A health systems perspective on antibiotic resistance

Maryam Bigdeli
Alliance for Health Policy and Systems Research
World Health Organization

International Conference on Improving the Use of Medicines
ReAct Satellite Symposium
Sunday November 13th, 2011
Outline

1. Systems Thinking for health systems strengthening: a paradigm shift
2. How do we apply Systems Thinking to
   • access to medicines?
   • antibiotic resistance and protection of novel antibiotics?
Systems Thinking: the foundation
Systems thinking

Systems thinking gives deeper insights into:

how a system works,

• why it has problems,

• how it can be improved

System building blocks and values

The WHO Health System Framework

System Building Blocks
- SERVICE DELIVERY
- HEALTH WORKFORCE
- INFORMATION
- MEDICAL PRODUCTS, VACCINES & TECHNOLOGIES
- FINANCING
- LEADERSHIP / GOVERNANCE

Overall Goals / Outcomes
- IMPROVED HEALTH (level and equity)
- RESPONSIVENESS
- SOCIAL & FINANCIAL RISK PROTECTION
- IMPROVED EFFICIENCY

WHO 2007: Everybody’s Business. Strengthening health systems to improve health outcomes
Health systems are more than the building blocks

How do we work them together for a more high performance system?

WHO 2009: Systems thinking for health systems strengthening
Characteristics of all complex systems

Most systems, including health systems, are:

- Self-organizing
- Constantly changing
- Tightly linked
- Governed by feedback

- Non-linear
- History dependent
- Counter-intuitive
- Resistant to change

And ....

- nest sub-systems within them
- but are part of larger systems
# Skills of systems thinking

<table>
<thead>
<tr>
<th>Usual approach</th>
<th>Systems thinking approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Static thinking</strong></td>
<td><strong>Dynamic thinking</strong></td>
</tr>
<tr>
<td>Focusing on particular events</td>
<td>Framing a problem in terms of a pattern of behaviour over time</td>
</tr>
<tr>
<td><strong>Systems-as-effect thinking</strong></td>
<td><strong>System-as-cause thinking</strong></td>
</tr>
<tr>
<td>Viewing behaviour generated by a</td>
<td>Placing responsibility for a behaviour on internal actors who</td>
</tr>
<tr>
<td>system as driven by external forces</td>
<td>manage the policies and &quot;plumbing&quot; of the system</td>
</tr>
<tr>
<td><strong>Tree-by-tree thinking</strong></td>
<td><strong>Forest thinking</strong></td>
</tr>
<tr>
<td>Believing that really knowing</td>
<td>Believing that to know something requires understanding the</td>
</tr>
<tr>
<td>something means focusing on the</td>
<td>context of relationships</td>
</tr>
<tr>
<td>details</td>
<td></td>
</tr>
<tr>
<td><strong>Factors thinking</strong></td>
<td><strong>Operational thinking</strong></td>
</tr>
<tr>
<td>Listing factors that influence or</td>
<td>Concentrating on causality and understanding how a behaviour</td>
</tr>
<tr>
<td>correlate with some result</td>
<td>is generated</td>
</tr>
<tr>
<td><strong>Straight-line thinking</strong></td>
<td><strong>Loop thinking</strong></td>
</tr>
<tr>
<td>Viewing causality as running in one</td>
<td>Viewing causality as an on-going process, not a one-time event,</td>
</tr>
<tr>
<td>direction, ignoring (either</td>
<td>with effect feeding back to influence the causes and the</td>
</tr>
<tr>
<td>deliberately or not) the</td>
<td>causes affecting each other</td>
</tr>
<tr>
<td>interdependence and interaction</td>
<td></td>
</tr>
<tr>
<td>between and among the causes</td>
<td></td>
</tr>
</tbody>
</table>
All health interventions have system-wide effects

- Scale-up antiretroviral therapy
- Integrate vouchers for malaria bednets into antenatal care
- Add cadre of community health workers
- Social health insurance
- Conduct vitamin A supplementation campaign
- Pay-for-performance
- Change 1st line treatment for malaria
- Conditional cash transfer
- Change microscopy guidelines
- Add new vaccine to immunization program
- Increasing need for systems thinking
- Increase health worker salaries
- Improve local use of HMIS data
- Increasing system-wide effects
## A system-wide view of intervention design

<table>
<thead>
<tr>
<th>Step</th>
<th>Action Description</th>
<th>Arrow 1</th>
<th>Arrow 2</th>
<th>Arrow 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>Convene stakeholders</td>
<td>Leaders identify stakeholders</td>
<td>Large stakeholder group convenes</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td>Collectively brainstorm</td>
<td>Creates small design team</td>
<td>Prioritizes effects, likelihood, severity</td>
<td>Brainstorms effects</td>
</tr>
<tr>
<td>Step 3</td>
<td>Conceptualize effects</td>
<td>Small design team conceptualizes effects</td>
<td>Redesigns intervention</td>
<td></td>
</tr>
<tr>
<td>Step 4</td>
<td>Adapt and redesign</td>
<td>Intervention design finalized</td>
<td>Large stakeholder group reconvenes to consider the redesign</td>
<td></td>
</tr>
<tr>
<td>Step 5</td>
<td>Determine indicators</td>
<td>Evaluation design initiated</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
How do we apply Systems Thinking to
- access to medicines?
- antibiotic resistance and protection of novel antibiotics?
A multi-layer health system view of barriers to access to medicines

**Source:**
Adapted from Hanson et al. 2003

Populated with access to medicines barriers identified in the literature between 2000-2010

<table>
<thead>
<tr>
<th>Level at which constraints to access operate</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Individual, household and community</td>
</tr>
<tr>
<td>II. Health Service Delivery</td>
</tr>
<tr>
<td>III. Health Sector</td>
</tr>
<tr>
<td>IV. Public policies cutting across sectors</td>
</tr>
<tr>
<td>V. International and regional level</td>
</tr>
</tbody>
</table>

EXCESS = NO ACCESS
<table>
<thead>
<tr>
<th>Constraint level</th>
<th>Barriers to access medicines</th>
</tr>
</thead>
</table>
| I. Individual, household and community| Physical barriers (geographical location, opening hours)  
**Perceived quality of medicines and health services**  
**Inadequate health seeking behaviour and demand for medicines**  
**Inadequate use of medicines**  
Social and cultural barriers (stigma related to poverty, ethnicity, gender, etc.)                                                                                   |
| II. Health Service Delivery          | low quality of health services, including staff capacity and motivation, infrastructure etc.  
Competition between public and private health service delivery  
Low level of funding for service delivery  
**Weak supply of medicines, low availability**  
**Inadequate prescription and dispensing**  
Low quality / substandard medicines  
High medicine prices                                                                                                                                             |
| III. Health Sector                   | Weak governance of the health sector affecting all building blocks:  
• Absence of stewardship over a pluralistic health system, including private and informal health sector  
• Absence of partnership with civil society or civil society participation in governance  
• Weak human resources planning and capacity development  
• Weak health information system and capacity for monitoring and evaluation  
• Low level of funding for health, inefficiency in the use of funds, low coverage of pre-payment and social protection schemes, over-reliance on donor funding  
Weak governance of the pharmaceutical sector affecting all functions: Registration, selection, procurement, distribution, licensing of pharmaceutical establishments, inspection, control of medicines promotion, etc. |
| IV. Public policies cutting across sectors | Low public accountability and transparency  
Low priority attached to social sectors  
High burden of government bureaucracy  
Conflict between trade and economic goals for pharmaceutical markets and public health goals                                                                                     |
| V. International and regional level  | International donors agenda, including for medicines  
Weak regional development and economic cooperation mechanisms  
Unethical use of patents and intellectual property rights  
Research and development not targeting disease burden in LMICs                                                                                                           |
Priority setting for health policy and system research agenda in access to medicines

Country and regional-level priority setting

• Countries and regions
  • Latin America: Brazil – Colombia, Dominican Republic, El Salvador, Suriname
  • Africa: Cameroon – Gabon, Chad, The Congo (presented in a separate abstract), Rwanda and Ghana (results pending)
  • Eastern Mediterranean: Iran – Pakistan, Lebanon
  • South-East Asia: India, Thailand
  • West-Pacific: Cambodia – Laos, Vietnam

• Timeframe: September 2010 – September 2011

• Grey and published literature search: local, regional and international databases
  ➢ Identify existing research and research gaps

• Key Informant Interviews at country and regional level (multi-level stakeholders)
  ➢ Identify priority policy concerns
  ➢ Identify priority research questions
## Priority setting

### Summary of literature search

<table>
<thead>
<tr>
<th>Level</th>
<th>Rational selection and use</th>
<th>Affordable prices</th>
<th>Sustainable financing</th>
<th>Reliable health and supply system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>Green</td>
<td>Yellow</td>
<td>Black box</td>
<td>Green</td>
</tr>
<tr>
<td>Individual, household and communities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level II</td>
<td>Green</td>
<td>Yellow</td>
<td>Black box</td>
<td>Green</td>
</tr>
<tr>
<td>Health service delivery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level III</td>
<td>Yellow</td>
<td>Green</td>
<td>Black box</td>
<td>Yellow</td>
</tr>
<tr>
<td>Health sector</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level IV</td>
<td>Black box</td>
<td>Black box</td>
<td>Black box</td>
<td>Yellow</td>
</tr>
<tr>
<td>National context</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Policies cutting across sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level V</td>
<td>Black box</td>
<td>Black box</td>
<td>Black box</td>
<td>Black box</td>
</tr>
<tr>
<td>Regional and international context</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Black box**: Little or no research

**Yellow**: Research found consistently

**Green**: Research well covered

Research on rational selection and use is mainly centred on
- Individual, household and community (level 1)
- Health service delivery (level 2)

**Determinants levels 4 and 5?** - rarely studied, very little interventions
Priority setting
Results of Key Informant Interviews

Top 3 priority policy concerns

<table>
<thead>
<tr>
<th>1. Rational selection and use</th>
<th>2. Reliable health and supply systems - Quality</th>
<th>3. Sustainable financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicines promotion</td>
<td>Substandard is more important than counterfeit</td>
<td>Funding mechanism, incl. SHI is more important than funding type and amount</td>
</tr>
<tr>
<td>Financial and non financial incentives prescribers and providers</td>
<td>Regulatory aspects, including HR and capacity</td>
<td>OOP</td>
</tr>
<tr>
<td>Health Seeking behaviour</td>
<td>Sustainable QA system</td>
<td>Sustainability</td>
</tr>
<tr>
<td>STG and EML</td>
<td></td>
<td>Efficiency</td>
</tr>
</tbody>
</table>

Additional issues:
- Transparency and accountability (corruption)
- Interconnection between issues – adaptive systems
- Engagement of all stakeholders – global action
- Monitor effects of policies and interventions
## Priority setting

### Results of Key Informant Interviews

#### Top 3 priority policy concerns

<table>
<thead>
<tr>
<th>1. Rational selection and use</th>
<th>2. Reliable health and supply systems - Quality</th>
<th>3. Sustainable financing</th>
</tr>
</thead>
</table>

#### Medicines promotion

- Substandard is more important than counterfeit
- Regulatory aspects, including HR and capacity
- Sustainable QA system

- Funding mechanism, incl. SHI is more important than funding type and amount
- OOP
- Sustainability
- Efficiency

**Additional issues:**
- Transparency and accountability (corruption)
- Interconnection between issues – adaptive systems
- Engagement of all stakeholders – global action
- Monitor effects of policies and interventions
Medicines promotion

**Level I– Individuals, households and community**
Community representatives, civil society organizations, patients groups, community health workers
Build networks of expert patients

**Level II– Service delivery**
Health service managers
Prescribers, pharmacist, laboratory services
Engage private sector, reach out informal sector

**Level III– Health sector**
Policy makers, regulators, decision makers
(registration, selection, guidelines, formularies, laboratory services, surveillance systems, social health insurance managers etc)

**Level IV– National level**
Finance, trade, customs
Education, rural development
Media

**Level V–Regional and International**
Pharmaceutical companies
Global health partnerships
New partnerships
Conclusions

• Complex determinants of antibiotic resistance
  • Roots causes are more complex than just prescribing practices
  • Determinants are present at multiple levels including global
  • More surveys of level 1 and 2 indicators will not solve the problem (although needed to monitor)
• System-wide approach to intervention design
• Multiple stakeholders involved, including global stakeholders
... and more questions

• Who should take responsibility? Where is the mandate?
  • At community level: Governments? MOH or other ministries? Civil society? Other?
  • National level (above health)
  • International level
• Have we harnessed the right capacities? Will doctors and pharmacists be relevant?
  • Social workers at community level
  • Anthropologists, social scientists
  • Media analysts, market researchers
• What funding is needed and where should it come from?
Second Global Symposium on Health Systems Research

• **When?** 31 October to 3 November 2012

• **Where?** Beijing, People's Republic of China

More on [http://www.hsr-symposium.org](http://www.hsr-symposium.org)

**Timelines:**
Call for abstracts from Dec 2011 to April 2012
Program finalized in June 2012
Registration opens in June 2012