Using Systems Diagrams to Conceptualize Context and Interventions in Pragmatic Research

Erin Kenzie, PhD

Abstract

Despite broad recognition of the need to account for complexity in pragmatic research, many available conceptual tools and frameworks are linear or categorical. Diagramming approaches from systems science such as causal-loop modeling and stock-and-flow diagramming can be used to visually describe how an intervention is believed to act on multilevel contextual factors to produce outcomes. Several examples will be briefly presented, and advantages and limitations of this approach for pragmatic research teams will be discussed.

Learning Objectives:

1. Learn how systems diagrams can be used to illustrate complex interconnections between context, interventions, implementation strategies, and outcomes
2. Learn to compare systems diagrams with standard frameworks
3. Learn about advantages and limitations of using systems diagrams to support decision-making in pragmatic research

Notes

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Key Terms

- Dynamic complexity: Arises from interactions between variables over time; beyond detail complexity
- Dynamic hypothesis: A working theory of how a problem arose and is perpetuated
- Causal-loop diagram: Node-and-arrow diagram illustrating feedback loops and interrelationships
- Stock-and-flow diagram: Diagram illustrating accumulations and flows; can lead to simulation

Colorectal cancer screening example

Link to diagram: https://kumu.io/ekenzie/smarter-crc-cld-v2

Link to walkthrough: https://ekenzie.kumu.io/managing-complexity-in-smarter-crc-v2

Characteristics of systems diagramming approach

- Describes *how* system structure produces behavior
- Centers the problem or system and its context
    - Interventions are seen as attempts to change system behavior
- Can be used as a conceptual model
    - Can be a mirror for study team's mental model
    - Can help align and refine perspectives of team members
    - Can draw from various source material
- Can be used to aid planning and analysis
    - Should be revisited & revised
- Time intensive and requires training

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