# *From understanding to impactful action: systems thinking for systems change in chronic disease prevention research*

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# From Understanding to Impactful Action: Systems Thinking for Systems Change in Chronic Disease Prevention Research

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**Abstract:** Within the field of chronic disease prevention, research efforts have moved to better understand, describe, and address the complex drivers of various health conditions. Change-making is prominent in this paper, and systems thinking and systems change are prioritised as core elements of prevention research. We report how the process of developing a theory of systems change can assist prevention research to progress from understanding systems, towards impactful action within those systems. Based on Foster-Fishman and Watson's ABLe change framework, a Prevention Systems Change Framework (PSCF) was adapted and applied to an Australian case study of the drivers of healthy and equitable eating as a structured reflective practice. The PSCF comprises four components: building a systemic lens on prevention, holding a continual implementation focus, integrating the systemic lens and implementation focus, and developing a theory of change. Application of the framework as part of a systemic evaluation process enabled a detailed and critical assessment of the healthy and equitable eating project goals and culminated in the development of a theory of prevention systems change specific to that project, to guide future research and action. Arguably, if prevention research is to support improved health outcomes, it must be more explicitly linked to creating systems change.

**Keywords:** systems thinking; systems change; chronic disease prevention; theory of change; prevention research



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## 1. Introduction

Population-level chronic disease prevention efforts are typically anchored in one or more of implementation science, knowledge mobilisation, or evidence-based practice [1–4]. More recently, chronic disease prevention research is applying systems thinking methods and tools to understand and address complexity [5,6]. These efforts are well described for research design, though description of real-world systems change is less clear. This paper describes the adaptation of a framework that can be used to apply systems thinking within chronic disease prevention research.

Many prevention researchers see societal change to prevent chronic disease as having broader impacts to reduce inequities and promote sustainable population health and wellbeing. Within programs of work or individual projects, intended goals become more specific (e.g., reducing nutrition-related inequities through policy change; lowering rates of cardiovascular disease within a population; and creating built environments that support healthy and active living [7–10]). High impact, long term change is difficult particularly without a clear concept of the complex system of interest, a clearly articulated theory of change, or shared understanding across stakeholders of different perspectives [8,11–17].

This paper set out to: (i) apply and adapt a complex systems change framework for prevention research, and (ii) explore the utility of the adapted framework using a case study of healthy and equitable eating (the $HE^2$ project) [10,18,19]. Foster-Fishman and Watson's ABLe change framework (ACF) [13] was selected and adapted for the Prevention Systems Change Framework (PSCF) and piloted to develop a theory of systems change for prevention. This iterative process of adapting and exploring was aligned with systemic evaluation practice characterised by in-depth and ongoing empirically-based reflection [20,21].

*Background*

The limited improvements in chronic disease outcomes to date, including cardiovascular disease, some cancers, and type II diabetes, have been attributed to a lack of engagement with the complex nature of the causes of chronic disease [17]. In addition, the commentary for a number of years around public health research is that it is focused too much on problem description rather than evaluating actions for creating change [22]. Engaging in 'systems thinking' in a meaningful way, has been shown to be an effective approach to understanding and acting on many intractable and complex public health challenges, including nutrition-related inequities, alcohol consumption, tobacco smoking, and obesity [6–10,23–26].

Systems thinking, defined for the purposes of this paper, is a mindset whereby complex phenomena are perceived as dynamic wholes comprised of numerous interconnected and interdependent parts, which, through their interactions, produce emergent products that are different to the sum of the parts combined [27,28]. There has been a significant increase in approaches that conceive of systems in different ways in prevention research, including social network analysis, agent-based and system dynamic simulation models, and participatory approaches to intervention design, like group model building, to better understand the complex drivers of chronic disease and possible solutions [10,29–33].

While the need for chronic disease prevention to be informed by systems science has been widely expressed [17], there are few examples of this translating into impact and change [6]. Framing prevention research within the context of systems thinking for systems change is different to formulating usual study aims and research questions. It draws attention towards understanding the systems within which prevention-researchers work, their roles within those systems, identifying specific changes, and how they can take action to make them a reality [12,13,34].

There are many disciplines and bodies of literature that discuss the concept of change making and how to do it effectively, such as the implementation field [35], change management [36], leadership [37], evaluation [38], and systems change [39]. Such theories suggest how a given series of activities or interventions will have impact within a system to create change [40–42]. A theory of systems change can be developed for complex interventions where change may occur in a progressive manner, and the system and people adapt as new issues emerge [41]. Furthermore, a theory of systems change can speak to aspects beyond external factors, such as prevailing epistemologies, how we position ourselves as researchers, and the data we collect [43].

Foster-Fishman and Watson developed and successfully applied the ABLe change framework (ACF), incorporating theories of change, to facilitate change making in the field of community psychology [13]. Their framework was developed specifically for facilitating systems change in local communities and provides a platform to guide systemic inquiry

applying a systems approach [13,20]. It has been successfully applied in the United States to the design and implementation of a system of care effort in early childhood, cradle-to-career initiatives, health reform, and comprehensive community planning [44]. With a few notable exceptions [8] formal theories of systems change have yet to be meaningfully applied in prevention research. We argue that creating a theory of systems change for prevention research strengthens the bridge that connects understanding and intervention, that is, to move from descriptions of complex systems more explicitly towards efforts focused on systems change for real and lasting impact [12,45,46].

In this paper we report how we adapted Foster-Fishman and Watson's ACF to apply the prevention systems change framework (PSCF) through the case study of the existing HE$^2$ project (Box 1). We present our empirically derived findings and discuss their implications for change-making, focused prevention research.

**Box 1.** Healthy and Equitable Eating (HE$^2$) Project.

The Healthy and Equitable Eating project (HE$^2$), conducted between 2014–2017, was one of the first projects supported through the Australian Prevention Partnership Centre (https://preventioncentre.org.au/ (accessed on 4 August 2021)). The Prevention Centre is a national research-policy collaboration aimed at applying systems approaches to the study of chronic disease prevention; it was first funded in 2013–2018 and funded for a further 5 years in 2018 [47]. The HE$^2$ Project examined the drivers of inequities in healthy eating relevant to the Australian context, applied a systems lens and methodology, and took place in three stages (i.e., the HE$^2$ diagram, the HE$^2$ policy framework, and the HE$^2$ qualitative study) [10]. Soft systems conceptual modelling workshops were conducted using a participatory approach. Seven sub-systems were identified within the HE$^2$ system: food supply and environment, transport, housing and the built environment, employment, social protection, health literacy, and food preferences. The HE$^2$ diagram set the groundwork for understanding and planning how to address inequities in healthy eating.

The HE$^2$ policy framework emerged from the diagramming work and extended previous conceptualisations of policy responses addressing nutrition-related inequities, by including the social determinants of healthy eating along with the seven sub-systems identified in the HE$^2$ System Diagram [18]. It presents a call to action to populate the framework with evidence-based actions that can be implemented to tackle inequities that constrain healthy eating. This piece of work also included a systems-informed qualitative study exploring the level of public policy attention given to addressing inequities in obesity in an Australian jurisdiction [19]. The findings from the qualitative study highlighted the importance of understanding local needs and institutional contexts, as well as fostering a shared understanding and concerns for tackling inequities in obesity. The overall project provided a means for exploring and articulating the relationships between various sociological, political, economic, and philosophical tensions within the broader system. These are key to navigating healthy eating and its social distribution as a complex problem—one that cannot be dealt with in a siloed manner nor by health departments alone.

The short-term change making goals of the HE2 study included enhancing capacities in core knowledge and understanding of the intersectoral causes of inequities in healthy eating, and shifting prevention research, policy and practice mindsets towards a systems orientation. The longer-term change making goals are articulated as part of the theory of systems change in the Results section of this paper.

## 2. Materials and Methods

### *2.1. The ABLe Change Framework (ACF)*

The ACF has three components that guide the user through a series of reflective questions that: (1) apply a systemic lens to a problem (this incorporates an examination of the policy landscape, systems interconnections, power and control dynamics, systems regulations, values and norms, and systems interdependencies); (2) consider issues related to the implementation of change; and (3) integrate the systemic lens and implementation focus to plan systems change. We selected the ACF for this study as it provides a strong theoretical framework which builds on seminal pieces of work in systems science, offers a deep and comprehensive set of questions to guide transformative systems change informed by a broad body of literatures spanning systems thinking, organisational change,

community change, and implementation theory, and explicitly incorporates a theory of systems change [8,12,13].

The $HE^2$ project (Box 1) was chosen for retrospective application and adaptation of the ACF to produce the PSCF for a number of reasons: (1) three of the co-authors, including the lead author worked on the $HE^2$ project and thus could reflect together on this piece of work, (2) the $HE^2$ project took a systems-based approach to addressing the complex problem of nutrition-related inequities, and (3) a focus on change making was an important aspect of this work.

This work was conducted as part of a larger study examining the role of systems approaches in responding to complexity in chronic disease prevention research (reviewed by the Australian National University human research ethics committee-ref. no 2019/653).

As the ACF had been specifically developed for use within the field of community psychology, it was necessary to make a number of context-specific changes to the framing and wording of its components so that it would better suit the prevention research context. Through the iterative process of applying and adapting the ACF using the historical, empirical case study of the $HE^2$ Project, we produced the adapted Prevention Systems Change framework (PSCF). In terms of adaptations across the ACF to create the PSCF, the majority of changes were made within the systemic lens component. While some changes were also made to the Implementation component, most questions remained similar. The Integration component in the ACF was not in table format but rather in the main text of the original publication. This text was paraphrased and incorporated into the new PSCF table, adding to the systematic process for working through the content. We also added a fourth component to develop an explicit theory of prevention systems change. A summary of the steps for adapting the ACF to create the new PSCF are provided in Table 1, and examples of the changes made are included in Table 2. The final PSCF is included in Table 3.

**Table 1.** Steps for adapting and applying the ACF to produce the Prevention Systems Change Framework (PSCF).

| | |
|---|---|
| Framework Location | Locate a framework that was relevant to our circumstances and characterised by a deep and comprehensive set of questions to guide transformative systems change. The ACF was chosen and studied given its theoretical underpinnings and previous usage. It was also discussed in terms of its applicability to prevention. |
| | Initially, the ACF was used in its original form to evaluate the $HE^2$ Project, but it became apparent that many of the questions needed to be adapted to fit the prevention research context as opposed to the community psychology context. |
| Framework Adaption | The three components from the ACF and the related questions were imported verbatim into a Word document, as a table with the three ACF components (column 1) and related questions (column 2). |
| | Two additional columns were then added:<br>(a) Column 3 for adapting the questions for the prevention research context. See Table 2 for examples of adaptations relating to a greater focus on policy, change of language to suit the prevention context, removal of questions that did not seem to apply, and addition of questions to add more depth to the exploration.<br>(b) Column 4 for recording our reflections on the $HE^2$ project based on responses to the adapted PSCF questions.<br>One column was then removed:<br>(a) Column 2 which was initially populated with the original ACF questions was removed leaving only the adapted questions for the prevention research context. |
| | The reflective notes in column 4, once discussed and written, were then divided into two sections to allow more nuance to be revealed relating to: (i) understanding the problem, and (ii) focusing on the systems change implications to gain a deeper understanding where the emphasis was placed within the $HE^2$ Project. |
| New Framework Application | Each component and its accompanying questions were reviewed and adapted as required for a prevention research context, with reference to the $HE^2$ Project. Through an iterative process, the questions for each component were either modified, removed, or remained the same, and a handful of new questions were added to create the PSCF. |
| | A fourth component was added to the PSCF to focus on the process of creating a theory of systems change. This component took the form of some short sentences, informed by the reflections made using the first three components of the PSCF, to explain how a series of events will have impact within the $HE^2$ system to create change. |

**Table 2.** Examples of changes to the ACF to produce the PSCF.

| Example Changes | Original ACF Question | Adapted PSCF Question |
| --- | --- | --- |
| More focus on policy | Do targeted constituents (adults and youth) have real influence over service delivery decisions, processes, plans and options? Does their voice really matter? If not, why not? | Do the different policy actors within the policy community (government departments, non-government organisations, and technical experts, researchers) have real influence over intersectoral policy decisions, processes, plans, and options? |
| Change of language to suit prevention context | What gaps in service exist to build a continuum of care? What additional programs/supports are needed? | What gaps in policy exist to build a healthy and equitable eating system? What additional policies and programs are needed? |
| Removal of questions that did not seem to apply | Where are current programs located? How does this location affect access and use of services? | |
| Addition of questions to add more depth to the exploration | | What are the key leverage points for addressing healthy and equitable eating? |

**Table 3.** Prevention Systems Change Framework (PSCF) Adapted from ACF [13].

| Systemic Lens | |
| --- | --- |
| **Systems Characteristics** | **Questions and Key Elements** |
| Policies | What gaps in policy exist to build the system? What additional policies and programs are needed?<br>Are the current policies evidence-based and relevant to the system? |
| Connections and boundaries | Are government departments, NGOs, industry, and community groups working in siloed or well-connected ways?<br>Do government stakeholders, non-government organisations, industry, and community groups trust each other and share information, data, and resources? |
| Power and control dynamics | Do the different policy actors within the policy community (government departments, non-government organisations, technical experts, and researchers) have real influence over intersectoral policy decisions, processes, plans, and options?<br>Do different government departments share decision making power around policies?<br>Is decision-making power shared across all levels (federal, state, and local) of government? |
| System regulations | Do any current policies or procedures get in the way of the overall goal of working towards achieving chronic disease prevention? If so, which ones need to change?<br>What new policies and procedures are needed to support the overall goal?<br>Does the current policy context motivate intersectoral action to create changes in order to facilitate the systems changes? |
| Values and norms | What attitudes and values held by policy makers might get in the way of the proposed changes? |
| System interdependencies | To what extent and how do system variables interact with each other and provide each other with feedback?<br>What are the key leverage points for addressing the issue? |
| Implementation Focus | |
| Component and Definition | Key Elements |
| Readiness | Policy actors' (i.e., government departments, non-government organisations, technical experts, and researchers) perceptions of:<br>Awareness: general awareness of the targeted change.<br>Valence: change would provide personal or system benefits.<br>Management support: local leaders are committed to the change.<br>Discrepancy: change is necessary.<br>Self-efficacy: change is feasible and system actors can implement the new behaviours.<br>Contextual and structural factors: change is supported by the institutional context. |

**Table 3.** *Cont.*

| Systemic Lens | |
|---|---|
| **Systems Characteristics** | **Questions and Key Elements** |
| Contingent capacities | Knowledge of the system:<br>- Understanding of the form and function of the system.<br>- Understanding of how targeted problems emerge from current system characteristics.<br>Relational capacity:<br>- Strong formal and informal ties between policy actors.<br>Change capability:<br>- Reshaping capability: system actors manage change effectively.<br>- Development capabilities: the availability of resources to support the change.<br>- Engagement capabilities: the ability of the system to authentically involve constituents in decision-making.<br>- Absorptive capabilities: the capacity of system actors to value, assimilate, and use new knowledge.<br>Innovative specific capacity:<br>- Skills and knowledge sets needed to implement a specific change. |
| Diffusion | Promoting broad scale awareness of change effort across system actors.<br>Encouraging the adoption of the innovation.<br>Ensuring the actual and appropriate use of the new information about the chronic disease prevention system.<br>Expanding the use of chronic disease prevention study findings across system sectors. |
| Sustainability | Maintaining effective new policies and procedures.<br>Institutionalisation of new mindsets and practices.<br>Sustaining capacities and supports needed to ensure that successful intersectoral collaborations are kept in the long run. |
| Integrating a Systemic Lens and Implementation Focus | |
| Key Components | Key Elements |
| Simple rules | Engaging diverse perspectives.<br>Thinking systemically.<br>Incubating change.<br>Effectively implementing change.<br>Adapting quickly.<br>Pursuing social justice. |
| Systemic action learning teams | Using systemic action learning. |
| Small wins | Identifying small wins. |
| Theory of Systems Change | |
| Prospective theory of systems change | For planning purposes.<br>Articulating actions and reactions to create systems change (e.g., who will do what, who that will impact on and what else will occur, and what is going to change with what outcomes). |
| Retrospective theory of systems change | For reflection and future planning purposes.<br>Articulating your systems change hypothesis and assumptions. |

The iterative process of adapting the ACF and applying the PSCF was primarily conducted as a dialogue between two of the co-investigators of the original HE$^2$ Project (MP and SF). They met on two separate occasions to discuss each component of the PSCF, consider the relevance and utility of the questions (adapting as required), and to record their reflections about the HE$^2$ Project. The results were then reviewed in detail by LR, leading to further refinements before discussion with the remaining authors of this paper.

### 2.2. The Prevention Systems Change Framework (PSCF)

The PSCF has four components (Table 3). The first component examines the systemic context of prevention systems change efforts and enquires about the policy landscape, systems interconnections, power and control dynamics, systems regulations, values and norms, and systems interdependencies. The second component examines the facilitators of prevention change implementation, including readiness to change, capacity within the system, how changes will spread throughout the system, and sustainability of implemented changes. The third component integrates the systemic and implementation focus, and considers the need to engage with multiple and diverse perspectives, the importance of agile teams who can adapt quickly to address issues as they emerge within the system, and the need for small wins to foster momentum. The guiding questions in the first three components are posed for consideration as one designs, implements, and improves prevention systems change efforts. The fourth component combines the learnings from the first three components to formulate an explicit theory of prevention systems change to support explicit reflection of one's hypothesis and assumptions, and/or for planning future actions.

## 3. Results

### 3.1. Reflections on the HE$^2$ Project Derived from Applying the PSCF

We used the PSCF to both reflect on the research work that took place within the HE$^2$ Project, and to consider what will be necessary to create systems change through future work. The results are discussed under the four key components of the PSCF, with details of the specific reflections that informed the results narrative provided in Tables 4–6. The retrospective review process of working through the PSCF culminated in the development of a theory of systems change specific to the HE$^2$ project, which can be used to guide future research on addressing inequities in healthy eating.

Overall, the retrospective HE$^2$ project reflection process revealed how much additional work is needed over an extended period in order to create systems change. While it was apparent that we had applied a systemic lens to the study of healthy and equitable eating, the implementation aspects of this type of work will require explicit and focused attention. In considering the integration of the systemic and implementation components, we identified that while some aspects had been addressed in the HE$^2$ Project (i.e., as part of simple rules in terms of pursuing social justice, thinking systemically, and engaging diverse perspectives), others, such as leveraging small wins and systemic action learning teams, offer valuable potential for future work. Other noteworthy findings included the need for core skills and capabilities that facilitate systemic analysis and implementation, the importance of influence and agency, and the value of shared understanding and common purpose to produce transformative change. All of these reflections informed the development of a theory of systems change to address nutrition-related inequities.

**Table 4.** Key questions for embedding systems change into prevention research work using the HE$^2$ Project.

| Systems Characteristics | Example Questions–Prevention Research (HE$^2$ Project) | Reflections on the HE$^2$ Project–Understanding the System | Reflections on the HE$^2$ Project–Creating Systems Change |
|---|---|---|---|
| Policies | What gaps in policy exist to build a healthy and equitable eating system? What additional policies and programs are needed? | This content was covered as part of our published HE$^2$ Framework which provided an organising framework for exploring where gaps in policies and programs exist. | The identified gaps in policy will need to be addressed as part of future systems change efforts. |
| | Are the current policies evidence-based and relevant to HE$^2$? | The use of evidence in informing current policies relating to HE$^2$ is mixed. In terms of the HE$^2$ Project, the HE$^2$ Diagram and Framework were focused on the population level within Australia, using a combination of published scientific evidence, practice wisdom, and subject matter expertise. We found this mix to be most aligned with systems practice in terms of using multiple sources of evidence. | Using a combination of published scientific evidence, practice wisdom, and subject matter expertise will be key to shifting the system, as multiple forms of evidence are required within different contexts. |
| Connections and boundaries | Are government departments, NGOs, industry, and community groups working in siloed or well-connected ways? | In HE$^2$ we focused only on government policy makers, technical experts and non-government organisations. A boundary was established within the system of the actors that we were seeking to influence, and this did not include industry or community groups. Upon reflection, having included these groups would have added to the richness of the data; however, our resources did not allow all groups to be included. | Moving forward, widening the boundaries in terms of actor involvement will be key to influencing systems change. We recognise the need to include communities with a lived experience of nutrition-related inequities, service providers and support services, and key decision makers. |
| | Do government stakeholders, non-government organisations, industry, and community groups trust each other and share information, data, and resources? | We did not explicitly ask this question, but we did uncover related data through the interview process. | In future iterations of this work, we could be more explicit with seeking out answers to this question as a way of exploring barriers and enablers to creating systems change. |
| Power and control dynamics | Do the different policy actors within the policy community have real influence over intersectoral policy decisions, processes, plans and options? | Covered in qualitative study interviews (e.g., were those within the social inclusion group influential in health policy work, and, conversely, were those within the health group engaged in the social inclusion policy work?). | Systems change efforts will need to involve those with intersectoral influence within the system. |
| | Do different government departments share decision making power around HE$^2$ related policies? | No, the departments don't currently share decision making power, and in fact work in quite siloed ways; this is more the case currently, following a restructure. This clearly acted as a blockage to creating change in terms of intersectoral working. | Exploring the possibility for shared decision-making power as a way of improving intersectoral working will be key for systems change efforts. |
| | Is decision-making power shared across all levels (federal, state, and local) of government? | Decision-making power is shared across all levels of government. The key learning here is that it would have been valuable to explore the decision-making power with respect to a focus on longer term changes in relation to HE$^2$. | A next step towards systems change could involve examining the decision-making points of potential leverage, and the relevant distributions of power at those points. We could take the view that the key to successful systems change is viewing everyone as an actor of change, and helping individuals leverage change within their sphere of influence. We also know that power is about shifting these dynamics. In future iterations of this work, it would be important to include the voices of community members who are experiencing inequities. |

**Table 4.** *Cont.*

| Systems Characteristics | Example Questions–Prevention Research ($HE^2$ Project) | Reflections on the $HE^2$ Project–Understanding the System | Reflections on the $HE^2$ Project–Creating Systems Change |
|---|---|---|---|
| System regulations | Do any current policies or procedures get in the way of the overall goal of working towards achieving healthy and equitable eating? If so, which ones need to change? | Our qualitative study shows some of the institutional mechanisms for promoting intersectoral collaboration that were positive, where it was possible. We had intended to do a policy analysis; however, another piece of work was exploring similar questions. | Policy siloes are an organisational practice; if we want to improve intersectoral collaboration (and thus create systems change), then the policy siloes are problematic, as well as the lack of institutional mechanisms to enable intersectoral collaboration. |
| | What new policies and procedures are needed to support the overall goal? | We addressed this at a high level in terms of policies (but not procedures) in the $HE^2$ Framework. This was also addressed through interviews in terms of exploring barriers and enablers to implementation of intersectoral actions. | Systems change will come about when policies and procedures supporting the improvement of inequities in healthy eating are implemented successfully. |
| | Does the current policy context motivate intersectoral action to create changes in order to facilitate a healthier and more equitable eating system? | This was covered in our $HE^2$ diagramming workshops as part of the qualitative study; people were able to draw connections between areas (e.g., linking the health sector with the education and transport sectors) but restrained, because politically they were not able to do it; thus, we implicitly illuminated this, but did not explicitly explore the policy context; perhaps we could have. | Given that actors are saying that intersectoral work is impossible or difficult, moving forward, it would be necessary to bring them together as a collective to discuss the system, creating shared understanding where possible, and start from there. |
| Values and norms | What attitudes and values held by policy makers might get in the way of the proposed changes to $HE^2$? | Equity is a value—we had a strong normative starting point that made equity very explicit. In the first $HE^2$ diagram workshop, people within the group were all self-selected and interested in addressing equity goals as part of their work and research, but within the diagramming workshops at the level of the qualitative study, many participants were not focused on equity at all; so, we had a diversity of views. We did not however explicitly ask them about attitudes and values, but we saw it play out in diagramming workshop. | Moving forward, it will be important to distinguish between implicit and explicit theories of systems change around equity, and where and how to achieve it. While people publicly agree that equity matters, when doing the work, this may be forgotten or not prioritised. Providing opportunities for those involved in the systems change efforts to pause and discuss the kinds of procedures and policies needed to ensure that equity is front and centre. |
| System interdependencies | To what extent, and how, do system variables interact with each other and provide each other with feedback? | This is precisely what our $HE^2$ Diagram shows. | The key is to now continue to use this visual depiction in order to progress the agenda with respect to policies that better support healthy and equitable eating. |
| | What are the key leverage points for addressing $HE^2$? | We established key leverage points within our $HE^2$ diagram. | A key feedback loop and leverage point within the food supply and environment sub-system within the $HE^2$ Diagram was one between food labelling and the impact food labelling has on food reformulation and marketing. This would thus be a key focus area for creating systems change. All leverage points should be explored and prioritised as part of the change effort. |

**Table 5.** Key components for strengthening implementation processes into prevention research work using the HE$^2$ Project.

| Component and Definition | Key Elements—Prevention Research (HE$^2$ Project) | Reflections on the HE$^2$ Project—Understanding the System | Reflections on the HE$^2$ Project—Creating Systems Change |
|---|---|---|---|
| Readiness | The extent to which system actors believe that change is necessary, feasible, and desirable within the broader structural context. | In terms of policy actors, we can only speak to the perceptions of those included within our study as opposed to the broader system of healthy and equitable eating.<br>Awareness: Those policy actors involved in the creation of the HE$^2$ Diagram were of the view that change is necessary; those included as part of the qualitative interviews had mixed opinions.<br>Valence: Little was discussed in relation to personal benefits of change; in terms of the system, however, the discussion always centred on the broad topic of inequities.<br>Management support: Leadership in this space varied in terms of supporting changes.<br>Discrepancy: The belief that change was necessary was held within the core group of HE$^2$ diagramming participants; broader than this, however, views were mixed, because change was not a high priority for all actors.<br>Self-efficacy: The broader system in its current form is constraining the desired change due to institutional constraints because some leaders are either unable or unwilling to promote change.<br>Contextual and structural factors: The feasibility of creating a healthy and equitable eating system is constrained due to blocks around intersectoral working. | The notion of readiness points to the need to include those actors with a remit to enact change in future work of this kind, and who understand the benefits of and will advocate for intersectoral working. |
| Contingent capacities | The skills and knowledge sets system actors need to effectively respond to the shifting demands of the systemic change work. | Knowledge of the system: The HE$^2$ diagram facilitated a strong knowledge of the system from the groups' perspectives, including important feedback loops.<br>Relational capacity: In general, ties were weak when it came to intersectoral working.<br>Change capability: Within the qualitative study, this was explored but without any depth; the findings that did emerge mainly indicated a lack of resources.<br>Within the study we interviewed people with a remit to implement desired changes and explored this in terms of barriers and enablers.<br>Many qualitative study participants were able to assimilate new knowledge regarding HE$^2$, but many were not, as it was not a priority for them to engage in this topic area and thus our traction was limited.<br>Innovative specific capacity: While the skills and knowledge set of those involved in our study were appropriate, only a small handful were equipped to implement changes. | Longer term, in order to make changes, more focus upon engaging with those with a remit and desire for implementing desired changes would be required.<br>While our study identified some capacity concerns, an intentional assessment of these specific implementation capacities helped us to understand the challenges more fully that we faced, and, therefore, it will be essential that these are addressed in future systems change efforts. |
| Diffusion | An intentional focus on the adoption, use, and spread of the targeted change. | Across the broader system, the findings and recommendations emerging from the HE$^2$ Project have been shared in multiple forums both locally, within Australia, and more broadly at the international level through avenues such as conference presentations, meetings, and discussions with policy makers. | In terms of ensuring that changes in mindset and practices occur, without some sort of accountability mechanisms in place, this is not a possibility. In future, we could take a more explicit approach to strategizing as to how to begin to shift to move beyond increasing awareness, knowledge, and sensitisation to beginning to focus on mindsets and practices of those from other sectors with a remit to make change. This would form a useful second stage for the HE$^2$ Project, moving forward. |
| Sustainability | Maintaining policies, practices, and changes brought about by the change effort. | In terms of new policies and procedures, new mindsets and practice, and sustaining capacities and supports, this is not something that we explored as part of our study, and, thus, we cannot speak to the concept of maintenance. | Being mindful of the sustainability of policies and practices throughout the HE$^2$ system will be a key feature of systems change in future iterations of this work. |

**Table 6.** Key components for bringing together the systemic lens and implementation focus using the HE2 Project.

| Key Components | Complex Systems Change Framework Features | Reflections on the HE$^2$ Project—Understanding the System | Reflections on the HE$^2$ Project—Creating Systems Change |
|---|---|---|---|
| Simple rules | Engaging diverse perspectives is arguably one of the most important aspects of defining a problem and identifying and understanding its root causes, as well as defining and setting the boundaries around a system. A powerful learning process occurs when multiple perspectives are shared in an open, receptive, and transparent manner. The Framework explicitly calls for the inclusion of diverse perspectives from vertical (e.g., leaders, managers, and staff at the coal face) and horizontal (e.g., non-government organisations, government organisations, and industry) system layers, and those affected by problems within the system (e.g., community members at risk for or experiencing chronic disease). | While we did include a diverse group of people, our perspectives were more convergent than divergent overall, except within the qualitative study, where there was more of a diversity of perspectives. | Future research would need to include a more diverse disciplinary and sectoral mix, as well as include insights from a representative range of communities experiencing nutrition-related inequities. |
| | The ability to think systemically, is key to identifying root causes of problems, thus leading to more potent and sustainable solutions. Without honing this ability, problems will be seen only in terms of proximal causes, rather than addressing the core driving force of the problem. | Thinking systemically was one of our strengths. We did this mainly through our HE$^2$ Diagram work whereby our language was more around 'causes' than 'root causes'. It's important to note here that the social determinants of health (SDOH) literature is focused on the systemic drivers of chronic disease. In reality, however, SDOH work is very siloed and often not carried out from a systems perspective. | Thinking systemically must continue to be the overarching paradigm from which to view SDOH work and work as researchers, moving forward; this must be emphasized at all stages of future work that seeks to address inequities in healthy eating. |
| | In working towards transformative change, it is essential that small changes across multiple levels of the community are taken in an ongoing manner, thus acting to incubate change. Further changes can be observed when key feedback loops are identified and leveraged upon accordingly. | Across various data collections points throughout the study, we discussed the different levels of awareness, knowledge, and sensitisation in those taking part in the study. In terms of the bigger picture work required to create a more healthy and equitable eating system, we identified key feedback loops at a high level across the system, and at a lower level within sub systems. We did not have discussions nor plan for small changes across multiple levels. In retrospect, there may have been benefit in doing so to help us navigate our way through smaller changes on the pathway toward more transformative changes, in terms of shifting mindsets and policy making practices. We did raise awareness, knowledge, and sensitisation in an implicit way throughout the course of the study. | Incubating change must be emphasized moving forward, with this work occurring both within research teams in terms of learning and practice but also with respect to changes happening externally, relating to addressing nutrition-related inequities. |
| | When it comes to effectively implementing change, it is essential that efforts are focused on building a supportive climate that facilitates ongoing implementation of change actions (e.g., mindsets and practices) across the system. These aspects are the focus of the implementation component of the Adapted Framework, namely readiness, capacity, diffusion, and sustainability. | As noted above, we had less of a focus on readiness, capacity, diffusion, and sustainability within this piece of work and, thus, this is something that would likely facilitate greater impact when it comes to our change goals on a longer-term basis. We did think about the readiness and capacity implicitly, but what we did not do was build in any monitoring, evaluation, and learning mechanisms; so, we were not sure if it was effective. | Monitoring, evaluation, and learning will be a key feature of future work. Thus, we will have the ability to learn and respond from an evidence informed place when it comes to the implementation of changes. |
| | When working within a complex adaptive system, and acting to foster change, the emphasis must be on understanding, learning, and adapting rather than rigidly planning. Being nimble, with the ability to adapt quickly to changing information, actions, and circumstances, will enable appropriate responses to opportunities or problems that may arise. | Across the study, there were several changes that were required to be made in order to adapt to the changing needs of stakeholders and study participants, especially in relation to the timing of data collection within the context of political and policy changes. These adaptations, however, were not in response to the change goals. | As noted above, having good monitoring and evaluation mechanisms and a focus on learning will be helpful for allowing us to swiftly adapt to new information, as it emerges. |
| | Pursuing social justice as not only a simple rule, but as an overarching value underpinning the work, will place a sharp focus on understanding inequities and their root causes. | Equity was the main value underpinning this piece of work from the perspective of the research team. The HE$^2$ diagram unearthed many of the root causes driving nutrition-related inequities. There was a problem, however, whereby some qualitative study participants didn't hold equity front and centre in their minds and work. | As noted in an earlier reflection, providing opportunities for those involved in the systems change efforts to pause and discuss the kinds of procedures and policies needed to ensure equity is front and centre will be essential. |

**Table 6.** *Cont.*

| Key Components | Complex Systems Change Framework Features | Reflections on the HE$^2$ Project—Understanding the System | Reflections on the HE$^2$ Project—Creating Systems Change |
|---|---|---|---|
| Systemic action learning teams | Systemic action learning provides a way of simultaneously addressing the need to bring together the systemic lens and implementation focus, because an iterative problem-solving cycle is inherent to this method of working (Stringer 2013). Teams are engaged in an ongoing cycle of inquiry, whereby context is studied, solutions are devised, designed, and actioned. These actions are then analysed for their level of efficacy, followed by a reanalysis of the current situation, thus repeating the cycle of inquiry again (Foster-Fishman and Watson 2010). Systemic action learning teams operate individually at different levels within the system, but collectively, the teams' efforts integrate into a cohesive effort that creates change across the system (Burns 2007). Teams each need to adhere to the simple rule of adapting quickly in order to address emergent issues and opportunities within the system. | We did not engage in this way as part of the HE$^2$ study; however, it is apparent how this level of detailed focus and ongoing analysis can have benefits in terms of maintaining a focus on learning and creating desired changes. | We would ideally design systemic action teams at multiple levels of government, as well as spanning industry, the not-for-profit sector, academic, and community level, as work in this area expanded over time and across the system. |
| Small wins | Identifying small wins across the duration of a body of work fosters momentum, motivation, and a recognition that change, even is small or emergent, is occurring. Tackling smaller issues that will accumulate to produce larger overall changes renders those responsible within the system to experience a sense of empowerment and commitment, that what seems insurmountable can be overcome. An awareness of small wins, as they occur, has the added benefit of feedback about what is and is not working and how the system is reacting to actions as they are implemented. | We did not implement the use of small wins within our project. It is something that may provide a useful indicator and, thus, continued focus on the mindset and practice shifts we were aiming to achieve in future work of this kind. In retrospect, we could have celebrated small wins such as having all the directorates within our qualitative study in one room to draw a causal loop diagram. This would count as a short-term win. | As small wins are an effective way of incubating change over time, future systems change work would benefit by incorporating these. |

#### 3.1.1. Component 1: Building a Systemic Lens for Prevention

The first stage in reviewing the HE$^2$ Project was to apply a systemic lens to the work (Table 4). In terms of policies for healthy and equitable eating, it was apparent that to create systems change it will be necessary to address the gaps in current policies, programs, and procedures. In terms of connections and boundaries, our review suggests a need to expand the range of actors involved by including more government departments, NGOs, industry, and community groups. It is also important to build connections between these actors across the system. With respect to power and control dynamics, we will need to involve those with intersectoral influence within the system, as well as the voices of community members who are experiencing nutrition-related inequities. It will also be beneficial to explore the possibilities for shared power in decision-making to improve intersectoral work. When it comes to system regulations, the lack of institutional mechanisms to enable intersectoral collaboration will need to be addressed, and generating shared understanding will be a necessary for enabling intersectoral work to begin. In considering values and norms around equity, it will be important to distinguish between implicit and explicit theories of systems change, and where and how to achieve it. While many publicly agree that equity matters, there is a tendency to not prioritise it; thus, it will be helpful to create more opportunities for those involved in the system to discuss the kinds of procedures and policies needed to ensure equity is front and centre. In addressing system interdependencies, all the leverage points identified within the HE$^2$ System Diagram [10] will need to be considered and appropriately prioritised as part of the change effort.

#### 3.1.2. Component 2: Continual Implementation Focus

The second component involved the application of an ongoing implementation focus to the work (Table 5). In addressing readiness for systems change to support healthy and equitable eating, the system in its current form was constraining desired changes due to an unwillingness, or inability, by policy and program leaders to promote intersectoral working. Thus, future programs of work need to include new actors with a remit and desire to enact such change. When it comes to contingent capacities, the skills and knowledge of those involved in our study were appropriate, but only a small handful were equipped to implement the changes required; this will also need to be addressed moving forward. Furthermore, ties across sectors were weak and require significant strengthening. In terms of diffusion of the intended systems changes, we need stronger accountability mechanisms to make healthy and equitable eating a possibility, and we need to explore new and appropriate diffusion mechanisms across the system. Ensuring the sustainability of changes was not emphasised as part of our initial piece of work; thus, being mindful of the sustainability of policies and practices throughout the HE$^2$ system will need to be a key feature of systems change in future iterations of this work.

#### 3.1.3. Component 3: Bringing Together the Systemic Lens and Implementation Focus

To bring together the systemic lens and implementation focus, we explored the potential value of simple rules, systemic action learning teams, and small wins (Table 6). The concept of Simple rules is broken down into six key features, namely, engaging diverse perspectives, thinking systemically, incubating change, effectively implementing change, adapting quickly, and pursuing social justice. While we engaged diverse perspectives in our work, overall, the perspectives across the project participants were more convergent than divergent, except within the qualitative sub-study, where there was more diversity of views. Future research could aim to explore this divergence more explicitly and include a more diverse mix of disciplines and sectors, as well as insights from communities experiencing nutrition-related inequities. Thinking systemically must continue to be the overarching paradigm for addressing nutrition-related inequities and be emphasized at all stages of the work. Incubating change could be emphasized, which can be realised by leveraging key opportunities and feedback loops. For example, within the food supply and environment sub-system, an important feedback loop exists between food labelling and the impact that

labelling has on the marketing and reformulation of food [10]. Monitoring and evaluation will also need to be key features of future work, to support an ability to learn from the evidence and adapt quickly to effectively implement change. To use systemic action learning teams, we would seek to design such teams at multiple levels of government, as well as spanning industry, the not-for-profit sector, academic, and community level to expand the focus on equity across the system. Finally, leveraging small wins can also be an effective way of incubating change over time, and future systems change work would benefit by more explicitly identifying and incorporating these into program communications. One of the key insights from undertaking this reflective process was the importance of considering the role of one small study as part of a broader program of work.

#### 3.1.4. Component 4: Developing a Theory of Systems Change

Theories of systems change are highly variable and can take many forms, including as a hypothesis and series of assumptions or framed in terms of a series of intended actions, anticipated reactions/responses, and predicted outcomes. Theories of change can also be presented in the form of a sentence, series of statements, simple logic model, complex series of logic steps in the form of a diagram, or dynamic simulation models [40–42,48,49]. Theories of change are also highly context specific and are ideally devised as part of a co-production process with those who are focused on their implementation [41].

For the sake of illustration, the following retrospective theory of systems change was drafted as part of the final stage of the reflective process using the PSCF. Typically, this would be done at the beginning, and revised throughout the life of a project (or body of work) by combining the first three components. Because we examined the $HE^2$ Project as part of a reflective process to adapt and apply the ACF to prevention research, we have produced a draft retrospective theory of systems change. It considers what is likely to be required to create systems change in the future and could be used to inform further dialogue and planning.

A draft theory of systems change for the health and equitable eating ($HE^2$) Project could look like this:

Theory of systems change: Longer-term and sustained change is supported by thinking and acting systemically. Coordinated actions by those with agency, authority, and remit to lead and implement systems change across the $HE^2$ system domains will foster healthy and equitable eating in the population. Systemic change should be informed by diverse points of view that include disciplinary and sectoral experts, and the insights of communities experiencing nutrition-related inequities.

Positioning equity and intersectoral working front and centre in all dialogues will build shared understanding of the problem and alignment on the solutions. Continued cycles of reflection and learning that are underpinned by monitoring and evaluation to incubate change, and acknowledging small wins to foster momentum, will help to produce sustained action across sectors.

Articulating this theory of systems change highlighted for us that the $HE^2$ Project was an important initial step, and that an extensive program of work needs to happen over an extended period to change the system that impacts on health and equitable eating. One research project can rarely achieve large-scale systems change, and, indeed, this would not be appropriate. The next step for an active prevention research project focused on impact and creating change would be to engage with relevant stakeholders to develop a long-term program of work underpinned by an explicit theory of systems change. The theory of prevention systems change for healthy and equitable eating, as articulated above, can be seen as a hypothesis to inform such ongoing dialogue, and as something to review, adapt, or develop further across the life of any future project or program of work.

## 4. Discussion

To address chronic disease prevention, there is an imperative for research to articulate what action is required within a complex system to generate change [17]. Systems

approaches have a growing profile in prevention research, but an often-missed key aspect of addressing complexity is the underlying purpose of systems change [12,13]. This aspect requires further exploration as an explicit function of systems-informed prevention research [2,17,24]. To this end, in this paper we explored the value of applying a systems change framework to existing prevention research, seeking to understand the role of such an approach in articulating the types of action required to generate change.

Based on an adaptation of the ABLe change framework (ACF), we used the new Prevention Systems Change framework (PSCF) to review the healthy and equitable eating ($HE^2$) research project. The review process entailed contemplating the questions within the first three components of the PSCF, namely: (i) applying a systemic lens, (ii) considering issues related to the implementation of change, and (iii) integrating the systemic lens and implementation focus, to (iv) develop a theory of systems change. The systematic consideration of the questions outlined in the PSCF enabled a comprehensive and evidence-informed research review and reflection process to unfold. These reflections generated new guidance on how research could progress from understanding the systems drivers of healthy and equitable eating towards impactful action within those systems. The PSCF could also be extended further by adding another column whereby specific actions for change are listed along with the names of actors and institutions with remit and responsibility to create change in these areas. This would act to create a sense of shared and collective accountability across the system of interest [50].

Articulating a systems theory of change is an important part of any ongoing social learning process focused on creating change [13,21] and has significant potential to guide the incorporation of a systemic lens in prevention research, to guide future research and action. Within public health, intervention and evaluation studies, and translation research have assisted to shift the field beyond understanding and description in the direction of change through the evidence-based movement [51,52]. The impact of evaluation research and quantifying person-centred outcomes was enabled through knowledge translation/mobilisation [3]. By incorporating systems thinking, we take a step further to consider the role of systems change [11,13,53]. If we are to advance the field of chronic disease prevention and have greater impact, embedding a structured reflective process and practice that applies a systems change framework will be essential [12].

It has been argued that when engaging with complex systems, what is learnt must be acted upon and because systems are dynamic, they will continue to change and evolve over time [20]. Therefore, when engaging in research designed to create change, processes of reflection, action, and feedback must be ongoing [13,20]. Further, engaging in reflective practice is a hallmark of becoming a skillful practitioner and must include both self-reflection and reflection on the research project itself [21]. The formulated PSCF has potential as a tool for retrospective review of existing work, and as a precursor for planning more impactful research. We thus contend that undergoing the type of reflective process enabled through the PSCF is valuable to do both retrospectively and as part of a research intervention planning process (Figure 1). Ideally, such cycles become a continuous process whereby reflection and planning become synonymous and feed into further research [20,21]. The development of the PSCF from the ACF was based on a single retrospective study. In line with systems practice, it is intended that the adapted PSCF may be further modified through considering other prevention research projects spanning different contexts, content, and scales.

The PSCF was adapted from the ACF to provide a framework to better suit the prevention research context. While the ACF provides an excellent framework for understanding and planning for systems change, there are several advantages of the PSCF over the ACF. These include its greater focus on policy, changes in language to suit the prevention context, removal of redundant questions within the prevention research context, the addition of questions to add more depth to the exploration process, and a specific focus on a theory of systems change in both prospective and retrospective settings.

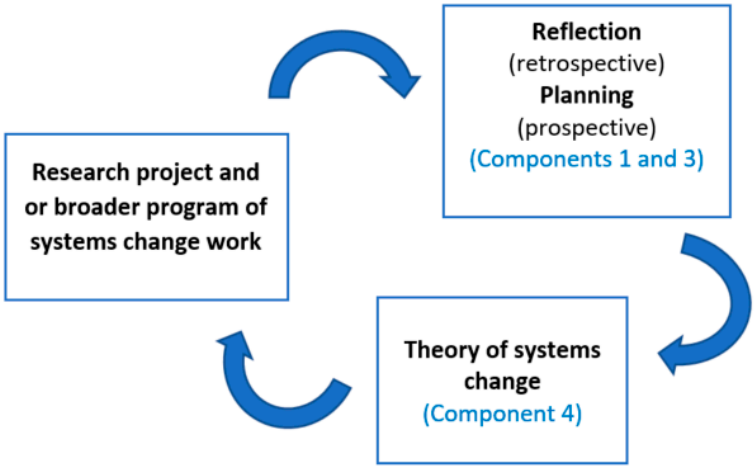


**Figure 1.** Cycle of reflection for creating systems change in prevention research.

## 5. Conclusions

To conclude, the Prevention Systems Change Framework was adapted from the ABLe Change Framework to suit the prevention research context. The PSCF supports a guided and comprehensive systemic analysis of prevention research from which to create a theory of prevention systems change and, thus, more explicitly connect research that generates understanding of complex systems with actionable systems change efforts.

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