services from a wide range of disciplines.
The Ebola death toll is now in the thousands in the West of Africa.

Yawn...

Meanwhile, the U.S.A. has recorded three confirmed cases...

Somebody?!

Do something!!
I hope through this research we can collectively DO SOMETHING and develop solutions to prevent such occurrences in the future - Thank You