Guidance on Systems Approaches to Local Public Health Evaluation

Part 2: What to consider when planning a systems evaluation

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NIHR | School for Public Health Research

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Part 2: What to consider when planning a systems evaluation

Executive summary

Systems thinking can help you evaluate activities aimed at improving population health and reducing health inequalities. In Part 1 of this Guidance, we introduced systems thinking. In Part 2, we now consider the circumstances when it makes sense to adopt a systems-informed approach to evaluation. Decisions about when and how to conduct a systems-informed evaluation should take into account the evidence needs of decision makers. Evaluation planning also involves considering pragmatic issues such as the resources and skills available for evaluation. Once an evaluator has a clear idea of what the research is supposed to inform and what resources are available, it is time to consider the methodological options and design the evaluation. Figure 1 below summarises these steps.

In this Guidance, we introduce you to six different types of methodologies used in different systems evaluations. These types of methods have different, but overlapping, purposes and can be used to address different types of evaluation question. In common with much research, systems-informed evaluations face the challenge of producing findings that will really help improve decision-making. We provide some practical tips on how to report systems-informed findings in ways that decision-makers find useful and accessible: e.g. avoiding conclusions that focus exclusively on methodological issues or that simply restate that an intervention's impacts were 'very complex.' Clear and concise messaging that keeps in mind what the evaluation was meant to inform in the first place are crucial.
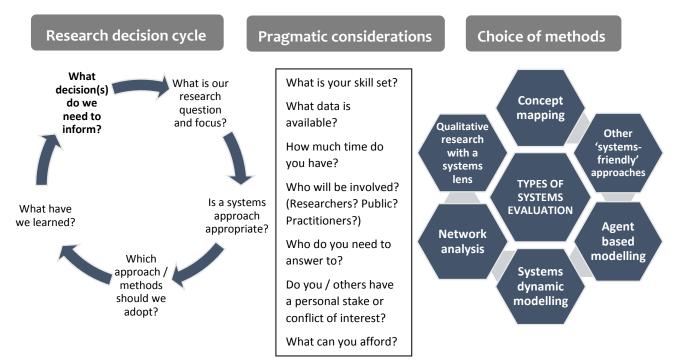

Figure 1: Planning a systems-informed evaluation: decision cycle, practical considerations and methodological choices.

About this Guidance

In this Guidance, we want to help readers plan an evaluation by providing advice on whether or not a systems approach is the right way forward and, if it is, what type of approach to opt for. It is Part 2 of a series. In Part 1 we introduced readers to systems thinking.

We developed the Guidance to help local professionals and researchers evaluate public health policies, related services and interventions. We recognise that we live in a world of limited resources, including resources available for evaluation. Consequently, the choices of *what should be done?* and *what can be done?* are entangled – including choices about what to evaluate and how.

> *A complex systems approach can overcome the frustration of having "the right answers to the wrong questions" for persistent public health problems.'*
>
> Rutter et al, 2017.

For this guidance we took inspiration from the quote above, and the paper it came from[1]: it highlights the need for evaluations to answer the 'right' questions to inform decision-making on how to tackle our most persistent public health problems. Evaluations can be criticised for having the "right answers to the wrong questions" if they have focused on what can be easily measured whilst neglecting some of the thornier, messier, hard-to-measure issues that, nonetheless, have a potentially crucial role to play in a successful public health strategy. Here we will advocate putting the decision makers' needs first in your evaluation planning. Methodological considerations, including whether or not to adopt a systems approach, flow from our understanding of what the research need actually is.

How did we produce the Guidance? We consulted international experts and UK professionals who work in public health and allied sectors. Our preparation included three practitioner workshops to guide us at different stages of producing the Guidance. We provide more details of our methods and our literature review in separate publications.

A note on terminology. Technical jargon can help people describe things more precisely but can also be off-putting and confusing. This guidance will attempt a compromise between plain English and explained jargon. Part 1 of the Guidance includes a glossary table, with examples, for many of the most commonly used 'systems' terms.

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[1] Rutter H, et al. (2017). "The need for a complex systems model of evidence for public health." The Lancet 390(10112): 2602-2604.

Planning a systems evaluation

In the decision cycle in Figure 1, we outline some key questions an evaluator might want to ask when planning a systems evaluation. It is circular because an evaluation should begin with a question about what decision(s) the evaluation will inform and leads to learning points that prompt new decisions for both deliverers and evaluators.

What decision(s) do we need to inform?

What is our research question and focus?

Is a systems approach appropriate?

Which approach / methods should we adopt?

What have we learned?

What is your skill set?

What data is available?

How much time do you have?

Who will be involved? (Researchers? Public? Practitioners?)

Who do you need to answer to?

Do you / others have a personal stake or conflict of interest?

What can you afford?

Figure 2: Decision cycle and pragmatic considerations for a systems evaluation

However, in our experience, diagrams like this suggest a logical, staged process that rarely turns out so neat in practice. For one thing, pragmatic considerations run alongside these decision points (as they do in the box in Figure 1), and these will also influence the kinds of evaluation one can do. Incidentally, we are not assuming here that research evidence is the only, or even main, factor influencing decisions. There has been lots written by others about how policy makers and practitioners think (or avoid thinking) about evidence when making decisions – literature we do not cover in any detail here.

We will outline some of the questions an evaluator might want to consider when planning a **systems evaluation**. These include:

(i)   What research questions or focus a systems evaluation might have?
(ii)   When is a systems approach appropriate (and when not)?
(iii)   Why might a 'traditional' evaluation approach be problematic?; and
(iv)   What different systems methods can be adopted?

We will end the section with some comments about how to draw out useful findings that can be translated into practice.

What can a systems evaluation focus on?

Here we consider what a systems evaluation might focus on. This can mean thinking about what the evaluation is intended to reveal, and about the kinds of interventions or activities the evaluation can assess.

> *Evaluation: The making of a judgement about the amount, number, or value of something; assessment.*
>
> Oxford Dictionary Definition

Decisions about what policies and interventions to put into practice are often subtly different to the kinds of research questions that evaluations can address. Decisions about practice tend to be value-based: e.g. *Is this the right thing to do? What is the best thing we can do given current circumstances? What can we do to make things better?*

Decisions about what to evaluate tend to be more specific and measurable. *Is this intervention effective at achieving X? Does it have any unintended consequences? Who tends to benefit and who does not? What helps or hinders delivery?*

So evaluations do not answer every kind of question that decision makers ask, but they should provide useful and reliable information to reduce uncertainty and inform value-based choices.

Over the next two pages we outline some of the issues a systems evaluation might focus on to inform practice decisions. Are all the types of research we describe 'evaluations'? That depends on the definition of 'evaluation'. On the next page, we describe approaches to research that can be considered to be part of a wider evaluation process, such as: identifying factors that contribute to a specific problem or its solutions; and modelling hypothetical scenarios that help in considering the potential impacts of interventions before they have even been implemented. On the following page, we talk about the types of interventions that an evaluation might seek to assess – an assessment of an intervention is probably what most people immediately think of when they hear the term 'evaluation.'

Examining problems and solutions from a systems perspective

In Figure 2 we outline 3 broad usages of systems approaches that focus on examining public health problems and identifying potential solutions. These are:

1. **Understanding problems** – for example, mapping out the many, linked causes of obesity, or homelessness, or whichever issue is being addressed. This 'map' can look like anything from a graphical depiction of the links between a few key factors, to a more formalised set of quantified relationships across a system.

2. **Identifying levers of change** – for example, assessing policy options and processes available to local planners who want to change the local food environment, or opportunities for making local public and third sector services better aligned to address a particular issue. When faced with a confusing array of legislative powers and opportunities to develop local innovative practice, a study of 'what can be done?' can be particularly valuable to local decision makers.

3. **Comparing hypothetical scenarios** – This can be done as a thought experiment or with computational modelling approaches. For example, modelling what would happen if fast food takeaways were banned 500m, 200m or 100m from local schools.

Understanding Problems

'Mapping' the multiple factors that contribute to local public health problems.

Examples include:

Identifying what contributes to a rise in homelessness.

The local obesogenic environment: identifying causes and characteristics.

Identifying levers of change

Assessing policy options, stakeholders and assets that can change local systems.

Examples include:

Policy options for reducing local alcohol consumption.

Mapping community and third sector groups relevant to a local health policy.

Comparing hypothetical scenarios

Asking what would happen if part of a system changed. This may involve advanced *modelling* techniques, or *thought experiments*.

Examples include:

Modelling alternative late night alcohol licensing policies for impacts on drinking, crime and the night time economy.
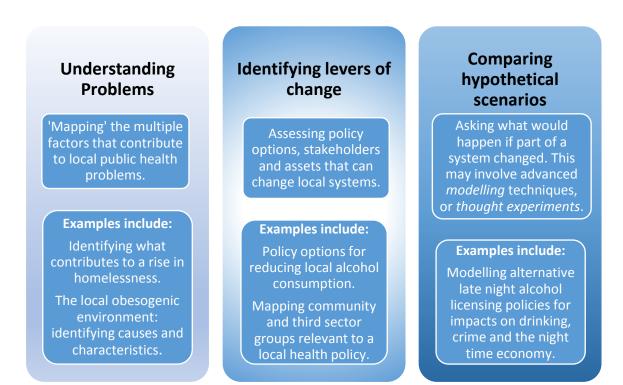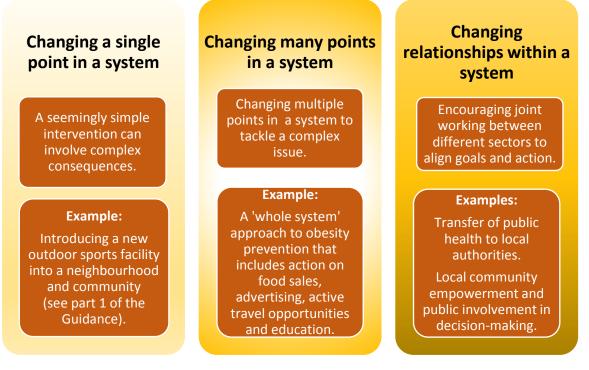
Figure 3: Identifying problems and solutions with a systems approach

What you can evaluate with a systems approach

In Figure 4, we identify three broad types of system change that an evaluation might want to examine. These are:

1. **Changing a single point in a system.** Seemingly simple, narrowly focused changes can lead to complex and unpredictable responses across a wider system. So simple interventions can have complex consequences.
2. **Changing many points in a system.** Some interventions change many points in a system. A strategic attempt to tackle a problem by changing many different contributors to that problem is sometimes called a 'whole system' approach.
3. **Changing relationships within a system.** This is a different type of system change, focusing more on encouraging stakeholders from different parts of the system to work together with the aim of aligning goals, resources and activities. Here, evaluators face the challenge of assessing how this joint working can best be achieved, and what its impacts might be.

Changing a single point in a system

A seemingly simple intervention can involve complex consequences.

Example:
Introducing a new outdoor sports facility into a neighbourhood and community (see part 1 of the Guidance).

Changing many points in a system

Changing multiple points in a system to tackle a complex issue.

Example:
A 'whole system' approach to obesity prevention that includes action on food sales, advertising, active travel opportunities and education.

Changing relationships within a system

Encouraging joint working between different sectors to align goals and action.

Examples:
Transfer of public health to local authorities.

Local community empowerment and public involvement in decision-making.

Figure 4: Different kinds of systems changes that can be evaluated

Many public health interventions involve all three kinds of system change. Still, it may make sense for an evaluation to focus on one point of intervention only, or one form of relationship change. Perhaps there is lack of evidence on that point, or perhaps that is the point around which an important decision needs to be made. This idea that complexity is always with us – but that does not mean that evaluations should aways try to consider every aspect of complexity – is discussed more in the following sections.

Simple, complicated and complex interventions: a matter of perspective

Some readers with an interest in complexity will know that interventions are sometimes grouped into three broad types: *simple*, *complicated* and *complex*.

- A simple intervention is like an easy recipe from a cookery book: follow the recipe exactly and you get the same results again and again.
- A complicated intervention is something far more difficult and technical – but once the technical difficulties are mastered it can be replicated exactly. Like building a circuit board.
- A complex intervention is less predictable and unreplicable: technical expertise might help, but so might experience, personality, favourable environment and luck. Like raising a child.

Do interventions really fall neatly into these three types? No, the world is rarely that neat but the typology is still useful so long as we remember that the simplicity or complexity of the intervention is often just a matter of perspective.

The example of dimming street lights.
Many towns and cities are dimming street lights to save money and energy. In one sense, the dimming of the street lights is a simple intervention affecting one point of the system (the lights) in one way (they get dimmer). However, it is also a complicated intervention: dimming a town's lights is not as easy as it might sound – it can be a technical challenge requiring different kinds of specialist expertise. Finally, we can choose to treat this as a complex intervention by taking in the wider range of stakeholders and factors involved in making this a politically and publicly acceptable intervention, such as local government, environmental lobbying, the public, the media and others that might shape how the intervention occurred and how different people responded to it. The intervention alone does not tell us which perspective to take. It depends on what decision you want to inform.

- If you want to know if street light dimming achieved the core objectives of saving money and energy it can be treated as **a simple intervention** with an evaluation that focuses on economic and energy saving impacts, perhaps comparing different levels of lamp brightness.
- If you also want to see if dimming the lights led to any unintended consequences (e.g. on road crashes, crime, feelings of safety, or other emergent issues), the evaluation could treat it as **a simple intervention with potentially complex consequences.**
- If you want to inform technicians about how best to actually engineer the light dimming, your evaluation could focus on the **complicated** technical choices, problems and solutions that arose, so that the intervention is easier to implement successfully in the future.
- Or you may want a much more **complex perspective**, which for example, examines how political action of this kind occurs, or how (and whether) economic and environmental objectives and stakeholders representing them can be brought into alignment when developing local policy.

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Deciding whether or not a systems evaluation is appropriate

A systems-based approach may not always be useful. Even if it seems worthwhile to adopt a complexity lens, that does not mean that *every* aspect of complexity really needs to be explored. This would require a lot of resources, and may not even be particularly helpful to decision makers. The key is deciding what decisions need to be made and what evidence would most usefully inform those decisions.

Evaluators need to think about whether taking a systems approach will practically enhance the evaluation; that is, whether it will increase the usefulness of the evaluation evidence to decision makers. A pragmatic balance therefore needs to be struck between appropriately and accurately representing the complexity of the intervention, and producing findings that are meaningful and useful. The following questions may be helpful in striking this balance.

Will a complex systems perspective be useful for my evaluation?

To answer this question, first consider what your stakeholders (i.e. your evidence users) really want to know about:

- If your users only want to know about the effects of the intervention on the individuals who received it, they may not be interested in a wider system perspective (though that may simply be because they are not aware that this could be useful to them).
- Users may not find a systems approach useful if they are unable to act on the findings. For example, we know that poverty is affected by global economic policies – but local public health practitioners or councillors do not influence these in the course of their daily work.
- Although interventions of any size can be viewed from a systems perspective, it may not be as useful to do so if the intervention only acts on a very small scale for a specific group of people within a generally stable wider system.

The butterfly effect

The butterfly effect is a metaphor used in chaos theory to describe how even a very small action can have large consequences: i.e. the beating of tiny wings prompts an escalating change to an atmospheric system that ultimately leads to a tornado. Even if this is so, we cannot put resources into assessing the system-wide impacts of every small activity – no more than we should expect lepidopterists (butterfly experts) to spend their time and money assessing the impacts of wing flaps on weather systems.

We can, however, stay open to the possibility of such an effect – and be ready to give it our attention if it starts to look more likely.

At what level(s) does the intervention have its effects?

If the intervention involves changes to wider structures or systems (e.g. through regulation, or new policies, or through the reorganisation of services, or delivery of services) then a systems perspective is more likely to be helpful. This could involve considering the impacts of the intervention at different levels – for example the individual level, the family level, the community level, the organisational level and the societal level. It could also consider how these effects interact at each level.

Do the intervention effects spill-over into other sectors, or areas?

Some interventions affect mainly a small number of outcomes; however, many interventions have effects across many sectors. Free school meals, for example, have been advocated as means of improving health, educational attainment, employability and even the military strength of a nation! They may also have unanticipated adverse effects – for example, targeted rather than universal free school meals may increase stigma for those who receive them.

Does the intervention affect the social, cultural or physical environment into which it is introduced?

Public health interventions often interact with their environment; an evaluation could explore the extent to which this is the case. For example, some interventions do not only change individual level impacts, but also change social norms; legislation to restrict smoking in public places affected smoking rates, but it also affected the wider acceptability of smoking in public places. This, in turn, may have affected individual smoking rates.

What are the processes and mechanisms which lead to impacts?

Decision makers and evaluators may want to know about the processes and mechanisms by which impacts are produced by the intervention of interest. From a systems perspective, this does not mean the ways in which these are produced within individuals. Rather, it means the system-level mechanisms. In other words, by what means does the intervention change the wider system (its structures and processes) to bring about change in individuals?

If (some of) the above aspects of systems are relevant to your intervention, and relevant to the decisions your stakeholders are likely to make, then a systems perspective may be worth considering.
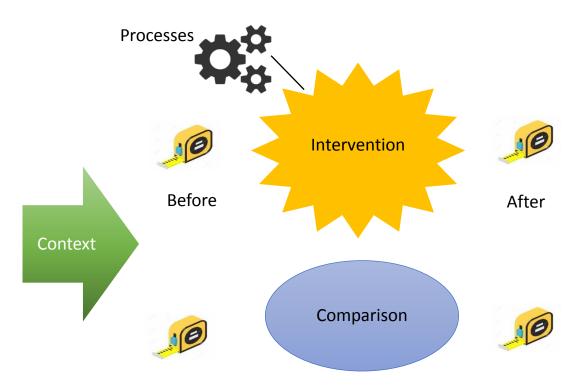
Finally, many people find it helpful to consider where the evidence users' main uncertainties lie. If their uncertainties are to do with the simple effects of an intervention, then this is where the evaluation should focus, at least in the first instance. If their uncertainties relate to spill-over effects (as above), then data collection can be directed towards this topic. However, this is not a hard and fast rule, because decision makers may inadvertently or deliberately focus on simpler, non-system issues. In such cases the evaluator may want to think through the system-level issues, and then direct the evidence users' attention (and the evaluation) towards these areas, if appropriate.

When are 'traditional evaluations' problematic?

As well as asking whether a 'systems' approach is useful for an evaluation, we can also turn the question around and ask why a 'traditional evaluation' might be problematic.

The term 'traditional evaluation' is itself problematic. There are many different evaluation designs and methodological innovation takes place across the field. Here, we will focus on a research design that many will recognise (see Figure 4). It combines impact and process evaluations. Changes in a particular outcome or outcomes are obtained by comparing measurements taken before and after an intervention. A population receiving the intervention is compared to a (hopefully similar) comparison population who do not receive it. A process evaluation is also conducted to learn more about factors affecting implementation and impact, often by interviewing implementers and people receiving the intervention. The evaluators may examine whether the intervention plays out differently depending on the presence or absence of different processes or other contextual factors (e.g. type of area, population differences, organisational differences).

Figure 5: A commonly used evaluation approach

These kinds of evaluations, done well, can help reduce certain types of bias and are particularly useful when thinking about an intervention with a clear start date, goal and suitable comparison population. **Still, there are some *problems and limitations*.** Table 1 presents some of the difficult questions people have been asking about traditional evaluations. Many evaluators – not only system scientists – have raised these concerns. Considering them could help evaluators decide when (and when not) a traditional evaluation is appropriate.

Table 1: Some difficult questions that can make 'traditional evaluation' problematic

QUESTION	EXPLANATION	WHEN CAN A TRADITIONAL EVALUATION BE PROBLEMATIC?
What are *interventions* and are they the norm?	The term *intervention* is not always helpful (although we use it). Many local services run more or less continuously with periodic tweaks and adjustments. Stand-alone 'interventions' (or programmes of interventions) with clear start dates, distinct delivery and impacts are rare, yet evaluations focus on them.	If you are assessing activities that have no clear start date (and in some cases no clear end date). Or an intervention that cannot be easily untangled from the delivery or impacts of other activities taking place at that time.
Should we always have *primary outcomes?*	Local services and activities can have many goals and complex consequences. Pre-specified primary outcomes may help our study design and statistics but may also give us misleading or incomplete findings if evaluations systematically ignore a much wider range of important benefits and harms.	If you lack compelling reasons for picking a particular outcome as being the most important. Statistical convenience or the requirements of funding bodies are not compelling reasons, but the needs of decision makers or a theory of change could be.
Do we confuse *important* with *measurable?*	Evidence to inform public health decision-making is skewed towards supporting interventions that are easier to evaluate: e.g. therapeutic medicine, or other activities that target individuals or (relatively) small groups. More complex interventions risk being undervalued simply because there are fewer studies that have evaluated them and because some of the studies that have been conducted are limited in scope or considered methodologically problematic.	When attempts to evaluate bigger, messier public health activities (like urban regeneration, transport strategies and community empowerment) risk being over-simplified or abandoned because evaluators struggle to design robust, affordable evaluations using traditional approaches.
Why place such emphasis on measuring *non-replicable 'outcomes'?*	Evaluators try incredibly hard to produce robust, precise measures of effects. Unfortunately, differences in setting, implementation and changes over time continually affect implementation and impacts. The goal posts are always moving, undermining assumptions that the effects we have measured so carefully will ever be repeated.	If an intervention is not likely to be replicable, it is time to ask how useful it is to focus evaluations on obtaining highly precise measures of specific impacts. Theories about how the intervention has interacted with the wider system *may* lead to findings that are more transferable across contexts.
Do we have to report findings *after they have happened?*	Many evaluators avoid early reporting of findings for fear that these may affect how an intervention is subsequently delivered. However, findings published too late to influence intervention delivery are also a problem. Concerns about late reporting of findings can be taken further still: perhaps evaluators should try to *predict* future, longer term impacts: e.g. by modelling the impacts of theorised changes.	If an intervention's delivery or its impacts could take years to occur. If the intervention and impacts are hard to reverse once in place and affect many people. Modelling studies can be conducted before or during an intervention – and do not preclude evaluators from going on to evaluate the actual intervention.

What types of systems evaluation methods are there?

Once you have decided that a systems evaluation is appropriate, there is still the question of what type of systems approach you should take.
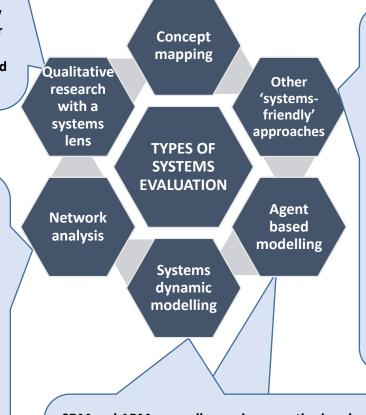
Figure 5 summarises some of the main types of system evaluation methods currently used in public health evaluation – based on a review of the literature we conducted. They range from those that use more qualitative methods, to approaches that use quantitative data, compuational modelling or a mixture.

1. **Qualiative research with a systems lens**. An accessible way of using systems thinking in an evaluation is by incorporating it into qualitative research. This can involve wide sampling of participants from different parts of the system, asking about relationships and change and analysing how different parts of the system affect one another.

2. **Concept mapping.** There are different types of concept maps (and different names for those maps). Unlike network analysis below (which maps networks of individuals or organisations), concept maps can consider broader factors that influence a particular issue or present opportunities for change. They can be analysed qualitatively or be designed to form the basis of computational analysis. A map assessed qualitatively can be quite loosely drawn to capture whatever stakeholders agree to be important. Maps that form the basis of further modelling adhere to specific criteria, defining what kinds of elements and what types of relationships can be modelled.

3. **Network analysis.** Network analysis involves mapping how different people or organisations (or other 'agents') connect to one another. Uses include identifying the key influencers within a network, and whether some parts of a network are 'cut off'. Participants are asked questions about their relationships, which are then mapped out and can be analysed using quantitative methods. Some studies repeat the mapping process to show how a network changes over time. When the focus is on people or organisations, some use the term 'social network analysis' and call the network maps 'sociograms.'

4. **Systems dynamic modelling**. Systems dynamic models use computational models to examine how complex changes occur over time. Different scenarios can be tested by examining how a change in the value given to one part of a modelled system has a knock on effect across the wider system. These wider impacts may then feedback to influence the way the initial change occurs over time.

5. **Agent based modelling.** Agent based models are computational models that simulate the actions and interactions of autonomous agents (e.g. individual people) within a larger group. Agent based modelling can be used to test different scenarios and show how simple rules governing individual decisions can lead to complex, and at times counter-intuitive, population-level impacts over time.

6. **Other 'systems-friendly' approaches.** Studies in this category illustrate the methodological innovation taking place in public health systems science. Some involve adapting other evaluation approaches and applying a systems perspective to them.

Evaluators often use qualitative research in process evaluations to find out how and why things happen in the way they do. Evaluators with qualitative research skills can add a systems perspective by examining how a wider set of stake-holders experience and respond to interventions.

Concept mapping is an accessible way of examining problems and solutions from a systems perspective. Typically, a map can be drawn during a one-day stakeholder workshop although some studies are more resource intensive: e.g. involve follow-up consultations or multiple maps.

This is where much of the exciting systems work takes place as new and old methods are created and adapted – often in a 'learn-as-you-go' approach. One real problem is that evaluators get so caught up in the methods, they may forget to report actual findings to inform practice!

A simple network analysis can help us understand how an intervention works: who is involved, how it diffuses (spreads), who is missed out. Asking key actors about their links to others and mapping them is a fairly simple task, but some studies map large networks and use sophisticated theoretical concepts and statistical techniques.

SDM and ABM generally require expertise in relevant computational methods and system mapping. The level of technical skill and resource needed increases with the complexity of the model, especially when evaluators attempt to use actual, live data to inform their models. They are particularly useful for testing different hypothetical scenarios and identifying unexpected consequences that can emerge over time.

Hexagon diagram labels:
- Concept mapping
- Qualitative research with a systems lens
- Other 'systems-friendly' approaches
- TYPES OF SYSTEMS EVALUATION
- Network analysis
- Agent based modelling
- Systems dynamic modelling

Figure 6: Different types of methods for systems evaluation

There is no single or dominant 'systems approach' to public health evaluation. Rather than advocate for a single approach to systems evaluation, we believe continued innovation in this field is most helpful at this time. Nor is there a neat, consistent set of rules that determine which approach should be used to address what kind of systems question. The choice of approach will be governed not only by its methodological appropriateness, but also the level of expertise and resource required.

Reporting useful findings to guide decisions

If systems evaluations are to inform decision-making, the evaluators have to make sure that findings are produced in a way that people can understand and act upon them.
If you look at some of the systems evaluations that have been published, it becomes apparent that whilst some have clear findings to inform policy and practice, others do not. Reasons for this include:

- Some authors choose to focus on the methodological implications of their work.
- Some state that their findings are not yet sound enough to inform real-world decisions. More data, more analysis or a bigger and better model are needed.
- Some suggest that the evaluation was only intended to inform participating stakeholders about the specific intervention being evaluated and that this has already been achieved.
- Some report so many findings that they (and the reader) get lost in the detail.

It is important that systems evaluations provide useful, practical findings, not least because the uncertainty associated with complexity can be (mis)used by vested interests as an excuse for postponing or avoiding some public health interventions. Below we provide some tips on the kinds of findings a systems evaluation can produce, based on studies we have reviewed.

1. **If your evaluation uses qualitative methods, you should have learned something about different perspectives.** Perhaps stakeholders have different goals and different understandings of how they can be achieved, reflecting divergent interests that may or may not be reconcilable. Perhaps your report can highlight insights into these different perspectives, describe how the activities of different stakeholders influence intervention implementation and impacts, or identify unforeseen consequences within the system.
2. **If your evaluation seeks to map factors that contribute to public health problems or identify possible solutions, which factors or solutions seem most important and most actionable?** Consider how you will choose your most important findings. Often the simplest way is to ask stakeholders to attend an interpretive workshop – but be mindful of people's different perspectives and interests.
3. **If you have conducted a network analysis you might be able to shed light on an intervention's reach or how it spreads (diffuses) across an organisation or network.** Your analysis could test whether some types of relationship encourage diffusion more than others. Perhaps you have been trying to identify key gatekeepers who connect with, and so might influence, many other people. Or perhaps you identified cliques or isolated segments who are less likely to be influenced by changes taking place elsewhere.
4. **If you have modelled different scenarios, you can report on the most favourable and least favourable alternatives,** for example, that might mean exploring whether an intervention performs differently in different settings or for different populations. It may involve comparing different interventions, or examining how the impacts may change over time.

Finally, try condensing your findings into a single, plain English paragraph to tell a 'systems story' describing the most important things you have learned. The "**What? So what? Now what?**" framework described in Part 1 of this Guidance could help. Avoid just concluding that the findings are all 'extremely complex.' We already know that. Be wary of claiming that a problem is too complex for a simple intervention to change (simple interventions can impact on complex problems). A good evaluation report steers the reader through complexity and draws out key messages.

Key learning points

➢ **When planning a systems evaluation, you should consider:**
  o What decision requires new evidence to inform it?
  o What the evaluation should focus on?
  o Is a systems evaluation appropriate?
  o What kind of systems methods should you use?

➢ **Pragmatic decisions about the resources available** (time, money, skill set, personnel, etc.) **will influence your evaluation plans.**

➢ **Systems approaches can help you:**
  o Understand problems
  o Identify levers of change
  o Compare hypothetical scenarios

➢ **Systems evaluations can focus on:**
  o Simple interventions (e.g. that change a single point of a system)
  o More complicated or complex interventions (e.g. that change many parts of a system – so-called 'whole system' interventions).
  o Interventions that focus on changing relationships (e.g. by encouraging more joint working amongst stakeholders).

➢ **Not every intervention or activity needs to be evaluated,** and not every evaluation needs to be a systems evaluation.

➢ **There are 6 common systems approaches to evaluation:** qualitative research with a systems lens; concept mapping network analysis; systems dynamic modelling; agent based modelling; and other 'systems-friendly' appraoches.

➢ **Report useful findings or recommendations to inform practice.** Make clear the implications of your findings for public health decision makers.

Selected bibliography

This Guidance is influenced by the work of many different systems thinkers, and by a review we conducted of previously published systems evaluations. Website links were correct at the time of writing (March 2019). Note some journal articles are open access whilst others require a subscription.

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MRC/CSO SPHSU Updated Guidance on Complex Intervention Evaluation (forthcoming).
https://www.gla.ac.uk/researchinstitutes/healthwellbeing/research/mrccsosocialandpublichealthsciencesunit/programmes/complexity/complexinterventions/complexint/

Online resources

The Centre for the Evaluation of Complexity Across the Nexus (CECAN). *Briefs on methodologies, case studies, and recorded webinars. https://www.cecan.ac.uk/

Better Evaluation. https://www.betterevaluation.org/

Scriptapedia https://en.wikibooks.org/wiki/Category:Book:Scriptapedia (includes guidance on group model building and causal loop diagram workshops).

Free online courses

Open University. Systems thinking. https://www.open.edu/openlearn/science-maths-technology/engineering-technology/systems-thinking-free-courses

John Hopkins University (Coursera). Systems thinking in Public Health.
https://www.coursera.org/learn/systems-thinking

Santa Fe Institute. Complexity Explorer (Known for the study of Complex Adaptive System (CAS). Offer a variety of free and paid courses (including advanced courses)) https://www.complexityexplorer.org/

Mapping software (Includes a mixture of free, free trial period, and priced software. Our sub-headings are only indicative, based on our impressions, and some software can be used for more than one purpose).

Concept mapping:
- VUE http://vue.tufts.edu/
- Kumu http://kumu.io

Network analysis:
- Gephi: https://gephi.org/..
- NodeXL: http://www.smrfoundation.org/nodexl/.
- R packages (igraph, sna, statnet, SIENA, etc.).

Agent-based modelling:
- NetLogo: http://ccl.northwestern.edu/netlogo/.
- GAMA https://gama-platform.github.io/
- Repast https://repast.github.io/

Systems dynamics modelling:
- Vensim: http://vensim.com/.
- Stella https://iseesystems.com/store/products/index.aspx
- Sysdea https://sysdea.com/
- Analytica http://www.lumina.com/