

Tackling ‘wicked’ health promotion problems: a New Zealand case study

LOUISE N. SIGNAL^{1*}, MAT D. WALTON², CLIONA NI MHURCHU³,
RALPH MADDISON³, SHARRON G. BOWERS¹, KRISTIE N. CARTER¹,
DELVINA GORTON³, CRAIG HETA⁴, TOLOTEA S. LANUMATA¹,
CHRISTINA W. MCKERCHAR⁴, DES O’DEA¹ and JAMIE PEARCE⁵

¹Health Promotion and Policy Research Unit, PO Box 7343, Wellington South, Wellington 6121, New Zealand, ²Massey University, Wellington, New Zealand, ³Clinical Trials Research Unit, University of Auckland, Auckland, New Zealand, ⁴Te Hotu Manawa Māori, Auckland, New Zealand and ⁵GeoHealth Laboratory, University of Canterbury, Christchurch, New Zealand

*Corresponding author. E-mail: louise.signal@otago.ac.nz

SUMMARY

This paper reports on a complex environmental approach to addressing ‘wicked’ health promotion problems devised to inform policy for enhancing food security and physical activity among Māori, Pacific and low-income people in New Zealand. This multi-phase research utilized literature reviews, focus groups, stakeholder workshops and key informant interviews. Participants included members of affected communities, policy-makers and academics. Results suggest that food security and physical activity ‘emerge’ from complex systems. Key areas for intervention include availability of money within households; the cost of food; improvements in urban design and culturally specific physical activity programmes. Seventeen

prioritized intervention areas were explored in-depth and recommendations for action identified. These include healthy food subsidies, increasing the statutory minimum wage rate and enhancing open space and connectivity in communities. This approach has moved away from seeking individual solutions to complex social problems. In doing so, it has enabled the mapping of the relevant systems and the identification of a range of interventions while taking account of the views of affected communities and the concerns of policy-makers. The complex environmental approach used in this research provides a method to identify how to intervene in complex systems that may be relevant to other ‘wicked’ health promotion problems.

Key words: intervention; comprehensive approaches

INTRODUCTION

Rittel and Webber first coined the term ‘wicked problems’ to refer to a category of public policy issues, not with moral wickedness, but with a high level of complexity (Rittel and Webber, 1973). Wicked problems are characterized as policy issues that: are continually evolving; have many causal levels; have no single solution that applies in all circumstances and where solutions can only be classified as better or worse, rather

than right or wrong (Rittel and Webber, 1973; Blackman *et al.*, 2006; Durant and Legge, 2006).

Commonly used hierarchies of evidence, reductionist and linear-based policy analysis methods are recognized as largely inadequate to address wicked problems (Fischer, 1993; Durning, 1999; Morçöl, 2001; Stewart and Ayres, 2001; Morçöl, 2002; Hajer and Wagenaar, 2003). Wicked problems challenge the role of evidence and expert opinion in finding solutions (Kreuter *et al.*, 2004; Fischer,

2009). Even when the complexity or wickedness of a policy problem is recognized by planners, the proposed solutions may take a 'tame' or reductionist stance, limiting action to a subset of the problem (Raisio, 2009).

This paper reports on a complex environmental approach to identify a comprehensive intervention portfolio to enhance food security and physical activity for Māori (the indigenous people of New Zealand), Pacific (New Zealanders of Pacific ethnicity) and low-income populations in New Zealand. It does so to illustrate the value of such an approach to tackling wicked health promotion problems and provides a method for policy makers and researchers in other fields and other jurisdictions concerned with understanding, explaining and addressing wicked health promotion challenges.

Obesity, poor nutrition and inadequate levels of physical activity can be identified as wicked health promotion problems, contributing to significant rates of non-communicable disease in both developed and developing countries (Lobstein and Jackson-Leach, 2006; Wang and Lobstein, 2006; World Cancer Research Fund/American Institute for Cancer Research, 2009). The drivers of obesity, nutrition and physical activity are recognized to be multiple, diverse and complex (Hammond, 2009), including both personal behaviours and aspects of the physical, economic, socio-cultural and political environments that shape them (Egger and Swinburn, 1997; Shiell, 2008; Vandenberg et al., 2008; Kopelman, 2010). Given this complexity of causation, solutions focused on individuals and single responses have been shown to be inadequate (Swinburn and Egger, 2004; Hill et al., 2007; van der Horst et al., 2007; Walton and Signal, 2010).

To reverse the trends of increasing obesity, poor nutrition and inadequate levels of physical activity, practitioners and policy makers are increasingly recognizing the need for comprehensive environmental policy and interventions (Swinburn et al., 2005; Sacks et al., 2008; Pearce and Witten, 2010). However, the complexity of the drivers of obesity, nutrition and physical activity can act as a barrier to policy development. In relation to the UK *Tackling Obesities* project, Shiell warns that a reaction to showing the complexity of causation in defining a policy problem may lead to inaction, as it raises the question of where action should begin within a highly connected complex system (Shiell, 2008).

The New Zealand Healthy Eating—Healthy Action (HEHA) Strategy is an example of a comprehensive health promotion approach to addressing obesity, nutrition and physical activity (Ministry of Health, 2003). This strategy called for action across communities, food industry, workplaces and schools through national and local policies and programmes and community-based initiatives (HEHA Strategy Evaluation Consortium, 2009). Within the HEHA Strategy further research was proposed for areas lacking evidence including identification of interventions for enhancing food security and physical activity for Māori, Pacific and low-income people.

Food security is the assured access to sufficient food that is nutritious, of good quality, safe, meets cultural needs, and has been acquired in socially acceptable ways (Russell et al., 1999). Lack of food security (food insecurity) is associated with poor health. People who are food insecure tend to have a less varied diet, lower intakes of fruit and vegetables, micronutrient deficiencies and malnutrition (Kendall et al., 1996). In cross-sectional studies, food insecurity has been associated with adult obesity (Bhattacharya et al., 2004), type 2 diabetes, poor academic development, behavioural and psychosocial problems in children and poor mental health (Cook, 2002; American Dietetic Association, 2006).

Despite being a 'land of plenty' with food and beverage exports representing half of all New Zealand's merchandise exports by value (New Zealand Trade and Enterprise, 2010), food security was identified as an issue for 20–22% of New Zealand households with children, with higher rates among Pacific peoples and Māori (Parnell et al., 2003). More recent investigations from New Zealand have shown high rates of food insecurity in Māori and Pacific populations and low-income households living in highly deprived areas (Carter et al., 2010). Also food insecurity has been shown to have detrimental impacts on psychological distress after adjusting for these socio-demographic factors (Carter et al., 2011).

Physical activity has been defined as any bodily movement produced by skeletal muscles resulting in energy expenditure (Caspersen et al., 1985). Physical activity in daily life can be categorized into occupational, sports, conditioning, household or other activities (Caspersen et al., 1985). Insufficient levels of physical

activity have well established health effects including chronic conditions such as type 2 diabetes, stroke, cardiovascular disease, high blood pressure as well as low self-perceived health and high mortality risk (Task Force on Community Prevention Services, 2002). Despite efforts to increase population levels of physical activity, approximately one-third of New Zealanders remain inactive (Sport and Recreation New Zealand, 2007).

This research assumes that to develop effective policies and interventions to enhance food security and physical activity for Māori, Pacific and low-income people, multiple interventions, impacting in multiple types of environment, targeting multiple causative associations are likely to be necessary. Therefore, a comprehensive intervention portfolio is required (Swinburn *et al.*, 2005). To guide portfolio development this research utilized both complexity theory (Byrne, 2005; Gatrell, 2005; Blackman, 2006), and an environmental framework, Analysis Grid for Environments Linked to Obesity (ANGELO) (Swinburn *et al.*, 1999).

The focus of complexity theory is the study of complex systems where social phenomena, such as food security, are seen as emerging in a non-linear way from the relevant social system as a whole, rather than through a linear causal chain within the system (Byrne, 2005; Gatrell, 2005). The use of complexity theory has grown within the biological and natural sciences in recent years (Gare, 2000; Capra, 2005), and since the 1990s has begun a transition to influence thinking in a range of social sciences (Medd, 2001; Rickles *et al.*, 2007).

Interventions within complex systems seek to change the emergent phenomena. To guide intervention development, an understanding of change within complex systems is required. Complex systems often exhibit stability over time. That is, while some components within the system may be added or removed, or interactions between components changed, a system can self-organize to maintain similar macro properties with negligible effects on emergent behaviour (Rickles *et al.*, 2007). This represents a fundamental property of complex systems that the output of a system is not proportionate to the input (Gatrell, 2005). A large input into the system may result in minimal change, while a small input may result in a fundamental change in how the system operates (a phase shift in complexity language), and the associated

emergent outcomes. To increase the likelihood of a phase shift, an understanding of the dynamics of the system under study is required, with particular attention given to control parameters. Intervening at the system control parameters increases the likelihood of a fundamental system change, even though the exact nature of this change cannot be predicted.

Byrne refers to control parameters as elements of a system that have a controlling influence on other system elements, acting to set the boundaries within which the system can operate (Byrne, 1998, 2001; Blackman, 2006), while Rickett *et al.* add that control parameters act as an external input into the system, impacting on the system at a macro level (Rickles *et al.*, 2007). As external inputs into a complex system, control parameters are particularly open to manipulation by policy intervention. As a guide to policy action, prioritizing interventions that impact upon control parameters provides an increased likelihood that intervention will move the system in a desired direction, with subsequent changes in outcomes.

The ANGELO Framework is a commonly cited tool used to analyse influences on obesity and opportunities for action. ANGELO enables a comprehensive analysis of the obesity environment by classifying the environment into four types: physical (what is available), economic (costs), socio-cultural (attitudes and beliefs) and political (the rules) (Swinburn *et al.*, 1999). ANGELO is important in providing an environmental focus to obesity, moving understanding of the cause of increased obesity from individuals to the context within which they live their lives. This, as Kickbush reminds us, needs a collaborative strategy with multiple sectors to impact on the problem (Kickbush, 1989). However, ANGELO can be criticized as a static model that fails to provide insight into interaction within and between environments. Using complexity theory alongside ANGELO provides an additional analytic layer. By utilizing the concept of control parameters within a complex system, a means to prioritize areas for intervention based on the likelihood of creating system-wide change (a phase shift) is added to ANGELO.

METHODS

The research aimed to identify possible public policy interventions to enhance food security

and physical activity among Māori, Pacific and low-income people in New Zealand. It was conducted over four phases: (i) a literature review and focus groups; (ii) identification of control parameters to focus upon; (iii) workshops with key informants to explore intervention options and (iv) investigation of a shortlist of intervention options and development of an intervention portfolio.

The first phase consisted of two comprehensive literature reviews identifying factors associated with food security and physical activity (Clinical Trials Research Unit May, 2008; Gorton *et al.*, 2010). Given a lack of relevant New Zealand literature, nine focus groups were also held with Māori (3), Pacific (3) and low-income people (3) (Lanumata *et al.*, 2008). Participants were asked about their access to healthy food and opportunities for physical

activity, barriers to such access and facilitators required to enhance access. In phase two, based on these data, descriptions of the social system from which food security and physical activity practices 'emerge' were developed and control parameters identified (see Figures 1 and 2). The system was classified according to the ANGELO environmental framework. Findings from phase one were mapped on system maps and highly connected elements, control parameters, identified Five control parameters (see Table 1) were prioritized by the research team and project advisory group, based on the number of connections each control parameter had and the strength of the evidence.

Phases three and four explored interventions to impact on the control parameters identified and move the complex social systems towards enhanced food security and physical activity for

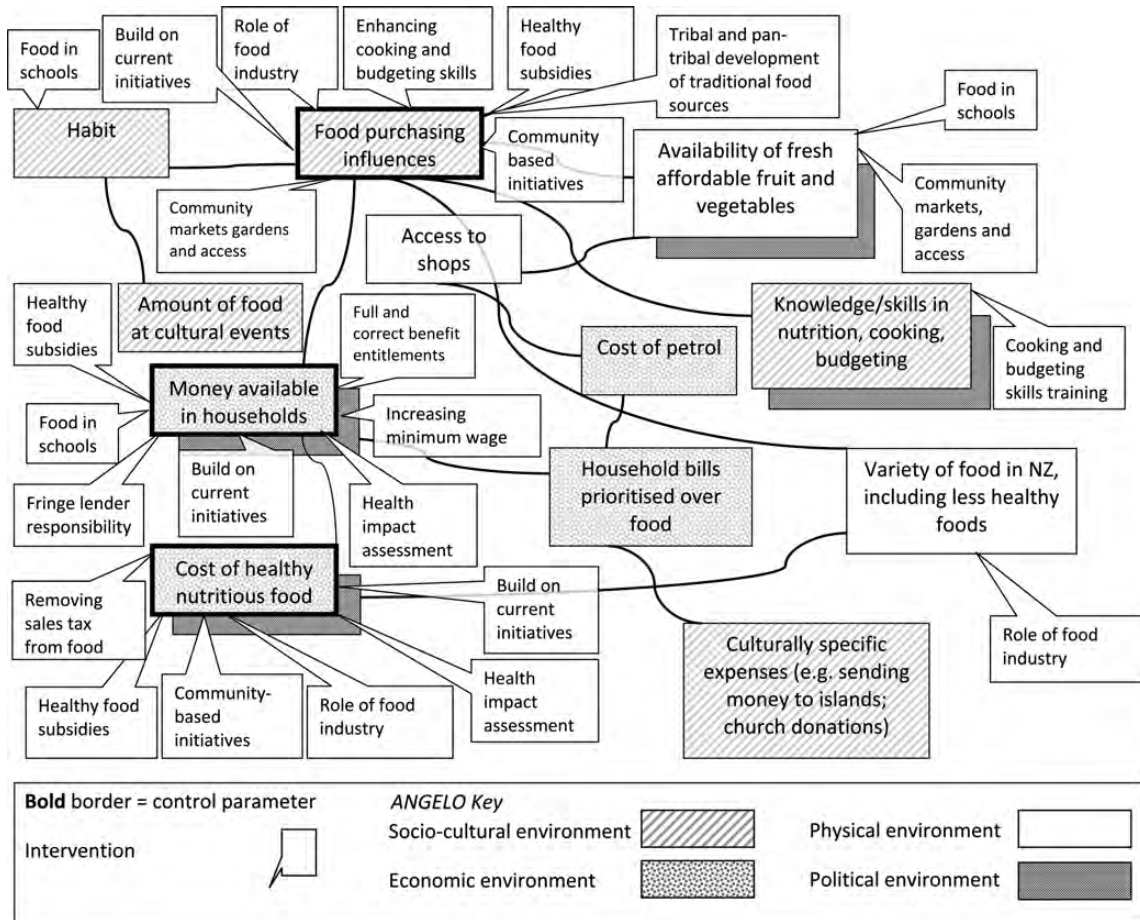


Fig. 1: Food security system map with interventions.

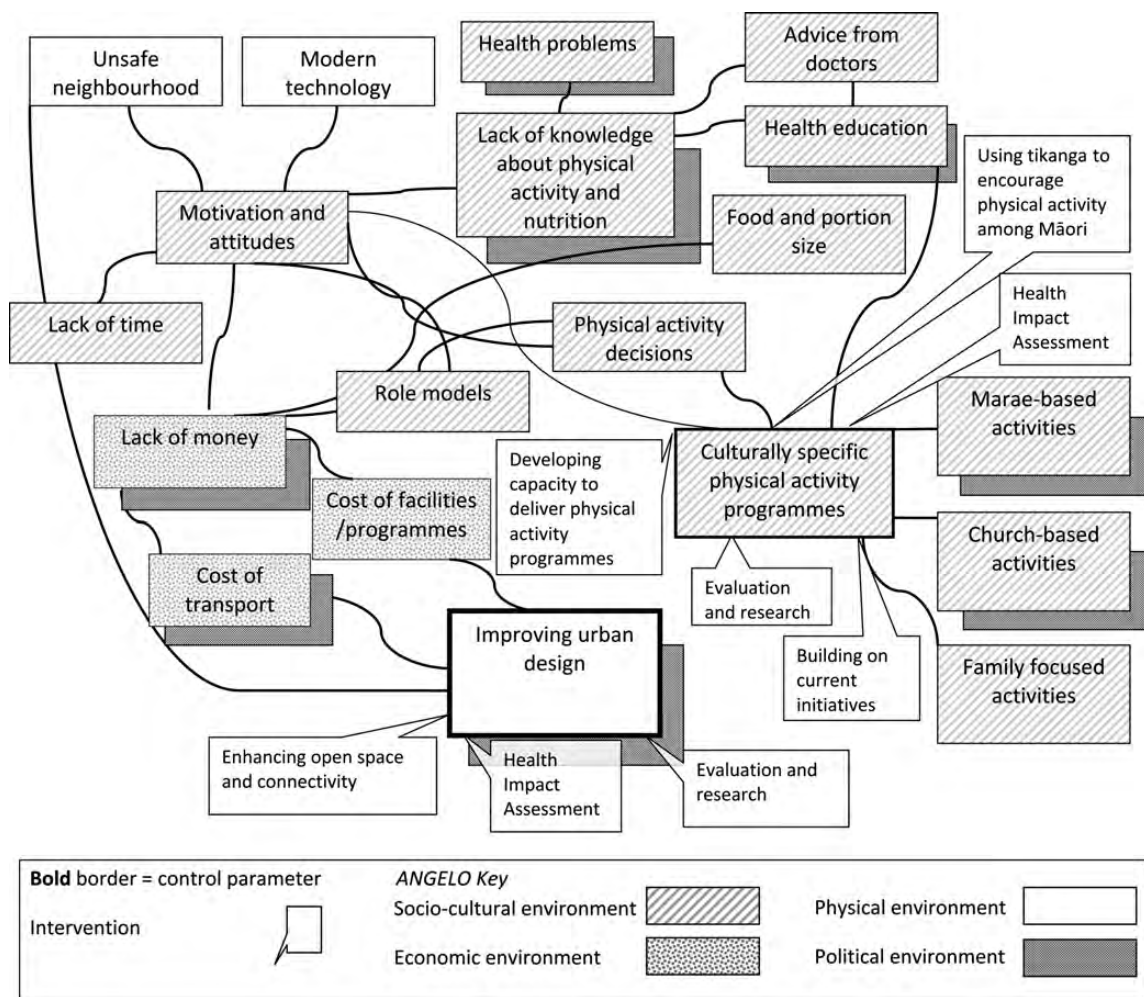


Fig. 2: Physical activity system map with interventions.

Māori, Pacific and low-income people. Phase three involved a series of seven workshops with a total of 56 key stakeholders from Māori, Pacific and low-income communities; policy-makers; non-governmental organizations; the food industry and academics to identify appropriate interventions. Each workshop agreed on intervention options based on filter criteria developed to judge the achievability of interventions on obesity (Swinburn *et al.*, 2005). The criteria are a common set of considerations in any policy-making process and address feasibility, sustainability, equity, potential side-effects and acceptability to stakeholders. A cost-benefit criterion was added in order to ensure interventions provided good value for

money. The equity filter focused on Māori, Pacific and low-income people.

In the fourth phase, prioritized intervention areas from phase three were explored in more detail using literature reviews and additional key informant interviews with a range of key stakeholders. Key findings and draft recommendations were presented at stakeholder workshops at the Agencies for Nutrition Action National Conference. This forum provided an opportunity to obtain feedback from leaders in the fields of food security and physical activity working in a wide range of government and community agencies across the country. Feedback was gathered in facilitated discussion groups on the key interventions and

recommendations. Approximately 40 people attended the food security workshop and 20 attended the physical activity workshop. Overall, feedback was largely positive. However, participants provided valuable advice about the proposed recommendations that was incorporated, as appropriate, when drafting final recommendations. For example, some recommendations were added and others were phrased in language appropriate to the particular policy arena. Stakeholders were identified from the researchers' networks, advice from the project advisory group and contacts in key areas, website analysis and through a snowball technique (Bryman, 2008). A particular focus was gaining representation from Māori, Pacific and low-income communities whose interests are not well represented in this country.

Disciplines represented in the research team included nutrition, physical activity, health economics, Māori research, Pacific research, social policy, health promotion, clinical trials, epidemiology and health geography. All team members took an active role in the entire research process enabling the team to learn from each other and to construct an in-depth understanding of the issues and potential solutions that no individual could have arrived at alone.

RESULTS

Results suggest that food security and physical activity for Māori, Pacific and low-income families can be characterized as 'emerging' from complex systems. Control parameters, to intervene to enhance food security are: money available within households; the cost of healthy, nutritious food and food purchasing influences such as access to food (Walton and Signal, 2008). Control parameters for enhancing physical activity for these communities are improving urban design; and development of culturally specific physical activity programmes (Walton and Signal, 2008).

Food security and physical activity system descriptions

Figure 1 represents the food security system, and Figure 2 the physical activity system, which were identified from the literature reviews and focus groups in phase one. The control parameters (bold border) identified in phase two are

also represented, as are interventions identified in phases three and four, and where they are likely to impact (interventions are entered in multiple places as appropriate). The system elements are identified by the type of environment being impacted on according to the ANGELO framework (Swinburn *et al.*, 1999). Those with influences on multiple environments are illustrated with multiple boxes (e.g. in Figure 1 overlap between political and economic environments is identified). Within Figures 1 and 2, a number of interventions impact on each of the control parameters and in Figure 1 most interventions impact on other system elements as well, strengthening their likely impact on the system as a whole. Elements across the four ANGELO framework environments are impacted on. Links between elements have been included where there is evidence.

Interventions

Seventeen potential intervention areas relating to the five control parameters were identified in phase three for further investigation in phase four as indicated in Table 1 (Bowers *et al.*, 2009). Two cross-cutting interventions were identified that were considered to impact food security and physical activity. These were Health Impact Assessment (HIA) (European Centre for Health Policy, 1999) and building on successful current initiatives such as the Pacific Heartbeat Programme (Heart Foundation, 2011), the work of Te Hotu Manawa Māori (Te Hotu Manawa Māori, 2011) and the Healthy Eating Healthy Action Strategy (Ministry of Health, 2004). The final report included papers on each of the 17 prioritized intervention areas from which 82 recommendations were made ranging from those requiring immediate action to action in the longer term. The recommendations were addressed to a range of actors including central and local government agencies, Māori tribal and pan-tribal organizations, Pacific communities, the food industry and service providers. Many of these actors were represented in the research process. Intervention areas included specific actions such as healthy food subsidies (using smart card technology), increasing the statutory minimum wage rate and enhancing open space and connectivity in communities as well as a common focus on further research and ongoing evaluation of interventions.

Table 1: Interventions by control parameter to enhance food security and physical activity in Māori, Pacific and low-income people

Control parameter	Intervention
Food security	
Money available in households	Healthy food subsidies using smart card technology Increasing the statutory minimum wage rate Ensuring full and correct benefit entitlements Fringe lender responsibility Provision of free or subsidized food in schools
Food purchasing influences	Enhancing cooking and budgeting skills Tribal and pan-tribal development of traditional Māori food sources Community markets, community gardens and improving access to food, e.g. home delivery or mobile vendors, supermarket shuttles, location of supermarkets
Cost of healthy nutritious food	Community-based initiatives, e.g. food cooperatives, gardening projects, barter schemes, and fruit and vegetable prescriptions The potential role of the food industry at multiple levels: primary production; food production, manufacture and distribution; and retailing and food services Removing sales tax from healthy basic foods
Physical activity	
Improving urban design	Enhancing open space and connectivity
Culturally specific physical activity programmes	Developing capacity to deliver physical activity programmes Evaluation and research on the impact of programmes Using tikanga (Māori cultural practices) to encourage physical activity among Māori
Cross-cutting interventions	
Impacting on a range of control parameters	Health Impact Assessment on issues related to food security and physical activity
Impacting on a range of control parameters	Building on current initiatives

DISCUSSION

This paper reports on the use of a complex environmental approach to determine how to enhance food security and physical activity among Māori, Pacific and low-income New Zealanders. This approach has moved away from adopting individual solutions to complex social problems instead identifying the systems that operate in each area and a portfolio of interventions likely to be effective. It has also taken an environmental focus, emphasizing the need to provide long term and sustainable solutions that impact on the settings in which people live their lives (Swinburn *et al.*, 1999). This research has built on, and added to, previous food security and physical activity research. It has included the voices of the affected communities in the research team, focus groups, workshops and key informant interviews. It has incorporated the perspectives of policy makers, NGOs and academics. In doing so, it has enabled the mapping of the relevant systems, the identification of a range of interventions and particular consideration to be given to the policy-making concerns of feasibility,

sustainability, equity, potential side-effects, acceptability to stakeholders and cost–benefit.

Results suggest that key areas to intervene to enhance food security for Māori, Pacific and low-income families relate principally to availability of money within households; the cost of food; and food purchasing factors such as cooking skills and community markets and gardens. Identified interventions include healthy food subsidies, increasing the statutory minimum wage rate, tribal and pan-tribal development of traditional food sources, a stronger role for the food industry and ensuring beneficiaries receive their full and correct benefit entitlement. In relation to enhancing physical activity, important areas for intervention are improvements to urban design; and development of culturally specific physical activity programmes. Interventions include enhancing open space and connectivity, developing capacity to deliver culturally specific physical activity programmes and use of tikanga to encourage physical activity among Māori. Collectively the interventions form a portfolio of actions to enhance food security and physical activity for

Māori, Pacific and low-income people (Bowers *et al.*, 2009).

While the volume of research describing the extent of obesity, physical activity and nutrition issues and causative associations is immense, there is much less research relating to intervention. Authors that have considered policy responses are increasingly calling for comprehensive portfolio type approaches, with action across multiple levels of governance (Swinburn *et al.*, 2005; Lang and Rayner, 2007; Brescoll *et al.*, 2008; Story *et al.*, 2008; Kopelman, 2010). To date, there have been few attempts to consider how an understanding of complex causation could inform policy action, or identify theoretically informed processes for prioritization amongst possible interventions. Within the limited number of studies that have introduced a complex view of obesity causation concrete intervention proposals have been lacking (Butland *et al.*, 2007; Shiell, 2008; Hammond, 2009; Kopelman, 2010). The current study has demonstrated a method to identify interventions that acknowledges the complexity of health promotion issues and the importance of environment whilst taking account of the views of the community and the concerns of the policy environment.

There are a number of strengths to this approach, several of which build upon, and reinforce, the existing literature regarding policy design for wicked problems. First, it enabled a focus on the complex environments within which people live. Second, it was firmly based in theoretical explanations. Third, the mixed methods design enabled the integration of data from different sources. Fourth, the iterative nature of the research meant that as each stage of the research was developed the research team went back to, and incorporated, the previous research findings thus building the final research outcomes. Fifth, equity considerations were a major focus throughout the research both in the initial research question and in the method used to answer it enabling the voices of less privileged communities to be heard. Sixth, the breadth of expertise in the research team meant that multiple methods could be used, key communities reached and a wide range of interventions could be explored. Seventh, this method provided advice to policy-makers that accounted for key policy considerations such as feasibility, equity and acceptability to stakeholders. Finally, it provided a tangible outcome

in the maps that both illustrate the systems, control parameters and interventions. These maps are an easy way to present complicated information to busy bureaucrats and politicians who might otherwise find such information challenging, as Shiell reminds us (Shiell, 2008).

A limitation of this approach is that while a comprehensive systems view was taken of interventions to enhance food security and physical activity, it was necessary to limit the scope of the research at each phase. From the inclusion criteria of the initial comprehensive literature reviews, through to the selection of interventions, possible areas of study have been excluded. While limiting the study scope has resulted in a more realistic set of recommendations, the weakness is the exclusion of potentially effective interventions. The limiting of scope is also reflected in the stakeholder engagement. Compared with government and NGO actors operating within the policy level system, inclusion of actors directly impacted within community level systems was restricted. When developing finer policy detail and implementation plans, more comprehensive engagement with these communities will be required. In particular, an understanding of local systems will be needed to inform and support implementation, paying particular attention to the initial conditions across communities, which can lead to divergent outcomes (Matheson *et al.*, 2009).

Second, the method has resulted in multiple solutions which may be difficult for governments to implement together due to budget constraints or the practicalities of implementation. Therefore, consideration could be given to prioritizing interventions that impact on multiple system control parameters, such as the implementation of healthy food subsidies using smart card technology, and to implementing interventions with flow-on effects to others. For example, teaching cooking skills may not alter food purchasing practice until availability of healthy foods and cost of healthy nutritious foods have been addressed.

Third, political contexts change and advice in one policy context may not translate well to another. By the time of the completion of this 2-year research project there had been a change in government. This more conservative government continues a focus on physical activity but not on food security. Consequently, despite the strength of the evidence gathered in this research, intervention in this arena has had little,

if any, attention. Yet, food insecurity persists in New Zealand, and may be worsening in the current economic climate.

CONCLUSION

This research suggests that action to enhance food security and physical activity requires multiple interventions that impact across the social systems from which food security and physical activity emerge. The results support recent calls from the obesity research community for a focus on environmental and policy change, aimed at the diverse drivers of diet and physical activity (Lang and Rayner, 2007; Finegood *et al.*, 2008; Sacks *et al.*, 2008, 2009; Story *et al.*, 2008; Kopelman, 2010). This research identifies the need for action to influence a range of physical, economic, socio-cultural and political factors within those social systems by many different government and community actors. The suggested interventions present a roadmap to begin coordinated and comprehensive action. Such an approach requires strong government leadership to ensure that those least privileged are not food insecure, and do not miss out on physical activity opportunities. Governments in many countries are currently facing the related challenges of high rates of obesity, poor nutrition, food insecurity and low rates of physical activity. This research provides insights for other jurisdictions into the types of initiatives needed to address these pressing health promotion issues.

The complex environmental approach used in this research provides a method to identify how to intervene in complex systems that may be relevant to other 'wicked' health promotion problems. The approach prioritizes interventions that impact on highly linked elements of any system (control parameters). Lessons for such application include: explicit use of complexity and environmental theory; an explicit equity focus; including a range of expertise within the research team; the use of mixed methods to provide rich data; active participation of affected communities and policy-makers in the process; use of filter criteria used in policy-making; and an iterative process with transparent decision-making at each stage. Further research is needed to test the value of this complex environmental approach in tackling 'wicked' health promotion problems in other arenas and other jurisdictions. Health promotion recognizes that there is no

one cause to public health problems (Dahlgren and Whitehead, 1991). A complexity approach reminds the health promotion community that likewise there is no one solution (Byrne, 2005).

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