Connecting Practice to Policy in Dengue Management

Associate Professor Dr Rozita Hod  
*Department of Public Health, Faculty of Medicine* 
&  
*Institute for Environmental & Development, UKM*  
*Universiti Kebangsaan Malaysia*  
5 October 2015  
gieto1@gmail.com  

Presented at the 10th Johor Scientific Meeting 2015
Outline of presentation

• Dengue epidemiology
• Major drivers for dengue spread
• Linkages between ecosystem services & health
• Impact of dengue
• Challenges in dengue control
• Eco-bio-social approach in dengue management
• Conclusion
Global distribution of dengue

Dengue, countries or areas at risk, 2013

The contour lines of the January and July isotherms indicate areas at risk, defined by the geographical limits of the northern and southern hemispheres for year-round survival of Aedes aegypti, the principal mosquito vector of dengue viruses.

Countries or areas where dengue has been reported

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.
Dengue Epidemiology

- Over 230 million dengue infection annually, global. (over 2 million of severe disease)
- 21,000 deaths, annually worldwide (Ref: Gubler 2012)
- 75% of dengue cases occur in Asia Pacific Region
- Major socio-economic impact for ASEAN Member States
Western Pacific Region

• 23 out of the 37 countries in WHO WPRO region has reported dengue transmission
• Outbreaks are cyclical in nature
• Two seasonal dengue outbreaks:
  i) during rainy seasons
  ii) 3rd-4th quarters in the pacific.
Primary vectors of Dengue

Aedes aegypti

Yellow Fever mosquito

Aedes albopictus

Asian Tiger mosquito
Dengue epidemiology

• As of 26 September 2015, there were 89,744 cases of dengue with 244 deaths reported in Malaysia for 2015. This is 20.7% higher compared with the same reporting period of 2014.

Source: Ministry of Health Malaysia, 1 October 2015
Since May 2015, DEN 1 has been the dominant serotype.

Source: Malaysia MOH 2015
Major drivers for the dramatic increase in dengue incidence for the recent decades

- Population growth with unplanned urbanization (inadequate housing, poor water, sewage and waste management)
- Increase in domestic & international travel
- Transportation of commodities (tyres)
- Limited financial resources
- Lack of human resources for dengue control measures
### Agents and infectious diseases with suspected or known links to landscape change

<table>
<thead>
<tr>
<th>Vector-borne and/or zoonotic</th>
<th>Soil</th>
<th>Water</th>
<th>Human</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>Melioidosis</td>
<td>Schistosomiasis</td>
<td>Asthma</td>
<td>Hemorrhagic fevers</td>
</tr>
<tr>
<td>Dengue</td>
<td>Anthrax</td>
<td>Cholera</td>
<td>Tuberculosis</td>
<td>Foot and mouth</td>
</tr>
<tr>
<td>Lyme Disease</td>
<td>Hookworm</td>
<td>Shigellosis</td>
<td>Influenza</td>
<td>Rice blast</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>Coccidiodomycosis</td>
<td>Rotavirus</td>
<td></td>
<td>Triachoma</td>
</tr>
<tr>
<td>Rift Valley fever</td>
<td></td>
<td>Salmonellosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td></td>
<td>Leptospirosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onchocerciasis</td>
<td></td>
<td>Cryptosporidiosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trypanosomiasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plague</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filariasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningitis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leishmaniasis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kyasanur Forest fever</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hantavirus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nipah virus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Patz et al. 2004
Impacts of dengue

• Public health, economic cost
• Major social impact: when large epidemics occur, disrupting primary care for hospitalized patients.
• High economic cost: Annual cost between 2002 to 2010 was USD46.45 million; individual household bearing 48%, government 24% and insurance 22%. (Halasa et al, 2012).
Challenges in dengue control

- Mosquito
- Environment
- Human behavior
- Community (Herd Immunity)
Dengue Prevention & Control Programs

• All ASEAN countries have Dengue prevention and control programs, however these need to be aligned to regional strategies and must involve all relevant stakeholders.

• There has been progress in public-private partnership, and there is need for it to be strengthened.
What works? What doesn’t?

• Despite many published articles/several systematic reviews on dengue control, no consensus has been reached.

• This lack of consensus reflects the heterogeneity of the published effectiveness of the studies on dengue control interventions.

• Studies using historical control substantially overestimated the effectiveness of the intervention, as compared to studies that use contemporary controls.

The issue of sustainability..

• A systematic review and meta regression analysis showed that dengue control measures are effective to reduce the entomological indices.

• These interventions are effective within 18 to 24 months after the intervention but then subsequently declined. (Al-Muhandis N & Hunter PR 2011).
The Public Health Model

1. Define the problem
   - data collection & surveillance

2. Identify causes
   - risk factors identification

3. Develop and test interventions
   - efficacy and effectiveness research

4. Adoption and widespread use
   - community demonstration and dissemination program

Efficacy works in the experimental trial
Effectiveness works in the real world

Hanson et al. Pub Health Rpts 2012;127:147
Spear R. 2015. Keynote address at the 5th IPHC
The Public Health Model...cont

Research to practice gap

Implementation gap

Efficacy to effectiveness gap

4. Adoption & Widespread use
Evidence to implementation gap

• Stage 4 of the Public Health Model-implementation- a social objective that can only be realised in the context of a community and its organizational and political processes.
• Public policy is set by those who build consensus not those who has the best evidence.
• Worldviews of researches, health practitioners, community, politicians, and other decision makers will be different

Emphasises the importance of all groups being involved at the start
Challenges in dengue vector control in the WPRO region

- limited capacity and lack of technical staff;
- programme activities are mainly reactive.
- over-reliance on chemical approaches,
- IVM remains a vague concept with a lack of success stories.
Examples of Practices in South East Asia countries
Singapore..

- Preventive surveillance program led by National Environmental Agency (detect and destroy mosquito breeding areas).
- Use of GIS to monitor and analyze Aedes distribution and dengue cases. This enables identification of focus area where intensive source reduction can be implemented.
- Virus serotype surveillance systems was established to detect emerging serotypes.

Aims: to ensure valuable resources are deployed strategically to achieve optimal outcome.
Singapore ..cont(1)

- Public involvement: necessary to maintain low vector population, because the vector repopulates soon after the vector control operations are relocated.
- Adopts a 3P strategy in outreach programs.
- 3P (People-Public-Private) partnership.
- Comprises of grassroots organizations, educational institutions, commercial organizations,
- These partnership understand different target groups better, thus able to provide valuable advice on the most appropriate means of outreach.
Singapore..cont (2)

• Inter agency Dengue task Force 2005: to ensure effective mosquito control and enhanced coordination among partners.
• Task force is chaired by the Chief Executive of National Environment Agency and members are 28 public, private and professional organizations.
• This platform serves to enhance communication and coordination among partners on the dengue control efforts.
• It also helps resolve inter-agency issues and responsibilities relevant to mosquito control.
• This demonstrate intersectoral collaboration at the highest level.
• The Dengue Task Force took part in disseminating dengue message reaching an estimated 50,000 people.
Thailand

• Launched ASEAN Dengue Day with a MOU (signed by Bangkok Metropolitan Administration, Ministry of Natural Resources & Environment, Ministry of Interior, Ministry of Education & Ministry of Public Health.

• Activities on 15 June 2011, 800 participants, from government ministries, media, local administration, school children, community leaders, village health volunteers.
Vietnam

• Establish National Dengue Control Program in 1999
• Introduce the “dengue collaborator” model
• 26 provinces were selected based on the severity of dengue transmission
• 10-20% of the most affected communes were assigned a “dengue collaborator”
• Dengue collaborator: a person tasked with removing mosquito breeding sites, exterminating larvae and educating people about dengue prevention. He covers between 70-100 households.
• Focus on specific target groups for e.g. housewives & school children
Philippines

- Memorandum of Agreement between Department of Health, Department of Interior & Local Government, Department of Education, Department of Science & Technology
- Political leadership
- Ceremonial turnover of nets, ovitraps
- Covering water drums with nets
- Install posters and fliers in strategic places
- Religious leaders: given dengue information kits
Way forward

• WHO Global Strategy on Dengue, emphasized on IVM with community and intersectoral participations in which control is directed towards geographic areas of highest risk of transmission in the most cost effective manner.
Strengthen regional cooperation

- Enhance regional preparedness and capacity through integrated approaches to surveillance prevention, and timely response for an outbreak
- Strengthen national and regional alert and response capacities in an efficient and sustainable way
- Share information, experiences and best practices in improving the access to primary health care by people at risk/vulnerable groups of Dengue through regional workshops/seminars/exchange visit among ASEAN member states.
- Encourage close collaboration and create networks among the public and private sectors and civil society in addressing the effort to prevent dengue transmission
Promote Inter-sectoral collaboration

• To increase awareness and understanding of non-health sectors of their roles and responsibilities in dengue prevention
• To move from reactive actions to long term prevention involving health and non health sectors
• To strengthen multisectoral planning
Research and collaboration

• There is need to conduct more comprehensive studies on societal distribution of the economic cost of dengue.

• Results from these research will enable policy makers and public health practitioners to make informed decisions on the cost efficacy of dengue control programs.

• The private sector also needs comprehensive economic analysis to guide the decision making in vaccines and anti-viral drug development.

• International funding agencies require these kinds of data to establish priorities in public health funding.
Conclusion

• Armed with multipronged approach, we must be united and committed in the fight to control dengue, reduce its transmission and towards sustainable dengue prevention and control.
THANK YOU