Systems thinking for noncommunicable disease prevention policy

World Health Organization
European Region

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Systems thinking refers to the process of considering the bigger picture when developing a solution to a problem. This style of thinking is especially important when trying to create solutions to complex problems that are influenced by a range of dynamic factors, including individuals, populations and organizations, all requiring consideration. One area in which systems thinking approaches are rapidly developing is noncommunicable disease (NCD) prevention.

NCDs are often multifactoral in nature, and it is well established that the impact of a variety of stakeholders and systems (such as food and transport systems) must be considered for NCD prevention policies to be successful. As a result, systems thinking has an invaluable role in the development of evidence-informed policies on NCDs. Systems approaches often encourage the involvement of different stakeholders, ensuring that policy development remains collaborative, transparent, inclusive and democratic.

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This issue is considered of particular importance in the WHO European Region where NCDs are responsible for approximately 90% of deaths and 84% of years living with disability.[1] In order to support more widespread use of systems thinking in NCD prevention policy, the WHO European Office for the Prevention and Control of Noncommunicable Diseases (NCD Office) has developed "*Systems Thinking for Noncommunicable Disease Prevention Policy: Guidance to Bring Systems Approaches into Practice*". This Manual is intended to summarize the characteristics of systems thinking, guide practitioners in selecting an appropriate method and share best practice examples of how systems approaches have been applied in NCD prevention policy.

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This ground-breaking document aims to provide a detailed insight into what systems thinking is and how it can be utilized in NCD prevention policy. In the Manual, real-world examples of how systems thinking approaches have been implemented at local, national and international levels are also provided for a variety of NCD policy areas (including tobacco control, obesity prevention, urban health and nutritional outcomes) from a range of global regions.

This factsheet aims to provide an overview of the Manual by introducing key concepts in systems thinking and examples of its approaches utilized in NCD prevention policy.

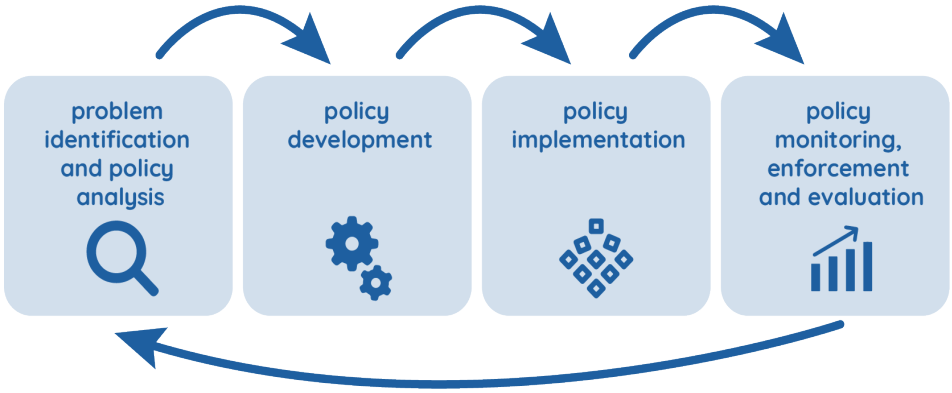
[1] IHME (2022). GBD compare. In: Viz Hub [website]. Seattle (WA): Institute for Health Metrics and Evaluation; 2022 (https://vizhub.healthdata.org/gbd-compare/, accessed 10 July 2022).

An introduction to systems thinking

Systems thinking refers to a set of ideas and methods that encourage us to look at the bigger picture when addressing complex problems. For systems thinking to be effective, a range of systems approaches can be implemented. **Systems approaches** are methods or methodologies that encourage the implementation of systems thinking. Key systems approaches are outlined in this factsheet and are explained in detail in the Manual.

In brief, systems approaches can be quantitative or qualitative and can be applied to different steps in the policy cycle (Fig. 1). The choice of which systems approach to implement depends on the issue being addressed, the resources available (including fiscal costs, data access, personnel availability and expertise), and proposed project time scales. Importantly, some methods that are costly in one area may be less costly in others. For example, quantitative approaches can often require less input from stakeholders than qualitative approaches but can require more access to other types of data.

Fig. 1. The policy cycle



One advantage of utilizing systems approaches when developing NCD policy is that they can allow for leverage points in a system and can identify unintended consequences of a policy. **Leverage points** are points in a system in which a small amount of change can lead to significant system-wide impacts. Thus, through the identification of these leverage points, it is possible to maximize the success of a policy. **Unintended consequences** are responses in a system that occur as a result of policy change that may have been hard to predict without the adoption of a systems approach. These consequences can be either beneficial or harmful and can help us to understand the wider-scale impact of a policy in a real-world setting.

In addition to better understanding of the broader impacts of a policy, systems thinking allows us to examine how the impact of a policy can change over time due to the dynamic nature of systems. For example, there can be temporal **delays** between the implementation of a policy and when the effect of a policy can be observed in a system. **Feedback loops** can also exist within a system, meaning that changes to one part of a system may affect other aspects of the system. Finally, these changes to other parts of the system **may not be linear**, resulting in policies having disproportionate impact elsewhere in the system following their implementation. Delays, feedback loops and non-linear relationships can all influence the success of a policy, meaning that it is important that they are understood and considered when designing and implementing policies. Concise definitions of each of these key points can be found in Table 1.

Table 1. Key concepts in systems thinking

Concept	Definition
Systems thinking	A set of ideas and methods which encourage us to look at the bigger picture
Systems approaches	Specific methods or methodologies (a set of procedures for gathering or interpreting data and/or evidence) informed by systems thinking principles
Leverage point	A point in a system where a small intervention can lead to substantial, system-wide changes
Unintended consequence	Response provoked when intervening in a system that is unintended or difficult to predict (can be harmful or beneficial)
Nonlinear relationship	A relationship between two elements in a system where the cause does not produce a proportional effect
Feedback loop	A closed chain of causal connections resulting in the output of a system or system element feeding back into itself
Delay	An interval of time between cause and effect, which can create instability and fluctuations in system behaviour

Examples of systems approaches

A variety of qualitative and quantitative systems approaches are outlined in the Manual. Details on the advantages and disadvantages of each approach are also provided, along with an overview of the policy cycle, guidance as to which stage of the policy cycle each systems approach can be applied, and real-world examples of each approach. Table 2 provides an overview of the systems approaches covered in this Manual.

Table 2. Examples of systems approaches covered in the Manual

Method	Overview
Concept mapping	Considers stakeholders' views by the development of concept maps, typically through workshop sessions, which can be conducted independently
Cognitive mapping	Utilizes network diagrams built from stakeholder interviews to understand relationships between different factors in a system
Agent-based modelling	Models individual behaviours, autonomous agents and environmental factors in a specific environment to understand the policy impacts
System dynamic modelling	Allows for the comparison of policy options by evaluating the impact of complex changes to a system over time
Causal loop diagram	Maps causal relationships between system elements to allow for a better understanding of which factors influence policy decisions
Group model building	Allows for the comparison of policy options by modelling temporal changes in a system over time
Network analysis	Aids in the understanding of social and institutional networks by mapping shareholders' connections, allowing influential or disconnected stakeholders to be identified
Qualitative comparative analysis	Evaluates complex health problems by identifying the simplest set of conditions that characterizes the presence or absence of an outcome

Using a systems lens

In addition to providing a detailed insight into systems approaches, the Manual also provides information on the importance of applying a systems lens to a conventional research setting. Utilizing a systems lens refers to the process of considering the impact of a policy on the whole system throughout the policy cycle without implementing a specific systems approach. By applying a systems lens to conventional research:

- the complexity of problems can be better appreciated;
- gaps in the policy landscape can be identified, and
- stakeholders' engagement can be improved.

Unlike other systems approaches, the application of a systems lens requires less expertise and resources, making it a good introduction to systems thinking.

Conclusion

The Manual on systems thinking for NCD prevention policy provides guidance on bringing a systems approach into practice and important insights to support using systems thinking in health issues such as NCD prevention. The Manual has specific examples of systems thinking approaches in practice, and information on important next steps for the use of systems thinking approaches in NCD prevention policy.

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