Systems Thinking for Health Systems Research

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We need to face up to complexity in health systems
Systems Thinking for Health Systems

Four revolutions

“There are four revolutions currently underway that will transform health and health systems.

1. Life sciences

2. Information and communication technology

3. Social justice and equity; and

4. Systems thinking to transcend complexity”

Julio Frenk (2008). Acknowledging the past; committing to the future.
Health systems

WHO’s Original health systems framework by 2008

How Health Systems work…

Inputs and Processes → Outputs → Outcomes → Impact

<table>
<thead>
<tr>
<th>Governance</th>
<th>Financing</th>
<th>Human resources</th>
<th>Medicines</th>
<th>Information</th>
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<tbody>
<tr>
<td>Service delivery</td>
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<td>Effective Coverage</td>
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<td>Responsiveness</td>
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Improved:
- survival
- nutrition
- equity

Reduced:
- morbidity
- impoverishment

But is this simple linear logic the way things really work?

Modified from: WHO Everybody’s business, 2008 & Health Metrics Network Framework
“A system is not the sum of its parts; It is the product of the interaction of its parts”

“What happens between the sub-systems is more important than what goes on within them; and is usually neglected”.

Source: de Savigny and Adam (2009) Systems Thinking for Health Systems Strengthening

Health systems are complex adaptive systems
And all building blocks are increasingly fragmented!
Here is the Medicines & Technologies block in one country
Complex adaptive systems

Self-organizing, constantly changing, tightly linked, non-linear, history dependent, counter intuitive, and governed by emergence and feedback....

Systems thinking

Systems thinking gives deeper insights into:

1. how a system works,
2. why it has problems,
3. how it can be improved

Systems thinking involves shifting attention...

- from the parts to the whole,
- from objects to relationships,
- from structures to processes,
- from hierarchies to networks,
- from rational to intuitive,
- from analysis to synthesis,
- from linear to non-linear thinking.

Adapted from Fritjof Capra

Tipping points

Small changes can produce big results!

but points of highest leverage are least obvious

There are no rules for finding tipping points, but there are ways of thinking that make it more likely.

Learning to look system-wide and see underlying processes, approaches and contexts rather than "events" is a starting point...
1. The mind-set or paradigm out of which the system its goals, power structure, rules, culture arises.
2. Goals of the system
3. Distribution of power over the rules of the system
4. Rules of the system (incentives, constraints)
5. Information flows
6. Material flows
7. Driving positive feedback loops.
8. Regulating negative feedback loops
9. Constants, parameters, numbers, subsidies

**Tipping points**

**Leverage points when intervening in a system**  
(in decreasing order of effectiveness)

- The mind-set or paradigm out of which the system its goals, power structure, rules, culture arises.
- Goals of the system
- Distribution of power over the rules of the system
- Rules of the system (incentives, constraints)
- Information flows
- Material flows
- Driving positive feedback loops.
- Regulating negative feedback loops
- Constants, parameters, numbers, subsidies

Governance

We tend to work mainly at these levels

Modified from Donella Meadows

**Systems Thinking for Health Systems Research**
Towards systems thinking methods for health systems research

- 2009: Concepts
- 2012: Strategies
- 2014: Applications
- 2017: Methods

Tools for the health research continuum

- **Research Domain**
  - Implementation Research
  - Operational Research
  - Intervention Trials
  - Risk Factor Studies

- **Health Policy & Systems Research**

- **Users**
  - Developers & researchers
  - Health care providers
  - Programme managers
  - Policy makers and system managers

- **Increasing value for health policies and systems**

Adapted from Remme et al. PLoS Med 7: 2010
Health systems research from a systems thinking perspective

✓ Health systems research is moving to the heart of global health development;

✓ Behaviour of complex health systems is determined by the actions of actors and institutions and the power and politics that operate between them;

✓ The messy, non-linear, loopy, counter-intuitive nature of health systems demands a different approach to research;

✓ Health systems research from a systems thinking perspective is more than research on health systems or policy, and different from implementation research;

✓ Some examples ....

All interventions have system-wide effects

Source: de Savigny and Adam (2009)
Systems Thinking for post-policy evaluation research

- **KEY COMPONENTS OF EVALUATION**
  - PROCESS EVALUATION
    - What is the state of the policy process?
    - What is state of implementation (adequacy)?
    - What changes could result in effects?
    - What facilitates / impedes the intervention?
  - CONTEXTS EVALUATION
    - What other co-interventions are relevant?
    - What else is changing in the system?
  - EFFECTS EVALUATION
    - What are the positive effects on coverage?
    - What health / equity benefits result?
    - Are there any unintended consequences?
  - ECONOMIC EVALUATION
    - Is the intervention a good use of resources?

Source: de Savigny and Adam (2009)

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A catalogue of useful methods for ...

- Low, middle and high-income countries
- Students of global health
- Health systems researchers and research users
- Health system managers
- Health professionals
Applied methodologies

Each methods chapter has the same two part structure:

1. Historical overview of the method, its theoretical underpinnings and a clear description of the method.

2. Practical, real-world, worked example of an actual application of the method to illustrate how it can be implemented to tackle a relevant health system research challenge.

11 Methods & 20 authors

- **Approaches for embedding research**  (Jill Olivier, Vera Scott, Dintle Molosiwa and Lucy Gilson)
- **Boundary Technique**  (Martin Reynolds and Helen Wilding)
- **Soft Systems Methodology**  (Kathy Kotiadis)
- **Cynefin**  (Annabelle Mark and Dave Snowden)
- **Causal Loop Diagrams**  (Andrada Tomoaia-Cotisel, Hyunjung Kim, Samuel Allen, and Karl Blanchet)
- **Network Analysis**  (Karl Blanchet and Jessica Shearer)
- **Human Systems Dynamics**  (Glenda Eoyang)
- **Process Mapping**  (Daniel Cobos Munoz and Don de Savigny)
- **Systems Dynamics**  (Erik Pruyt)
- **Scenario Technique**  (Horst Vollmar)
- **Outcome Mapping**  (Jenna Evans)
### Systems thinking tools for health systems research

#### Tools for **describing and analysing** situations

<table>
<thead>
<tr>
<th>Tool</th>
<th>Use</th>
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<tbody>
<tr>
<td>Causal Loop Diagrams</td>
<td>To visualize emergent behaviour and explore non-linear interrelationships</td>
</tr>
<tr>
<td>Systems Dynamics modeling</td>
<td>To explore consequences of non-linear relationships and modelling and testing solutions in whole systems</td>
</tr>
<tr>
<td>Social Network Analysis</td>
<td>To identify and map the stakeholders, the relations among stakeholders, and the structure of their network/systems</td>
</tr>
<tr>
<td>Outcome Mapping</td>
<td>To plan, monitor and evaluate how complex interventions contribute to outcomes</td>
</tr>
<tr>
<td>Process Mapping</td>
<td>To understand processes and how information flows in complex multi-stakeholder settings</td>
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#### Tools for **changing and managing** situations

<table>
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<tr>
<th>Tool</th>
<th>Use</th>
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<tbody>
<tr>
<td>Process mapping &amp; modeling</td>
<td>For understanding processes and how interventions might integrate and work in the system</td>
</tr>
<tr>
<td>Boundary critique</td>
<td>For framing research methodological design in relation to the system boundaries</td>
</tr>
<tr>
<td>Soft systems methodologies</td>
<td>Approach for stakeholder and researcher participatory reflection on the problem</td>
</tr>
<tr>
<td>Complexity Analysis (Cynefin)</td>
<td>Sense making framework to distinguish simple, complicated, complex and chaotic situations and guide to managing risk</td>
</tr>
<tr>
<td>Human systems dynamics</td>
<td>A suite of tools for understanding self-organizing behaviour of actors in the system</td>
</tr>
<tr>
<td>Scenario technique</td>
<td>For simulating and reflecting on alternative solutions in strategic planning</td>
</tr>
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Application of Systems Thinking Tools and Approaches

For presentation in this symposium

Approaches and tools that can help

- Embedded Systems Approaches
- Boundary Critique
- Soft systems
- Cynefin
- Causal loop diagrams
- Network analysis
- Human systems dynamics
- Process mapping
- System dynamics modeling
- Scenario technique
- Outcome mapping

I need to...

- Describe the system and its boundaries
- Analyze stakeholder relationships and engagement
- Identify and understand systems problems
- Identify solutions to problems
- Support decision making processes (negotiation)
- Test and model potential solutions
- Monitor and evaluate system interventions

Use of visualization tools
Use of software applications

Thank you