

Research and Interventions in Complex Adaptive Systems

CHORUS Webinar

Monday 6 December 2021

Objectives

- Provide a theoretical background to /understanding of the characteristics of the health systems as a Complex Adaptive Systems and issues in implementing and evaluating interventions as part of research in such systems
- Facilitate the application of this theory in co-designing and evaluating health systems research and interventions in general and the CHORUS project 1 in particular, giving thought to intended and unintended effects and implications for design and evaluation



Context

- **Environmental context:** factors external to a country, such as international political environment and international agreements, obligations, and pressures. E.g. SDG
- **Situational context:** ‘...a more or less transient, impermanent, or idiosyncratic condition or event that has an impact on policy [decision-making]’.³⁶ E.g. wars and conflict, terrorism, economic cycles, natural disasters such as epidemics, droughts, floods, oil spills and earthquakes.
- **Structural context:** “...the more permanent and persistent features of a system, such as its economic base, political institutions or a demographic structure. These features have a more sustaining and, therefore, generally more predictable impact on policy [decision making] than situational factors”.³⁶ Eg. political, macroeconomic, social, demographic and ecological structures.
- **Cultural and socio-political context:** “...the value commitments of groups within the community or the community as a whole...”.³⁶ Eg. norms and values, national heritage, formal and informal political cultural norms and values concerning the role of the individual and the state, as well as traditional social values relating to social institutions such as marriage, the family, gender roles, religious values and religious institutions.

Leichter HM. A Comparative Approach to Policy Analysis: Health Care Policy in Four Nations .
Cambridge: Cambridge University Press, 1979

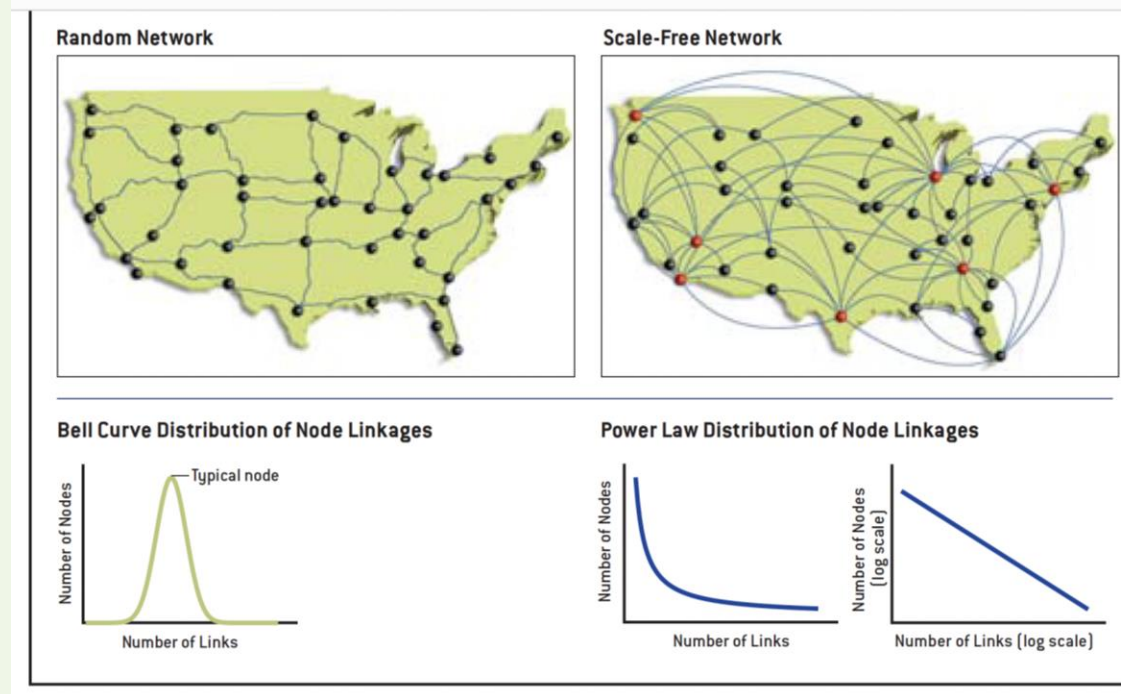
Complex Adaptive Systems (CAS)



- Systems are made up of tightly interlinked components.
- This means actions and effects in one part almost invariably have intended and unintended effects of varying magnitude and duration across several other parts, and often across the whole.
- Systems can be simple e.g., a lock and key, complex e.g., a car or complex adaptive e.g., a health system
- CAS have separate but interconnected parts
- Can only be fully understood by appreciating the relationship and interconnectedness between the parts
- Constantly changing, governed by feedback
- Intervening in one part of the system will almost always have ripple effects in other parts of the system.

Scale Free Networks

(Reference: Barabasi & Bonabeau 2003. Scientific American)



The Health System

The health system refers to all organisations, people and activities whose primary intent is to promote, restore or maintain health

Central to health systems are people in diverse roles within the system such as decision makers, frontline providers and managers, as well as the clients and users of the system.

People are central to the complex adaptive nature of health systems

People – Actors and Stakeholders

- People in roles (that may overlap) as:
 - Providers
 - Payers /financiers
 - Consumers /clients
 - Community members
 - Managers and decision makers at all levels
- People within health systems as actors and stakeholders with individual and group:
 - Interests
 - Power & Influence
 - Ideas
 - Values
 - Experience, knowledge, skills

Conceptual Framework – the Health System: A shelter for population health

ROOF:
PROGRAMS & INTERVENTIONS
(Delivery: Access, Quality, Utilisation)

PILLARS: VALUES
Responsiveness

PILLARS: VALUES
Equity
/Fairness/Justice

PILLARS: VALUES
Rights and
responsibilities

MORTAR

- People, power, interests, trust, networks and processes and related complexity and adaptability

FOUNDATIONAL BRICKS / BUILDING BLOCKS

- Resources: Human, Medicines and technology, Infrastructure tools and supplies, information systems, financing,
- Governance (includes policy making) systems and structures

**Context: (1) The ground on which the foundation is laid (rock or sand) &
(2) the situations to which the building is exposed over time (winds & storm)**

Why does it matter to pay attention to Health Systems?

- “A goat that belongs to the whole village belongs to nobody” Nigerian proverb.
- Health Systems belong to everybody (all programs) and therefore to nobody (no program)
- But everybody (all programs) needs them to be able to function
- Illustration of how interventions can play out in CAS

Crisis Ridden Decision Making in a Complex Adaptive System

When ‘solutions of yesterday become problems of today’: crisis-ridden decision making in a complex adaptive system (CAS)—the Additional Duty Hours Allowance in Ghana.

Health Policy and Planning, Volume 27, Issue suppl_4, October 2012,
Pages iv20–iv31, <https://doi.org/10.1093/heapol/czs083>

Problems arise in a context – not a vacuum

- Average monthly basic salaries for junior and senior doctors were about US\$ 199 and 272, respectively, at the start of the ADHA saga in 1998.
- Brain drain and shortages of highly trained and skilled HR e.g. estimated that between 1986 and 1995, 60% of doctors from the country's main medical school emigrated – mainly to US and UK
- High Client to public sector health professional staff ratios and workloads heavy, because of staff shortages.
- In 2002, estimated 6.2 physicians per 100,000 pop. in Ghana as cf. 279 in the US and 164 in the UK
- A few years before the events described, doctors had fought without success for overtime payment

Chronology of Events

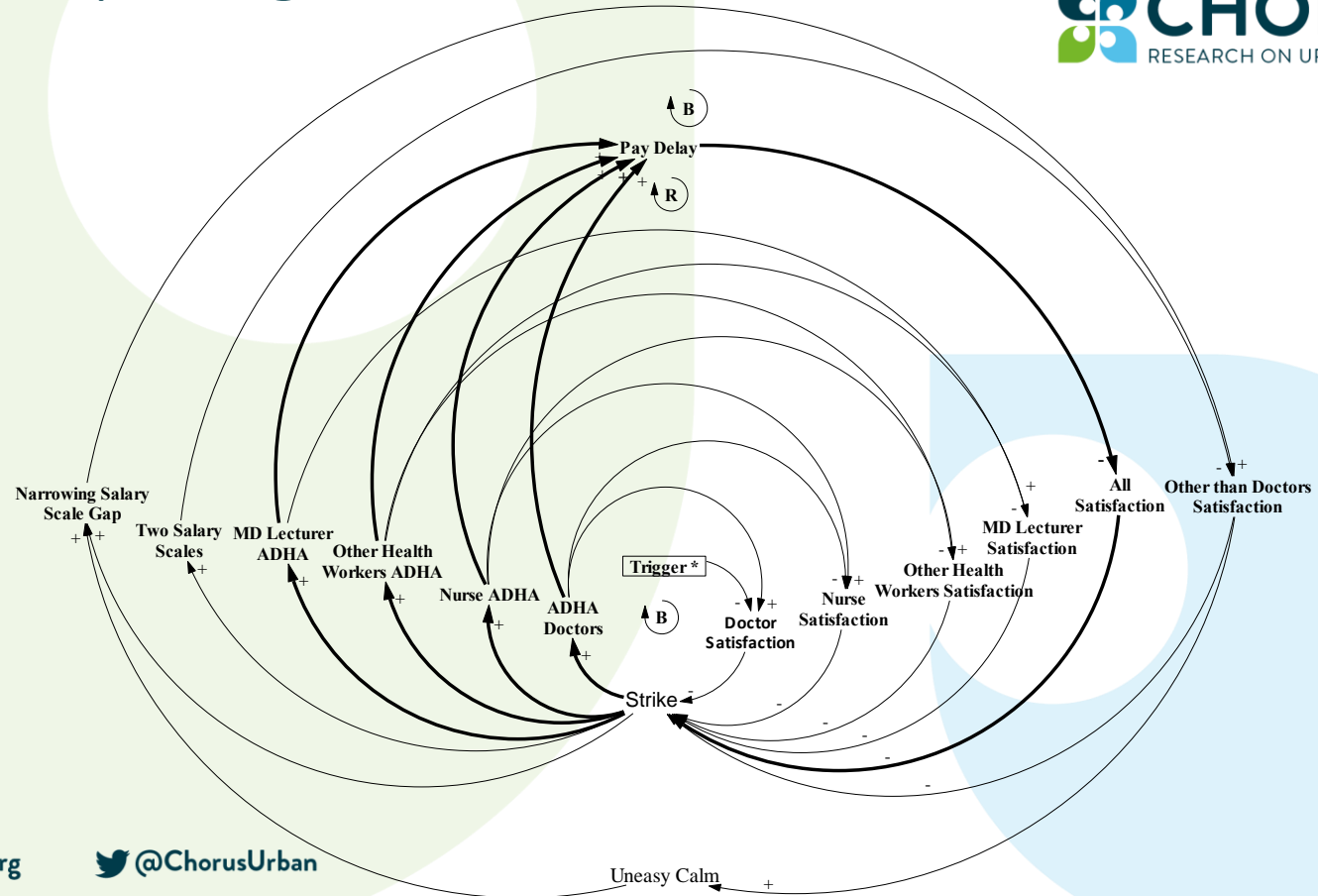


Dates	Events
1998 Genesis	<p>37 Military Hospital wage increase GMA industrial action & presentation of options to government MOU signed in Dec between GMA and GOG for limited ADHA</p>
1999 – 2000 Evolution	<p>Junior doctors at Korle Bu TH strike over payment delay Fund for the payment of the ADHA to doctors released 26/2/99 Industrial actions and threats by other Health Care Workers (HCWs); Junior nurses strike, immediately followed with threats by the Medical Assistants, the Pharmacists, the Bio-medical Sciences and general Health Service Workers Associations agitating for inclusion in, ADHA By September 1999 nurses included MOU between GOG & other HCWs (represented by their union leaders) for ADHA based on 3 conditions: Additional time, Timesheets and Vetted There were further strikes due to late payment of ADHA Non-clinical staff and medical school teachers get ADHA. Unofficial implementation of local “ADHA Committee”</p>

Chronology of Events

Dates	Events
2001 – 2004 Full Implementation	<ul style="list-style-type: none">Further local strikes and raising of ceilingsUneven application of rules on limits and time accountingIncreasing administrative burden of ADHA at districts and regionsDiscussions of consolidation of ADHA into salaries beginFinancial ceilings reset and flat rates by cadres introduced as step to consolidation
2005 – 2007 Consolidation into pay reform	<ul style="list-style-type: none">Government issues report “Restructuring the ADHA” September 2005GOG issues circular formalizing the consolidation of ADHA into salariesLast ADHA payment, December 2005Continuing industrial action by doctors and other HCW regarding the terms of consolidation and delayed first paymentJune 2008 first payment of consolidated salary back dated to January 2006

Causal loop diagram



Drawing lessons

- Self organisation and adaptation based on experience.
- Path dependence (history matters)
- Feedback loops
- Emergent behavior
- Phase transitions /tipping points / triggers (critical point at which radical change takes place)
- Scale free networks

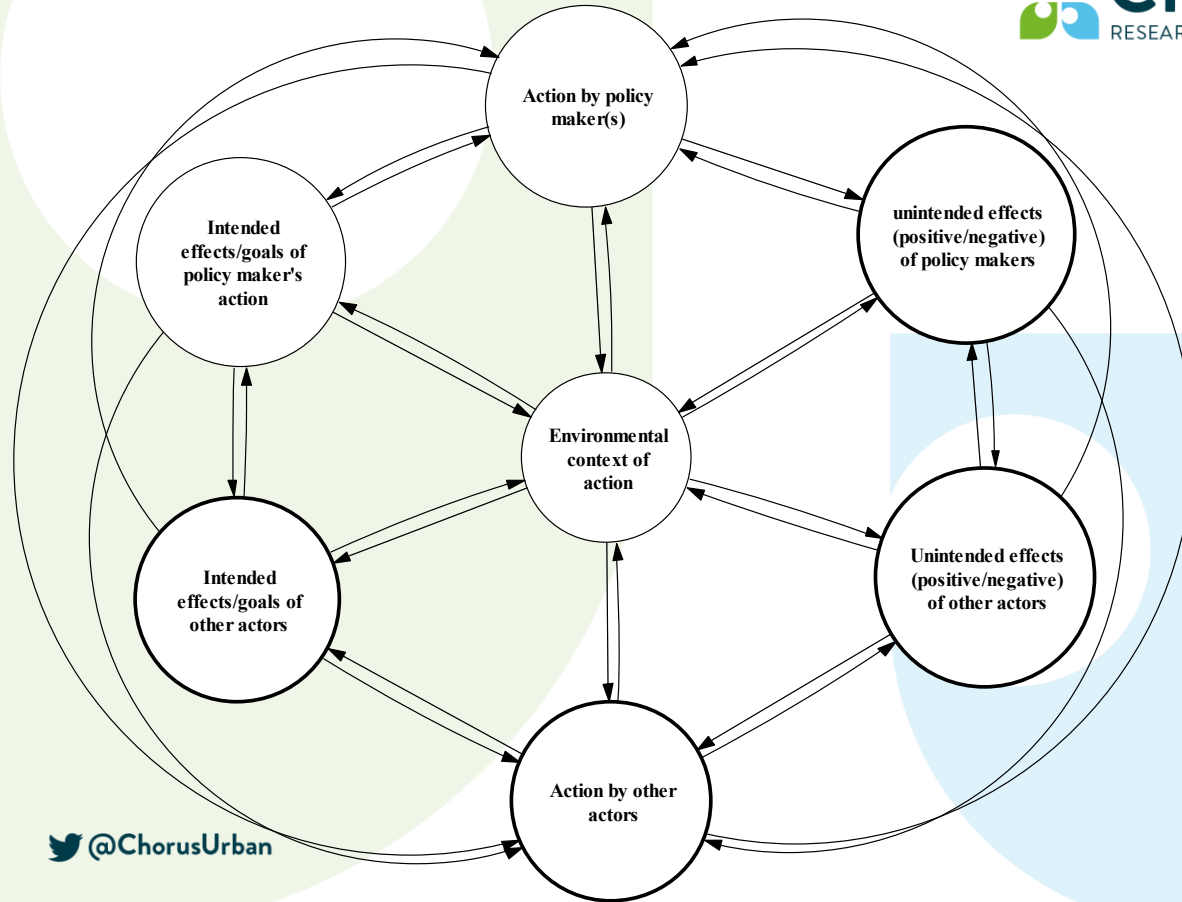
Drawing lessons

- Critical to understanding this case study is the concept of health systems as Complex Adaptive Systems (CAS)
- CAS are made of separate but inter-related parts
- Can only be fully understood by appreciating the relationship and interconnectedness between the parts
- Self organize and adapt based on experience.
- Actors and stakeholders and their power in shaping and responding to change are an important part of this complexity
- Constantly changing, governed by feedback, intervening in one part of the system will almost always have ripple effects (desired or undesired) in other parts of the system.

Drawing lessons

- Thinking about health systems as Complex Adaptive Systems (CAS) is an essential step in conducting research and designing and evaluating interventions in health systems contexts
- The ADHA saga in Ghana illustrates the importance of this and the challenges and results of crisis driven, linear, and reductionist decision making within (CAS).
- Understanding and applying systems thinking principles in CAS, in design of your baseline research and interventions and the evaluation and keeping an eye out for intended and unintended effects is critical.
- Social science skills such as stakeholder analysis, listening and dialogue, ongoing systematic examination of consequences, intended and unintended effects, inclusion of and brainstorming with relevant stakeholders, negotiation and conflict resolution.

Drawing lessons: Conceptual Model



Breakout group discussions: CHORUS Country Teams

- Have the issues we have been discussing been adequately addressed in your plans?
- Do you want to make any modifications?
- How can you plan to use this when you are ready to focus on the implementation plans for co-design of your research project interventions?
- Are there issues you need to watch out for including stakeholders you may have overlooked,
- Are there potential intended as well as unintended effects
- How do you plan to follow up





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