

Systems approaches for chronic disease prevention: sound logic and empirical evidence, but is this view shared outside of academia?

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Key points

- There is a need and desire to improve the prevention of chronic diseases
- Systems thinking and its methods are being encouraged as a way to shift our thinking about, and intervene in, chronic diseases
- Despite the sound logic of systems thinking, there are mixed views about it among those working in, and advocating for, prevention
- Clarity around language and evidence of the value of systems methods for chronic disease prevention are needed

Abstract

Introduction: There is a need and desire to improve chronic disease prevention efforts across Australia. Increasingly, scientists are urging the use of systems thinking and its methods to significantly shift the way we think about, and intervene in, chronic diseases. This research aimed to examine the convergence between the systems science literature and the views of those working in and advocating for prevention, in relation to the value of systems thinking and its methods for the prevention of chronic diseases.

Methods: Individual and small-group semistructured interviews were undertaken with 29 individuals across Australia. The interviewees reflected a diverse cross-section of senior public health managers and program implementation staff from state and territory health departments, and senior thought leaders and public health advocates. Interviews were audio recorded and coded into key themes.

Results and discussion: Feedback from informants illustrated that, among those working in and advocating for prevention, there is a mix of support for systems thinking for chronic disease prevention, and some healthy scepticism. The lack of consistent confluence between those promoting the value of systems science, and those responsible for working in and advocating for prevention indicates a level of confusion about language and definitions. It also reflects a desire for published evidence about systems methods that have proven effectiveness.

Conclusion: Systems thinking and its methods have a promising and important role to play in creating a robust, effective and sustainable strategy for prevention of chronic diseases throughout Australia. However, the method requires further development and refinement, and promotion of case studies of effectiveness. We also need to heed lessons learnt overseas.

Introduction

Chronic diseases are Australia's greatest health challenge. The figures are stark – almost half of Australians have a chronic disease such as heart disease, stroke or heart failure, chronic kidney disease, lung disease or type 2 diabetes; and 20% of these people have multiple chronic diseases.¹ Chronic diseases are responsible for 90% of all deaths¹ and 83% of premature deaths (i.e. deaths among people aged less than 75 years).²

Chronic diseases significantly reduce quality of life for the affected individual, and for their family and friends. Chronic diseases also generate significant costs through health system expenditure, and reduced workforce participation and productivity. Compared with same-age peers without chronic diseases, people with chronic diseases are 60% less likely to work and are less likely to work full time.³ This burden is likely to increase as Australia's population ages.

Fortunately, much of this burden of chronic disease is preventable. The World Health Organization has estimated that at least 80% of all cases of heart disease, stroke and diabetes are preventable through lifestyle changes – such as stopping smoking, reducing harmful consumption of alcohol, increasing physical activity and improving nutrition.⁴ Prevention is also cost-effective. Research has found that even a small suite of interventions could result in 650 000 fewer years lived with a disability for the Australian population and would generate \$6 billion in net savings to the health system.⁵

Australia has a strong tradition of developing and investing in prevention to deliver major health gains, including improved rates of immunisation and seatbelt use, restrictions on driving under the influence of alcohol, and changes to sleeping positions to prevent sudden infant death.⁶ Mortality from heart disease has significantly improved, declining more than 70% since the 1970s⁷, thanks to major prevention efforts such as smoking controls, and hypertension and hyperlipidaemia detection and treatment.

Notwithstanding these important gains, much more needs to be done to control the chronic disease epidemic at a population level, including the much higher risks for vulnerable groups such as Aboriginal and Torres Strait Islander people, migrants and refugees, older people, people experiencing socio-economic disadvantage, people with a mental illness, and people living in rural and remote areas. Nationally and internationally, we are recognising that a paradigm shift in how we think about chronic diseases is required.⁸ Tackling chronic disease will take a concerted effort spanning decades⁶, and a systemic, sustained suite of initiatives, delivered at scale, will be required to address the health burden of chronic diseases and associated risk factors such as obesity.⁹

Consistent with this reframing is increasing recognition that systems thinking and the use of systems analytic methods offer potential for tackling complex health

problems such as chronic disease.^{8,10,11} This is because chronic diseases are embedded in a complex system – a system of biological, social, physical, cultural and economic factors that combine in nonlinear ways to shape individual choices, exposure, risk factor development, and disease incidence and progression. Systems thinking and its approaches are attractive, because they encourage the examination of system components – people, processes, activities, settings and structures – and the dynamic relationships between them.¹⁰ This enables a better understanding of the system – its parts and as a whole – to encourage better decisions about intervening to facilitate change.

The value of systems approaches has been demonstrated in a variety of areas in health, including diabetes care¹², adherence to treatment for HIV infection, infection control in hospitals¹³ and tobacco use.¹⁴ Importantly, there is also increasing evidence to support the use of systems science modelling methods as quantitative tools to guide policy decision making and investments, including conscientious disinvestment, in responding to complex public health problems.¹⁵

Although the logic is sound and the empirical evidence promising, it remains unclear how those working in, and advocating for, prevention view systems science and its applicability, and possibly its value, to a national chronic disease prevention strategy. The purpose of this research therefore was to:

- Survey practitioners, policy makers, advocates and thought leaders regarding the growing discourse about the value of systems thinking and its methods for prevention of complex public health problems
- Comment on the confluence between the systems science literature and the views of those working in practice about how to improve the prevention of chronic disease.

Methods

Semistructured interviews were undertaken with stakeholders, who were invited to participate based on their expertise.¹⁶ Participants included senior public health managers and program implementation staff from state and territory health departments (practitioner/policy maker in the analysis), and senior thought leaders and public health advocates from key agencies throughout Australia (advocate/thought leader in the analysis). Individuals were recruited using a combination of purposive and snowballing sampling techniques, so that invitees were individually identified by the research team on the basis of their likely ability to provide an informed contribution to the study, or to nominate other suitable candidates from their organisations.

A personally addressed email from the Director of The Australian Prevention Partnership Centre (TAPPC) (www.preventioncentre.org.au) was sent to 33 people inviting them to participate. TAPPC is a national centre that

investigates approaches to building an effective, efficient and equitable system for the prevention of lifestyle-related chronic disease. The invitations were followed up by the research team. To ensure that the study captured informed perspectives, all respondents needed to have 2 years' relevant experience, be 18 years of age or older and be able to provide informed written consent to participate.

Data were collected from individual and small-group semistructured interviews, separately facilitated by two experienced social researchers with no competing interests related to the research. Interviews were undertaken between June and August 2015 and, where possible, were face to face and audio was recorded. Using Australia's 2005 National Chronic Disease Strategy as a case study¹⁷, a semistructured discussion guide was used to explore the views of respondents about (1) whether systems thinking and approaches could improve a national strategy for reducing the health burden from chronic disease, and (2) how a systems approach could or should be used in a national strategy. The following definitions were given in the interviews to provide a consistent context for respondents: "Systems thinking recognises that many determinants of health lie in systems outside the health sector, such as in the food system, the transport system, and the housing and economic systems. Taking a systems approach involves working in and with these other systems. This could mean, for example, working to align objectives across sectors, or focusing on actions that promote health and improve outcomes in education and transport".

Responses were anonymised, and audiotapes were reviewed independently by each interviewer (MB and colleague). Consistent with the grounded theory approach, themes relevant to the aims of the research were generated from the content of the interviews rather than from previous assumptions.¹⁸ To ensure rigour and objectivity, both interviewers independently reviewed audiotapes to draw out and list themes and subthemes, and then compared their analyses. If there was inconsistency in interpretation, the research team (SW and EM) discussed and reviewed the results, to collectively agree and refine key themes.

The research was reviewed and approved by the Sax Institute low-risk research assessment committee (R2015/05/03).

Results

There were 29 participants in the research, comprising 17 who were sent the invitation email and 12 who responded in place of, or together with, the original invitee. Interviews were approximately 1 hour long, and were conducted face to face and by telephone. All eight of Australia's state and territory jurisdictions participated in the research, including representatives from 10 academic or public health advocacy organisations.

We began by asking general questions about the value of 'systems approaches' to the prevention of chronic diseases. The responses from informants reflected two general views: (1) respectful and interested, but more sceptical; or (2) very supportive and keen to see its application.

The few respondents who expressed reservations had concerns that 'systems thinking' was a label given to a fairly commonsense approach to problem solving and that it overintellectualised the process to the point of confusion. As one respondent aptly commented:

I sat in on one of the [introduction to systems thinking] workshops and I couldn't help but think the emperor has no clothes. (practitioner/policy maker)

Other respondents simply felt overwhelmed by the concept of systems thinking, which made them hesitant about its practical application:

It's hard to conceptualise ... there's so much that impacts our health. (advocate/thought leader)

Despite these concerns, even the sceptics appeared willing to test the theories and their applicability:

I'm not sure where systems thinking will take us – we should pursue it and see where it ends up. (practitioner/policy maker)

There's a logic to it that warrants exploration. (advocate/thought leader)

However, most respondents were supportive of systems thinking and could see value in its application to complex problems such as chronic disease prevention:

Chronic disease is just the sort of issue where [systems thinking] can help. (advocate/thought leader)

These respondents thought that systems thinking had the potential to facilitate a departure from the traditional approach of focusing on individual health consumers, by redirecting focus to changing social norms rather than just individual behaviour. This was seen as welcome and necessary:

We need to take the Australian prevention system to the next level. (practitioner/policy maker)

Additionally, several respondents agreed that systems approaches would support deeper examination of the root causes of chronic diseases, including consideration of different environmental, geographical and cultural contexts.

When prompted to comment more specifically about the value of systems approaches in the development of national strategies for prevention of chronic diseases, there was a general view that a more comprehensive approach was needed. Respondents felt that drawing from systems thinking would demand a long-term view of addressing chronic diseases – for example, by linking interventions across lifecourses rather than electoral cycles.

Almost all respondents agreed that systems thinking could be used as a tool to improve the process for developing future frameworks for strategic prevention activities, and not just inform actions. Doing so would help to identify and articulate the interests and roles of all actors in the system, whether individuals, health professionals, governments, researchers, nongovernment organisations or private sector organisations. It would also facilitate an inclusive, collaborative and open process that would genuinely engage diverse views and innovative approaches from throughout the nation:

Don't neuter the process from the outset. Don't rule things in or out – it undermines the whole process.
(advocate/thought leader)

Further, it was noted that systems thinking allowed a process where shared understanding was developed, roles and responsibilities emerged, and joint commitment to the 'cause' was an important outcome:

People are all correct, they just come from different angles. You need to put them together, understand their mental models then integrate them into a systems model. (practitioner/policy maker)

[Systems thinking is] a vehicle for working together on really tough problems. (advocate/thought leader)

Some participants believed that bringing people together would enable expansion of the work already being done by all actors to prevent chronic diseases, allowing the use of the expertise or capabilities of different actors, such as drawing on marketing expertise within the private sector.

A small number of respondents questioned what taking a systems approach to a national strategy would mean in practice. In particular, they expressed concerns that this approach could simply be overwhelming:

Where and how does change happen in a complex system? It would be valuable to know more about that. But it's hard to see how that can be enshrined in a national strategy. (practitioner/policy maker)

Discussion

This research sought to elicit views from senior health department personnel, public health advocates and thought leaders on the value of systems thinking and its methods, generally as well as more specifically, for national chronic disease prevention strategies. Overall, the data from this study suggest that the majority of respondents could see value in systems thinking and its methods for complex problems such as national strategies for chronic diseases. A small number were more sceptical. There was no obvious difference in views between different 'types' of respondent or positions held.

Among those generally in support of systems thinking and systems approaches for chronic disease prevention, there was a view that this thinking and methods would:

- Ensure a long-term view of prevention
- Facilitate an inclusive, collaborative and open process in developing a national strategy
- Encourage a shared understanding of the issue, with joint commitment to responsibilities and solutions.

This positive view of the potential of systems science for improving the prevention of chronic diseases is consistent with an increasing discourse nationally about the complex nature of chronic diseases^{19,20} and the need for systemic approaches to their prevention.⁸

Among the respondents who were more sceptical about systems thinking, there appeared to be a level of frustration at the confusing language being used in systems approaches. These individuals also questioned the practical implications of translating systems thinking into actions that are achievable and substantively different from current approaches. In our view, this scepticism is consistent with a number of recent publications in this space. Despite the growing number of opinion pieces on the value of systems thinking for health^{10,21}, and increased reporting of the use of both qualitative and quantitative systems techniques for health policy and prevention initiatives^{22,23}, there needs to be greater engagement in the public health field with the full range of systems methodologies.²⁴

Based on the research findings presented here, a number of recommendations for future research, policy and practice are worth considering. With respect to language and definitions, the systems science field is complex and dense, with numerous methods and a vast nomenclature. The language is therefore confusing. People use the term 'systems' in diverse ways and interpret its meaning differently. We suspect that most people in senior positions interviewed for this research already consider themselves to be systems thinkers, because they conceptualise problems and responses by looking at the whole health system. Although important, this is arguably only one component of what systems thinking means. As such, there is a need to build consensus around a unified definition of systems thinking that will "resolve its identity crisis".²⁵

In terms of evidence for systems thinking and methods, most informants expressed an appreciation for the underlying principles guiding systemic approaches to the prevention of chronic diseases and could see value in applying these principles to national approaches. However, there was an eagerness among informants to see examples of applications that offer substantive improvements to traditional public health approaches. Although there are some international examples^{8,14}, more data are needed to identify where, how and under what circumstances systems thinking and its approaches can be applied in beneficial ways to the Australian health policy context.

Although not explicitly raised by the respondents in this research, we also question whether chronic disease prevention efforts would benefit from encouraging further understanding of, and engagement with, the theory of systems science. Continued research on the techniques and tools of systems science and their application to health is warranted.

To our knowledge, this is the first attempt to qualitatively describe attitudes to the value of systems thinking and systems methods among those working in, and advocating for, the prevention of chronic diseases across Australia. A strength of this study is that views were included from all state and territory health departments, ensuring national input from the groups primarily responsible for setting policy and funding, and for implementing prevention initiatives at jurisdictional levels. We were also able to invite the views of key individuals who often have an important role in advising governments on strategy and programs. The discussion guide used throughout the research was flexible so that, as data collection and analysis occurred concurrently, there were opportunities to explore emerging themes in more detail in later interviews. Using two experienced consultants to undertake the interviews meant that their individual analyses of the data – especially the identification of themes – could be compared, and any discrepancies discussed and consensus reached. It also meant that bias from existing relationships with interviewees was limited, and there was no incentive to select results to fit a predetermined position or agenda.

Conducting semistructured interviews ensured that discussions could be adapted to each participant, but this also meant that the research was often unable to fully quantify the levels of agreement or contrast between jurisdictions about issues that were raised by participants independently from the interview discussion guide. This study, therefore, does not allow for comparative analyses between jurisdictions. Further, this analysis is restricted to the perspectives of state and territory governments, because Australian Government representatives were not interviewed. Also, because of the limited number of respondents, we were unable to quantify whether there were any relationships between respondent characteristics and their responses, apart from being able to identify what type of respondent they were – senior public health managers and program implementation staff from state and territory health departments, or senior thought leaders and public health advocates from key agencies across the country.

Conclusions

There is a growing body of literature and discourse encouraging the use of systems thinking and its methods for complex public health problems. Among those working in, and advocating for, the prevention of chronic disease across Australia, there is primarily support for systems thinking, together with some healthy

scepticism. The lack of consistent confluence between those promoting the value of systems science and those responsible for working in and advocating for prevention reflects a level of confusion about language. It also suggests a desire for better guidance about how systems thinking translates into practical and effective action. Strategies that clarify language and definitions, and provide documented examples of value-adding are needed to improve the confluence between research, policy and practice about the potential of systems science and its methods for chronic disease prevention policy and strategy. With some further development, and robust documentation of implementation and evaluation, systems thinking has a promising and important role to play in creating effective, efficient and sustainable strategy across Australia for the prevention of chronic disease.

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Competing interests

None declared

Author contributions

EM and SW led the writing, editing and revision of the manuscript. MB wrote the first draft of the results section. AW and MB edited and reviewed the manuscript.

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