

Expert testimony to the Programme Development Group on a whole system approach to prevent obesity: written reports

Guidance to tackle obesity at a local level using whole system approaches was initiated by NICE in 2009. The work was put on hold in November 2010 and reviewed as part of the Government's obesity strategy work programme. The revised scope has a stronger focus on local, community-wide best practice. It addresses both process and outcomes.

Before the development of this guidance was put on hold, the Programme Development Group (PDG) for this work met on four occasions and a series of evidence reviews was completed. The PDG also invited a number of experts in "whole system" or "community-wide" working to provide testimony at one of their four meetings from July 2010 to November 2010. Testimony was provided by:

- Dr Julian Pratt and Dr Diane Plamping
- Professor Linda Bauld
- Dr Jake Chapman
- Dr Steve Allender

This paper provides the written reports submitted to the PDG to accompany the expert presentations and subsequent discussion.

The PDG is of the view that the expert testimony they have heard to date on *whole system* approaches to obesity will have resonance in considerations about *community-wide* approaches to obesity prevention. For example, the expert testimony considers issues around complexity, advocacy, relations between partners, scaling up projects, failure and evaluation. However, we would also like to hear stakeholder's views on the work that the PDG has considered to date.

We are particularly interested to hear stakeholder's views on:

- 1. The implications of the review findings for current and emerging practice at the community-wide level.**
- 2. What additional expert testimony should the PDG invite, particularly in light of revisions to the scope.**

Please also see the associated call for evidence.

Whole system approach

1. Introduction

The scope for this NICE guidance is ‘Preventing obesity using a ‘whole system’ approach at local and community level’. It draws on the obesity systems map developed by Foresight¹. In preparation for this work the Programme Development Group (PDG) commissioned a report from PenTAG on the Whole System Approach².

The testimony presented in this paper is intended to clarify the different ways in which the term ‘Whole System’ is currently used and to suggest that NICE should make use of all of these usages in the development of its guidance.

2. Systems and theories of change

Systems

We take as a working definition of a system anything that can be conceptualised both as a whole and as a set of interconnected parts.

Complex Adaptive Systems and Designed Systems

Given this very inclusive definition of ‘system’, there are many different sorts of thing that can lay claim to being a system and many ways of classifying systems. One distinction that is becoming increasingly helpful in a range of application areas is between simple systems and complex systems.

Simple systems are those in which the behaviour of the whole can be predicted from knowledge of the behaviour of the parts and their connections. A single planet orbiting a sun is a simple system, and other examples are systems that have been designed by people – machines, buildings, devices. The parts of a simple system are themselves simple. The underlying mental model is of a design – a set of plans, a scale model which may be static or moving. A simple system can be incredibly complicated (literally ‘folded with’), and its behaviour can be very difficult to understand from the behaviour of the parts – but this understanding is always in principle possible. Simple (and complicated) systems tend towards disorder, their entropy increases, and if we design a system we know that we will have to put energy into its monitoring and maintenance.

The term ‘complex’ carries, in addition to a sense of the complicated, the sense of an indivisible whole – as in its usage to describe a building complex. The behaviour of each part, and of the whole, depends on the interactions of all the parts, so it is not possible to build up an understanding of the whole other than by engaging with the system as a whole. An example is the ‘three body problem’ – the orbits of two planets around a sun are governed by no soluble set of equations and can only be predicted by iterative approximations. These planets do not follow a predictable path, like an ellipse, but a constantly shifting orbit that does not repeat itself.

The prime examples of complex systems are living systems, ecosystems, evolving systems. The underlying mental model of complex dynamic systems is of computer simulations that play out over time. The parts of a complex system are usually themselves complex systems, for example cells that are parts of an organism. Complex systems, which are generally open to a flow of energy and so described as dissipative structures, do not degenerate into disorder but actually create their own order – for example the order of a vortex created by water leaving a bath and dissipating its potential energy. Complex systems generally have the capacity to be self-ordering, or self-organising, though these patterns of order may disappear when conditions are not supportive.

Boundaries

The boundaries of a designed system are created by its designer. The boundaries of a complex system are created by its own internal dynamics, in interaction with its environment. The boundaries of a vortex are shaped by the energy and viscosity of the fluid, the boundaries of a cell are created by its own metabolism.

Everybody is part of many human systems – for example a couple, a family, a neighbourhood, a work group, the supporters of a football team. We suggest that human systems organise around purpose (what is important to them) and meaning (why it is important). If you are connected to others who share the same purpose, you are part of a human system organised around that purpose.

Systemic approaches

We think of an approach as systemic, as a systems approach, if attention is given to a whole, to its parts and to the interconnections. Inevitably one of these will be in the foreground at any particular moment, but an approach is only systemic if all are held in the attention.

Theories of change

Anybody who wants to take action to make a difference in the world will employ a theory of change, even if this is not explicit.

Designed systems, machine metaphor

The dominant theory of change in our culture is derived from a view of the world, including human systems, as a simple (though complicated) system. Order has to be designed in. A designer has to take responsibility for analysing the current situation from a position of objectivity and for proposing an intervention that will have the desired effect – either because it is so persuasive that people change their behaviour or because it is possible to coerce them to do so. This is a designed systems approach and the interventions can be described using the metaphor of a machine – re-design, re-engineering, leverage. It is a sequential approach in that analysis leads to policy, which leads to action.

The designed systems approach is a powerful way of understanding and describing but its great weakness is that there is so often a disconnect between policy analysis and making a difference. A lot of energy has to go into motivating people to carry out the policy which they have had no part in developing.

An example of this sort of designed structure is a firm that decides what to produce, whom to employ, what roles each will play and what will be the sanctions and rewards.

The Foresight report on obesity is implicitly rooted in this theory of change, and the obesity map is a very sophisticated analysis of the problem. It recognises the multiplicity of

interacting causative factors and the significance of these interactions, but the policy prescriptions are for the parts.

Adaptive system, living systems metaphor

An alternative theory of change is derived from a view of human systems as complex dynamic systems that are capable of self-ordering or self-organising. When such a system is not acting as you would want it to, it is likely either that it is organising to achieve something other than its stated purpose or that it is being constrained by its environment. As there is no external designer, any actor in the system (individual, team, group, organisation, community) may take on the role of 'animateur' and perturb the system in the hope that it self-organises to achieve a different purpose.

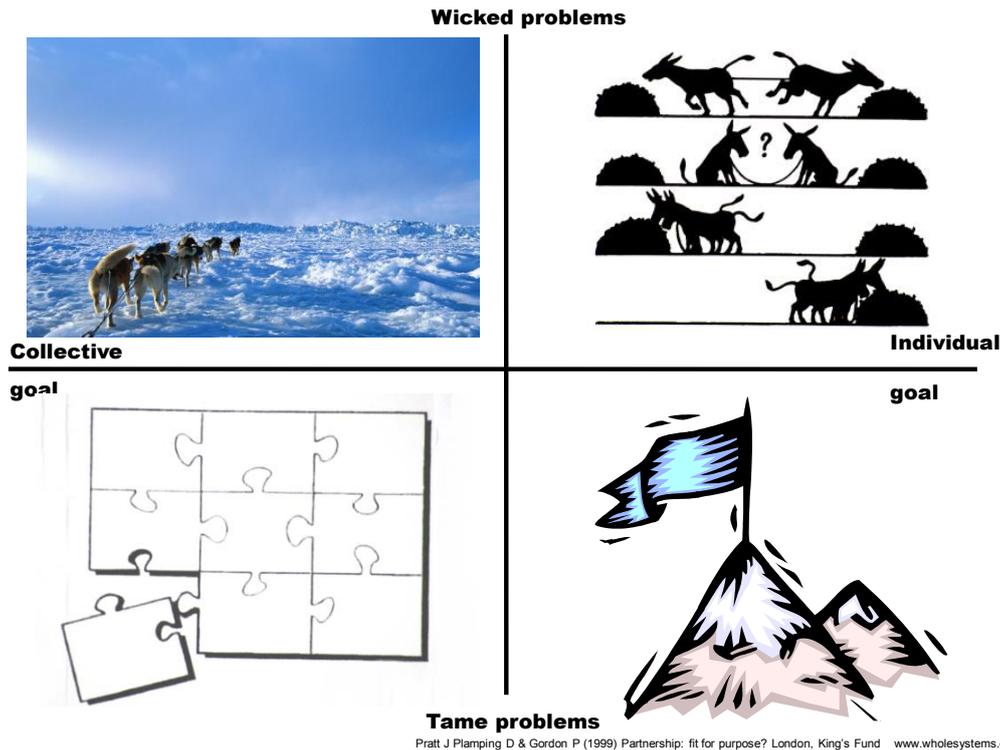
This is an adaptive systems approach and the interventions can be described using the metaphors of living systems and ecosystems – interconnection, interaction, identity, patterns, flows of energy. It is an holistic approach in which the sharing of understanding and purpose is not a precursor of action but an integral part of it.

An example of this sort of adaptive structure is a social network that influences an individual's diet, exercise and weight.

Landscapes Framework

Rittel and Webber³ made a very helpful distinction between 'tame' problems that can be defined, broken into manageable chunks and solved; and 'wicked', policy-resistant problems where, even with a goal they are agreed on, a group of people will have quite different views on the nature of the problem, what may be causing it and how to resolve it.

We have used this distinction to describe a simple two by two matrix that many people have found helpful when orientating themselves in a situation where they want to take action to make a difference in a human system⁴. In what we have come to call the Landscapes Framework⁵, wicked problems are above the line and tame problems are below the line. On the right each actor in the system (individuals, teams, communities, departments, professions, organisations) pursue just their own goals; while on the left they also have some shared goals.



In the bottom left people share a goal that they know how to achieve – building a bridge, for example. A productive approach when you believe yourself to be in this landscape is co-ordination. There has to be an understanding of what the goal is, how to achieve it, how to break it into manageable parts, what sequence to carry them out in and who is responsible for each part of the jig-saw. This is a designed systems approach based in analysis and planning that is entirely appropriate for tackling tame problems.

In the top left people share a broad goal, but the detailed steps that would take you there are not knowable at the outset. They have no option but to explore together, to co-evolve, and the ice-field is constantly shifting with new possibilities and new obstacles constantly appearing. When people tackle this landscape together they trust that they are capable of self-organisation. This is an adaptive systems approach that is appropriate in tackling a wicked problem; and this is the approach that the PenTAG report identifies as an ‘authentic’ whole systems approach.

Both are systems approaches – designed and adaptive – but the underlying mental model of how systems organise is different. It is possible to take a systems approach in all four quadrants, and we believe that co-operation (top right) and competition (bottom right) are also likely to be relevant to tackling obesity.

3. Whole systems

The term ‘whole system’ does not have a single agreed meaning, but it has nevertheless proved to be fruitful. In this section we briefly describe its history, and distinguish between two of its meanings – system-wide analysis on the one hand, and a way of working that animates the self-organising capacity of complex adaptive systems on the other.

History

The term 'whole system', which had some currency in environmental and spiritual groups in the 1980s, was taken up in the 1990s by Organisation Development consultants working in the USA with multinational corporations in a way that drew to a greater or lesser extent on the theory of complex adaptive systems⁶. Building on this body of theory and practice in our work at the King's Fund for the London and Northern Health Partnerships, we first used the term 'Whole System Event' in 1995 to describe events that brought together a rich variety of participants from across the health and social care system to work together on issues that concerned them. The issues that they chose to work on were clearly located in the top left landscape (e.g. 'how can we improve the health and wellbeing of older people around here?') and the events were designed to support co-evolution through exploration and dialogue. We thought of these the events as one visible moment in a longer process, but we rapidly realised that participants were being seduced by the power of the events into ignoring the planning and follow-up. We therefore shifted our emphasis from talking about Whole Systems Events to describing a Whole Systems Approach⁷ that was adaptive, co-evolutionary and located in the top left.

In the 1990s people responded to the term 'whole systems' as an invitation to think beyond the limitations of a competition-based NHS and would say things like 'we don't know what a whole systems approach is, but it sounds interesting'. When New Labour came to power in 1997 they brought a language, indeed a duty, of partnership in the public sector and a commitment to joined-up government. It seems clear from the form that they prescribed for Action Zones and Local Strategic Partnerships that they intended these partnerships to follow a designed systems co-ordinating approach. The term 'whole systems' was rapidly appropriated by the NHS and used to refer to a bottom left designed systems approach, and within a year or two planners were being re-named directors or co-ordinators of whole systems.

Since 2000 the term 'whole systems' has in practice been used to refer both to approaches in the top left (adaptive) and to approaches in the bottom left (designed).

It is interesting to speculate why PenTAG's literature review has identified so clearly just one of these meanings as 'authentic'. Our hypothesis is that the use of 'whole systems' to refer to activity in the bottom left is under-theorised because it implicitly draws on the theory of planning, while its use in the top left has been theorised as part of a struggle to introduce a radically different way of working into public services in the UK.

'Whole systems approach' used to signify 'system-wide analysis'

The Foresight report uses 'whole systems approach' to refer to a system-wide analysis of the causes of obesity (bottom left). This usage is consistent with one of the widely-used meanings of 'whole systems' i.e. system-wide.

While the analysis of complex systems has progressed dramatically over the last quarter of a century, the prescriptions for action to which it leads have not moved far beyond those derived from familiar approaches to analysis and planning.

'Whole systems approach' used to signify an approach to complex adaptive systems

The PenTAG report² has provided a summary of a whole systems approach rooted in the theory of complex adaptive systems. It is an approach that is simultaneously so obvious that

it barely warrants a description, while so radical in organisational life and academic thought that it is difficult to imagine putting it into practice. It can be understood through experience, but less easily through words. We do not attempt to describe it in this paper, but have done so in *Working Whole Systems: putting theory into practice in organisations*⁴.

It is distinguished from a designed systems approach in several major ways:

- it is an approach to action not a method of analysis
- it tackles complex wholes without aiming to break them into manageable chunks
- it pursues multiple courses of action in parallel rather than following a sequential process
- it treats human systems as adaptive and self-ordering, comprising agents that are meaning-seeking and purposeful.

4. Issues for the Programme Development Group (PDG)

Designed and adaptive whole systems approaches

We believe that the PDG is in a position to interpret the term ‘whole systems approach’ in whatever way is most conducive to the prevention of obesity. Our view is that the PDG would be unwise to limit its use of the term to the adaptive top left sense that PenTAG have described as ‘authentic’. This leaves two options – either

- (a) to use the term, as the Foresight report does, to refer to a bottom left designed systems approach, or
- (b) to acknowledge that both designed and adaptive approaches are worth considering.

(a) Interpret ‘whole systems’ as ‘system-wide’

There are several reasons why the PDG might decide to limit its recommendations to a designed systems approach which provides, from the perspective of an external observer, a sophisticated description of the complex system that influences the incidence of obesity. It can be based on the sort of evidence that is persuasive to others and consistent with the analytical mental model that NICE employs. And the prescriptions for action can be shaped so that they tackle tame aspects of the overall wicked problem of obesity.

The disadvantage of this choice is that it would exclude from consideration the additional use of top left adaptive whole systems approaches.

(b) Acknowledge both designed and adaptive systems approaches

We hope that the PDG will acknowledge that both designed and adaptive approaches to obesity have their own merits. The reason for including the adaptive systems approach is twofold: that it is capable of enabling things to change when understanding a causal map is not enough on its own; and that when an analytical model is imperfect (e.g. the interactions in a cognitive map cannot be expressed quantitatively) a group of people acting adaptively may be able to reach a better understanding of what will work using their tacit knowledge than a computer model can using explicit knowledge.

A disadvantage of this choice is that the evidence base for adaptive whole systems working is much less robust than the evidence that underlies the Foresight report. Some whole

systems working has been evaluated⁸, but evaluation is very challenging with an approach in which the consequences of an intervention cannot be predicted in advance.

A challenge is that, when taking an adaptive whole systems approach, it is to be expected that local action will be different in each place.

Local and central

Most of our work that has taken an adaptive, co-evolutionary whole systems approach has been at local level – typically at the level of a city or a London borough, sometimes at the level of an organisation or a region – though we have also taken the same approach in a policy system at national level. What can be achieved at each of these levels is almost always constrained by the absence of the involvement in the conversations of people from other levels.

When working at a national level we have been keenly aware of the value contributed by a whole systems approach that draws in several government departments and connects them to those who implement policy.

We believe that an ideal model for adaptive whole system working is for it to take place simultaneously at local and national levels. When a local system recognises the need to include participants from the national level there is then a national group that is hungry to inform itself about the realities on the ground by sending members to learn from, and inform, the local work.

Is there a passion for tackling obesity?

Adaptive human systems organise themselves around meaning, and are driven by the passion of the participants to make a difference. In practice, the development of an adaptive whole systems approach begins with the development of an inquiry question that taps into participants' passion and releases energy for change. It is the agents (people, organisations) that are drawn to the inquiry question who constitute the system. The question supports the development of connections between the parts and enables the emergence of new ways of organising in the system.

We have therefore tried to imagine what sort of inquiry question would bring together an adaptive system to prevent obesity. Clearly there are a small number of enthusiasts and people with a special interest – such as the members of the PDG – who would be drawn to an inquiry question along the lines of 'what can we do to prevent the expected rise in obesity in this area?' But, as the members of the PDG began to identify, people they have talked to about preventing obesity have not demonstrated any obvious organising passion that might lead to action.

Inquiry questions that seek to solve a problem (e.g. how to improve hospital discharge) have proved to be much less compelling as the basis for an adaptive whole systems approach than questions that seek solutions (e.g. how to make going home from hospital a positive experience). But even if a more positive obesity question could be identified it is difficult to imagine that it would draw in food suppliers, providers of transport and leisure facilities, planners, architects, TV chefs, fashion leaders, Treasury advisers and people of all sorts who make decisions every day about what to eat and what exercise to take. On the other hand, inquiry questions that focus on eating well, on doing more walking, on vigorous exercise, on living longer and well or on feeling and looking good would each have the potential to draw in and energise people with a wide range of perspectives.

It may well be that an attempt to promote an adaptive whole systems approach to obesity would rapidly fragment into separate adaptive whole systems approaches to food, transport, exercise, self-image and locus of control. Indeed there are already the beginnings of whole systems approaches (though not using this name) to local healthy food production and to a mix of transport that includes more human effort in the Transition Towns movement – in response not to obesity but to climate change. These may be the sort of adaptive whole systems approaches that the PDG could consider advocating, alongside an analytical and designed approach.

Diane Plamping, Julian Pratt & Pat Gordon

www.wholesystems.co.uk

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Lessons from Tobacco Control

This paper describes progress made in reducing smoking rates in England over the past 50 years and outlines potential lessons from tobacco control that can be applied to other areas of public health, including efforts to prevent obesity. The paper begins by describing changes in smoking prevalence and summarising the impact of smoking on health. It then outlines the main developments in tobacco control policy between the 1960s and the present day and reflects on the key components of these developments. The contribution of research is then considered and the evidence-base for tobacco control interventions briefly outlined, with a particular focus on smoking cessation and smokefree legislation. In conclusion, a current example of a whole systems approach to addressing smoking is provided.

Smoking and Health

Smoking rates in England have dropped significantly since the early 1960s when 70% of men and 47% of women smoked¹. Prevalence is now 22% amongst men and 20% amongst women. Steady reductions in smoking rates were achieved between 1998 and 2008 in particular when a comprehensive package of tobacco control policies was in place in the UK. During that period adult smoking rates fell by a quarter and those in young people (11-15 year olds) by half^{2,3}. However, there are still nearly 9 million smokers in England today³. Smoking is not evenly distributed amongst the population – it is concentrated in more deprived areas and those from routine and manual groups make up more than half of all smokers. Prevalence amongst those in the lowest fifth of the household income distribution averages 29%, compared with 15% amongst those in the highest income quintile³. Smoking commonly starts in childhood with the vast majority of smokers starting before they are legally old enough to smoke⁴.

Smoking is the leading cause of preventable death in England. More than 80,000 people die each year from active smoking and up to 10,000 from the effects of second hand smoke^{5,6}. There are more deaths from smoking in England than the next six most common causes of preventable deaths combined (alcohol misuse, drug misuse, preventable diabetes, suicide, road accidents and other accidents and falls)⁷. Smoking is also the leading cause of inequalities in health – it is responsible for at least half of the excess risk of death in middle age amongst men in unskilled occupations compared with those in professional groups⁸. The gap in life expectancy attributable to smoking has recently been illustrated by 28 year follow up results from a prospective study of the survival of men and women in Paisley and Renfrew in Scotland⁹. This study found that the least affluent non smokers (those in the study who had never smoked) were much more likely to have survived than even the most affluent smokers. The authors concluded that even if the socio-economic circumstances of less

affluent smokers were to significantly improve, their health gain would be very limited if they continued to smoke⁹.

Smoking causes a range of diseases and is a risk factor in six of the eight leading causes of death globally. It is the largest preventable cause of cancer with one in four of all cancers attributable to smoking, including 90% of lung cancers and 73% of deaths from upper respiratory cancer^{10,11}. Recent studies of cancer genes have found that cigarette smoke causes DNA mutations that lead to lung cancer¹². Smoking also causes around one in five cases of cardiovascular disease and a range of respiratory diseases including 86% of chronic obstructive lung disease¹⁰. One half of smokers will eventually be killed by their addiction and lose 10 years of life on average¹³.

However, stopping smoking can significantly reduce the risk of smoking-related disease – for example, the millennium women’s study has found that the risk of heart disease following stopping smoking can fall to the level of someone who has never smoked through time¹⁴. Quitting can also significantly improve healthcare outcomes even amongst those with pre-existing smoking-related diseases. The health impact of smoking also includes the harmful effects of second hand smoke, particularly on children. Secondhand smoke exposure is clearly linked to a range of respiratory diseases and heart disease and is the leading cause of cot death¹⁵.

Tobacco use is one of the main sources of demand for the National Health Service. The most recent estimates suggest that treating smokers costs the NHS more than £2.7 billion per year¹⁶. However it is not just the NHS that bears the costs of smoking. Recent estimates have assessed the impact of smoking on society including worker productivity, absenteeism, loss of productive output, costs of passive smoking, environmental costs and fire costs. This places the societal cost at £13.74 billion per year, whereas smoking contributes £10 billion to the Exchequer through revenue from tobacco taxation¹⁷.

Tobacco Control Policy

Although evidence on the health effects of smoking began accumulating over 200 years ago, it was not until the 1950s that any real attention was paid to this evidence. In 1950 five case control studies were published illustrating the link between lung cancer and smoking, including Doll and Bradford Hill’s study. It took a further decade before the role of government in addressing smoking was acknowledged and a policy framework was proposed. In the UK, this framework was set out in the 1962 Royal College of Physician’s report on Smoking and Health¹. This report set out recommendations for policy in six areas: the provision of public education on harm from smoking; restrictions on sales of tobacco to children; restrictions on advertising; restrictions on smoking in public places; increasing tobacco taxation; providing information on cigarette packs about tar and nicotine content; and

investigating the value of 'anti-smoking clinics'¹. However, it would be almost half a decade later until all these measures were in place in the UK. Progress was achieved slowly.

In 1965, television advertising of tobacco products was banned and in 1971 the first health warnings appeared on cigarette packs, followed by tar and nicotine yields in 1973. Also in the 1970s tobacco taxes were raised above inflation. However, during the 1980s and early to mid 1990s relatively little policy progress took place. Instead, advocacy efforts escalated, led by Action on Smoking and Health (ASH) the tobacco control strategy established by the RCP in 1971. International tobacco control efforts also increased during this period and World No Tobacco Day was launched by the WHO in 1988. In 1993, Doll and Peto published results from the British Doctor's study that showed the extent of premature death due to smoking, with one in two smokers dying from smoking-related diseases¹³. This and other evidence persuaded the incoming New Labour government in 1997 to begin developing a package of policies that were outlined in the 1998 White Paper, *Smoking Kills*¹⁸. The policies in combination represented a comprehensive approach to tobacco control and included:

- An advertising ban (introduced in stages from 2002 to 2005)
- Tax increases (above the rate of inflation to 2001)
- Action on smuggling (increased from 2000)
- Mass media campaigns
- Enforcement of underage sales
- Better access to stop smoking medications
- The establishment of NHS stop smoking services

The policies set out in *Smoking Kills* did not include smokefree legislation but this was eventually introduced in England in 2007 following Scotland, Wales and Northern Ireland. Thus by 2007 all of the policies originally recommended in the RCP report were in place. Further progress, including the introduction of visual health warnings on packs (2008), raising the age of sale from 16 to 18 (2007) and the commitment to a point of sale display and vending machine ban (2009, not yet implemented) was made more recently.

What factors explain this progress, particularly in the past 10-15 years? Key ingredients include¹⁹:

- A sound scientific evidence base
- Authoritative reports from key organisations setting out action needed
- A central point to lead advocacy and campaigning
- Coalition building
- Public support for policies and interventions
- Political support for policies and interventions

The evidence for tobacco control began with studies on the impact of smoking but now includes a considerable body of research setting the rationale for, and impact of particular policies and interventions. This evidence has been invaluable in persuading planners and policy-makers to invest in tobacco control measures. Key organisations such as the RCP and the British Medical Association (BMA) have used this evidence to produce authoritative reports that have made the case for policies and interventions, underpinned by international developments such as the implementation of the World Health Organisation Framework

Convention on Tobacco Control (FCTC) from 2005. The existence of ASH as a central point for advocacy and campaigning has also been crucial, and ASH has been able to act as a focus for coalition building. The Smokefree Action Coalition, for example (with its roots in earlier coalitions, this partnership was formed to advocate for smokefree legislation) is centred around ASH but includes a wide range of charities and other organisations that are advocates for tobacco control. Their actions combined with the evidence (often communicated through mass media campaigns) have helped to shape public opinion in favour of measures to address smoking. These measures have built up over time, assisting in denormalising tobacco use which has further contributed to public support. New Labour's support for tobacco control undoubtedly contributed to the rapid progress observed in reducing smoking between 1998 and 2008 in particular - a steady decrease of 0.5% each year. It remains to be seen to what extent the change in government at Westminster in 2010 will affect tobacco control, and smoking prevalence, in the longer term.

Evidence for Action

As outlined above, the evidence-base to inform tobacco control is generally strong. At the international level, The World Bank has identified six key elements of tobacco control policy that are supported by evidence and are cost-effective. These policies form the core of recommendations for action in the FCTC. These policies aim to:

- deliver effective communications and education campaigns;
- support smokers to quit;
- reduce exposure to secondhand smoke;
- reduce tobacco advertising, marketing and promotion;
- effectively regulate tobacco products;
- reduce the availability and supply of tobacco products.

As examples, evidence for action to support smokers to quit and to reduce exposure to second hand smoke is summarised here with a particular focus on evidence to inform action in England.

Smoking Cessation

The vast majority of smokers in England want to stop (more than 70% in 2009) but relatively few succeed in the longer term²⁰. The success of quit attempts can be significantly increased if smokers have access to effective treatment. Advice from a health professional, telephone quitlines, behavioural support (counselling in a group or one to one with a trained adviser) and stop smoking medications (NRT, bupropion and varenicline) are all effective and cost-effective and are available in the UK. The best form of treatment involves a combination of behavioural support and use of stop smoking medication. This combination is provided by

NHS stop smoking services and has been shown to be four times more effective than trying to quit unaided²¹.

The World Bank and the FCTC recommend that countries should provide treatment services to support smokers to quit. The UK was the first to introduce a national stop smoking service, which remains the most comprehensive in the world. Since 2001 stop smoking services have treated 4.7 million smokers in England resulting in just under 700,000 longer term (at one year) quitters^{22,23}. Research has demonstrated that these services can also contribute to reducing inequalities in health. A systematic review of the effectiveness of the services, published in 2009, summarised results from studies that had shown that they are reaching and treating disadvantaged smokers²⁴. A study published in 2007 and included in this review also found that although disadvantaged smokers had lower quit rates, the NHS services were treating a far higher proportion of these smokers and therefore contributing to bridging absolute and relative gaps in smoking rates between disadvantaged and more affluent areas²⁵.

Studies have also demonstrated that these services and other cessation treatments are amongst the most cost-effective of any health care intervention. A recent economic analysis conducted for NICE found that cessation interventions of the type offered by stop smoking services cost up to just £985 per quality adjusted life year (the NICE threshold for cost-effectiveness is £20,000 per QALY) with some forms of support offered by the services being cost neutral^{26,27}.

Protection from Second Hand Smoke

The health effects of second hand smoke (SHS) exposure are well-established²⁸. In order to protect workers and the public from these effects, bans or restrictions on smoking in public and workplaces are a key component of tobacco control policy. Smokefree legislation has been in place in England since 2007 and a briefing paper to the Department of Health has recently summarised the impact of this legislation²⁹. Smokefree laws results in measurable improvements to respiratory health in workers (i.e. studies of barworker's health in the UK and elsewhere) and reductions in emergency admissions for heart attacks (resulting in 1,200 fewer hospital admissions in the year following smokefree in England). These laws also create an environment that can encourage smokers to cut down or stop (an estimated 300,000 smokers in England tried to quit as a result of the smokefree law) and can contribute to reductions in second hand smoke exposure in children (as demonstrated by studies in England, Scotland and Wales). International studies also suggests that smokefree laws have a net positive effect on businesses although a feasibility study in England concluded that a longer period of post-legislation follow-up data was needed before robust conclusions about the impact on the UK hospitality industry could be made²⁹.

In England a number of workplaces remain exempt from smokefree legislation. These exemptions mean that both smokers and nonsmokers continue to be exposed to the harmful effects of second hand smoke in these settings. Future policies should consider removing these exemptions and also consider how best to protect children from SHS exposure at home and in the car. A recent Royal College of Physicians report sets out the evidence to support further measures to promote smokefree homes and cars⁴.

Despite these examples of evidence to inform action to address smoking, gaps remain. Evidence for some interventions in tobacco control is weak. For examples, programmes targeted at helping young smokers to quit (particularly those under the age of 18) have shown limited if any success. A range of smoking cessation therapies exist for which there is little or no evidence (acupuncture and hypnotherapy, for example). School-based smoking prevention programmes have limited efficacy when provided in isolation from other tobacco control interventions. Some types of mass media campaigns (for example those that try to expose the tactics of the tobacco industry – known as ‘denormalisation’ campaigns) have been shown to be effective in other countries but not in the UK. Finally, with the exception of the studies of NHS stop smoking services outlined above, there remains limited evidence to inform policies or interventions to reduce inequalities in health caused by smoking.

Conclusion

Each policy measure listed mentioned above has been shown to be effective in its own right. However, both the World Bank and the World Health Organisation have stressed the importance of comprehensive tobacco control. Policies are most effective if delivered as a package, and national policies are most effective if supported regional and local action. Particularly at the local level, whole systems approaches are useful and at least one current example of such an approach in England exists. In Nottingham, an action research project evaluating local action to tackle smoking began in 2009. Nottingham has a higher level of smoking than the national average and smoking in some parts of the city, such as the community of Aspley, is in excess of 40%. The Aspley project aims to:

- Characterise smoking norms and attitudes to quitting, including consideration of trends as a result of national and local developments
- Detail areas of consensus and contention between professional and lay views with regard to knowledge and values about smoking and quitting
- Actively explore and evaluate effective approaches to reducing smoking at the community level

The evaluation of the Aspley project is employing a range of research methods to examine the implementation of (and impact of) the interventions in place. The study is led by Professor Ann McNeill from the University of Nottingham. The Aspley interventions include local mass media work and a range of action in partnership with local retailers, including work to: assess local tobacco sales; reduce proxy purchasing and underage sales; make available NHS stop smoking service literature; and make NRT more widely available. The project also includes the development of a pathway to draw local smokers into the quitting

process through a range of interventions with community workers and the NHS. Results from the Aspley project will be available from 2011. More information can be found at www.ukctcs.org

Professor Linda Bauld

University of Bath and UK Centre for Tobacco Control Studies

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Systems and system failure

I was trained as a physicist (at Cambridge) and taught physics, technology and systems at the Open University. I have no clinical expertise and no specialist knowledge of obesity. My evidence is presented as a result of my experience of teaching systems thinking, carrying out a number of projects using systemic approaches and working with senior civil servants on 3-day “system challenges” organised as part of the Prime Minister’s Top Management Programme (TMP). I anticipate that my contribution may assist in developing the principles of adopting a “whole systems approach”, complementing those with content expertise.

Science and engineering make use of three key principles in seeking to establish understanding and devise interventions in the world. The first principle is to be able to carry out reproducible experiments that enable different observers to validate data. This requires that experimental conditions can be constrained to be reproducible. The second principle is that understanding of the whole can be established by a detailed understanding of the parts; this is the principle of reductionism. This principle fails when either the characteristic under examination is an ‘emergent property’ i.e. one that is not explicable in terms of characteristics of components, or when the issue of interest is based on the *relationships* between the components. The third principle is that once an understanding has been obtained then it should be possible to devise tests that could falsify the theory or hypothesis by intervening in the situation of interest. This principle requires that the conditions of the test can be controlled sufficiently carefully to draw unambiguous conclusions regarding the outcome of the intervention. These principles do not apply when the domain of interest is a ‘human activity system’. Where people and their behaviours are concerned ‘observations’ are more dependent upon the perspective (or paradigm or world view) of the observer than in science or engineering; objectivity is generally elusive. Furthermore the context in which observations or interventions are made is continually changing in unpredictable ways, which make experimental control and controlled interventions virtually impossible. It is therefore extremely difficult, if not impossible, to obtain ‘evidence’ about the functioning of human activity systems. Within such systems it is normal for there to exist:

- (a) a complex network of causes that frequently feeds back on itself. The systems that have been modelled mathematically indicate that the overall behaviour of the system is determined by the *structure* of these interactions (in particular feedback loops and delays) rather than the values of any particular variables or parameters.
- (b) radically different perspectives about how the system works or ought to work. The existence of these different perspectives adds significantly to the complexity of the system’s operation, in part because messages and data will be interpreted differently by people with different perspectives and also

because different agents and agencies are likely to be pursuing competing goals.

Although the relational complexity (point (a) above) is generally recognised, most people are blind to the pluralist complexity (point (b) above). This is because few adults progress in their development¹ to the point where they are sufficiently dis-identified from their own way of viewing the world that they can genuinely appreciate other perspectives. Indeed there is a disincentive for taking this step since it makes the depth of complexity, and the difficulty of instituting constructive change, more apparent. However until one is able to appreciate the multiple perspectives operating within a human activity system one's actions and interventions are likely to be misinterpreted, resisted or otherwise thwarted – which is why within such systems almost everyone regards themselves as powerless and blames malfunctioning on other agents within the system.

Peter Senge, a long term advocate of a whole systems approach, tells a story in which groups of people blaming each other for problems in the design of a new car, come together and reach a point at which they said 'My God! look at what we are doing to ourselves.' As Senge comments

“The key word in this statement is ‘we’. Up to this point there had been someone to blame for the problem; the other teams, their bosses, not enough time. When the ‘theys’ go away and the ‘we’ shows up, people’s awareness and capabilities change.”²

Associated with the issue of appreciating other perspectives is the tendency to group people into categories that conceal important differences between them. It is clearly impossible to consider each person in a complex system individually; but part of the *art* of human systems analysis is to recognise the features that distinguish different groups normally treated as a homogenous whole. Appreciating these differences means that interventions may need to be tailored for each sub-group rather than assuming the 'one size fits all'. I would imagine that there are significantly different groups of obese people; some who are addicted to food, some with low self-esteem, some driven by poverty, some without the capacity to understand nutrition and so on – and that each of these groups will respond differently to interventions. An example of this occurred in a systems project aimed at tackling youth nuisance on deprived estates in Manchester³. At that time Manchester was regarded as the ASBO (anti-social behaviour order) capital of the UK and there were fierce debates as to whether

¹ The argument dramatically curtailed here is based upon the work of Kegan, Loevinger, Torbert and many others in the field of adult development. The shift referred to is from conventional to post-conventional reasoning. An accessible summary is available as a reprint from Harvard Business Review at

<http://www.newperspectives.com.au/downloads/seven%20transformations%20of%20leadership.pdf>

² *Presence: exploring profound change in people, organisations and society* by P.Senge et al. Nicholas Brealey Publishing, London, 2005, p.45

³ *Lessons from a pluralist approach to a wicked policy issue* by Chapman, J. Integral Review **6** (1) 2010 available at <http://www.integral-review.org/documents/Chapman,%20Lessons%20from%20Pluralist%20Approach%20Vol.%206%20No.%201.pdf>

they assisted in the campaigns to reduce youth nuisance. Some argued that they increased the street credibility of those receiving an ASBO whereas others claimed that they were an effective deterrent, especially when properly enforced. Information from field workers resolved the dispute by pointing out that for gang leaders ASBOs were indeed a badge of honour; however for the larger numbers of gang followers they were often effective in reducing offending.

Because there are normally a wide variety of perspectives operating within a human activity system it is inappropriate to seek, or even imagine it is possible to devise, a *solution* to the issue being considered. This is because a 'solution' from one perspective may well make matters worse for people with different perspectives. Rather than seek a solution the aim of the process is to develop an *improvement* that all those within the system can agree will reduce harm or otherwise improve the overall functioning. This shift in aim is a key ingredient in adopting a 'whole systems approach' since it will enable most, perhaps all, of the agents within the system to act coherently. In some cases simply having the agencies directing their energies towards working together instead of trying to win arguments is enough for progress to be achieved. In other cases the improvement may appear trivial initially, but can make a substantive difference to the functioning of the entire system. For example one of the outcomes of the Manchester youth nuisance project was the introduction of parenting courses for parents with children over eight years old. Up to that time parenting courses had focussed on the earlier years leaving parents of children most likely to engage in anti-social behaviour without support or guidance. Instituting such courses would not 'solve' the problem – but it was an improvement that all those involved agreed would help.

Similar examples of simple improvement steps have occurred in many of the TMP 'system challenges' carried out on real life issues. One challenge was to assist the Neighbourhood Renewal Unit (NRU) 'improve the life chances of 19 year olds in Peckham'. Peckham was at that time one of the deprived neighbourhoods with high levels of exclusion, gang problems and teenage pregnancy. In exploring the system the TMP participants found that many of the excluded children, and others in trouble, were helped by dedicated and imaginative community groups. These voluntary organisations found it hard to provide continuity for their key staff because both the NRU and Local Authority supported them with annual grants. The feedback to the NRU pointed out that a significant improvement for the disadvantaged youngsters in Peckham could be gained by simply extending the duration of grants to these voluntary organisations to 3 or 5 years.

The shift away from 'solutions' toward 'improvements' is also consistent with a recognition that it is impossible to have sufficient understanding or control of the context to predict the outcome of interventions in complex systems. It is therefore more realistic to aim for small improvements and to support this with a learning approach involving as many of the key agents and agencies in the system as possible. This approach also recognises that sustainable change in complex systems occurs slowly and requires continued attention to improving rather than a strategy or policy designed to 'solve' the problem once and for all.

Another aspect of adopting a systems approach to issues is that it requires those involved to reflect on their own perspective and the implicit assumptions involved. When I began to explore this for myself I recognised that I had uncritically accepted the definition of obesity as a problem – largely because it would overwhelm the NHS - not because it caused suffering for the obese. I also saw that alternative frames that could be employed might cast the problem very differently. What if obesity were regarded as an addiction to food? Which of the many theories of addiction would be most relevant? Is the problem rooted in people's *relationship* to food? If so what are the factors that condition or influence this relationship? What would be the result of regarding obesity as an emergent property of a cultural system that fosters *greed* in many different ways? People are applauded and envied for being greedy for fame, for wealth, even notoriety – why not in relation to food? Or is the problem really one rooted in our sedentary lifestyle and desire to have *instant* satisfaction? It seems to me that at least some of these different frames could provide the basis of a fruitful inquiry – but they are all very different from my initial assumptions about 'the problem of obesity for the NHS'.

The challenge of exploring different framing of the issue is similar to, but not identical to, that of appreciating the perspectives of other agents or agencies within the system. For example as a part-time business person I have a limited understanding of the sense of achievement and pride that food producers must feel when they succeed in developing a product that the public likes sufficiently for them to be able to sell it profitably. Similarly I can sense the effort required by food retailers to differentiate their stores and to devise their pricing and marketing strategies so that they have the satisfaction of succeeding in both providing what the public wants and being a successful business. Food producers and retailers have a profound effect on people's relationship to food – but that is not their goal, so they are likely to resist taking it on unless they can see commercial advantage in doing so. I know from working with different perspectives in complex systems that it is impossible to appreciate another perspective by speculating about it; I actually have to find a way to put myself in the other's shoes. There are a number of systems techniques for achieving this, but they are rarely used because most people do not want to know about this level of complexity – they prefer to stick with their view of what is going on and their blame story about why the system is malfunctioning.

In most human activity systems a change in the functioning of the whole system requires a significant number of people within the system to change; they may have to change some or all of their habits, behaviour and values. When progress on an issue requires people to change their beliefs, behaviours or values then, according to Heifetz and co-workers, the issue is an 'adaptive issue' and requires a different leadership style – known as Adaptive Leadership⁴. One of the key insights from Heifetz's work is that people resist change because they perceive the losses more

⁴ The theory and practice is described in the following books: *Leadership without Easy Answers* by R.Heifetz, Harvard University Press, 1994; *Leadership on the Line* by R.Heifetz & M. Linsky Harvard Business Press, 2002 and *The Practice of Adaptive Leadership*, by R.Heifetz, A. Grashaw and M Linsky Harvard Business Press 2009

clearly than the benefits. The losses may be of familiarity, of dearly held values or beliefs, of some aspect of self-esteem or simply loss of resources or power. Heifetz and his colleagues stress that one of the key tasks in facilitating change is to acknowledge these losses. What they do not emphasise is the degree to which this requires those fostering the change to appreciate the perspectives of those involved so that the nature and depth of loss can be acknowledged. So the importance of appreciating the perspectives of different people within the system is reinforced. It is also the most difficult and most neglected aspect of working with whole systems.

Summary

I have had very limited exposure to the work of NICE and this PDG on obesity and the adoption of a whole systems approach. I have emphasised the aspects of working with complex systems that appear to be absent from the documents I have been able to read. I apologise if, as a result, I have spent time on issues already well known to the PDG.

The key points I have sought to make:

- (a) when dealing with complex systems it is impossible to obtain the sort of evidence that would be required in science, engineering or clinical trials.
- (b) there are two aspects of complexity in human activity systems. One is relational and can be understood by mapping sequences of causes through the system (holism). The other requires an appreciation of the different perspectives used by agents and agencies within the system (pluralism).
- (c) most of the population, including many experts and scientists, are not able to dis-identify from their own perspective sufficiently to be able to appreciate other people's perspectives fully. Until all the key perspectives are incorporated into a study then any analysis will be partial and any intervention likely to fail.
- (d) when dealing with complex human systems it is necessary to focus on improvements, not solutions. Sustainable change takes place slowly and as the result of co-operative action by large numbers of agents and agencies within the system.

Jake Chapman, DEMOS
November 2010

Steve Allender – testimony to PDG 24th November 2010

Working with local communities to prevent obesity: a whole of system approach

Dr Steven Allender

Associate Professor
WHO Collaborating Centre for Obesity
Prevention
Deakin University Geelong Waterfront
Campus

Senior Researcher
Department of Public Health
University of Oxford

Obesity is a national priority for Australia because it is a major determinant of type 2 diabetes, coronary heart disease, diabetes, many cancers, musculo-skeletal and psychosocial problems and costs more than \$8bn annually (Access Economics 2008).

The World Health Organization Collaborating Centre for Obesity Prevention (WHOCC), has achieved, when compared to controls, reductions of; 2% and 3% overweight/obese among 2 and 3.5 year olds (Bell et al., 2008); 3cm in waist circumference and 1kg of weight among primary school children (Sanigorski et al., 2008); and 6% in overweight/ obese among adolescents (Millar in press, Allender in press). Each intervention was set in the ‘testing ground’ of the Barwon South West (BSW) region of Victoria, involved more than 3,000 children and used participatory, capacity building approaches over an intervention period of at least 3 years. The success of these interventions has been tempered by the difficulties in ‘scaling up’ by simply duplicating demonstration project approaches to a population level (Sanigorski et al 2010).

The National Institute of Health and Clinical Excellence review of system based approaches found that two of these interventions, Romp n Chomp (2 and 3.5 year olds) and BE Active Eat Well (primary school aged children) met all but one of their predetermined criteria for whole of system intervention. The other intervention, It’s Your Move, which targeted adolescents was not published in time to be included in this review. The NICE review concluded that these interventions most closely intimated a whole of system approach out of all interventions identified in the literature. The element which was missing from each of these interventions was that they did not explicitly recognise or use knowledge of the existing system as a part of the intervention design.

The challenges of how to ‘translate to scale’ from these successful interventions and the dearth of successful interventions elsewhere (Summerbell et al., 2005) echo growing

agreement that obesity intervention must address the complex and interconnected mix of etiological factors from behaviours to social, built, natural and economic environments. This ‘next generation’ of intervention must apply knowledge of dynamics of social, community and political existing systems to optimize prevention outcomes (Finewood et al., 2010). A retrospective analysis of success in reducing smoking prevalence in the second half of the 20th century demonstrated that intervention across the full complexity of determinants, a ‘whole-of-system’ approach, was critical (NCI 2007). System means an interconnected set of elements that is coherently organized in a way that achieves something (such as an education system) (Meadows 2008). Taking a systems perspective stresses the importance, among other things, of linkages, relationships, feedback loops and interactions among the system’s parts (Hawe 2009).

The WHOCC team are developing an explicitly systems-based approach to creating a preventive health system with the BSW region serving as the ‘testing ground’ for this work. To develop a whole of system approach five questions need to be considered; what is the current state of the system?; what needs to be in place to create the optimal obesity prevention system?; What are the indicators of the right process for systems change?; Has the shift in the system resulted in a change in obesity?; How does this approach need to be modified to work in national and international contexts?

Measuring the current state of the system

To understand the current state of the system locally validated, detailed maps of the existing system can be used as a baseline preceding system change. Mapping the current system means working within the WHO system framework (WHO 2007) and extending the framework for measuring systems change within an evaluation combining the nested hierarchies of micro, mezzo and macro level (Glass and McAtee 2006) with the four elements of systems proposed by the NCI (2007); systems dynamics, systems networks, systems organizing, and; systems knowledge. The basic framework is adapted from WHO work on Health Systems for understanding the system building blocks and system elements are as follows:

Table 1 Framework of system building blocks and system elements (adapted WHO 2007)

		Systems thinking elements			
System building blocks		System Organizing	System Knowledge	Systems Networks	System Dynamics
	Governance				
	Information				
	Financing				
	Service delivery				

	Human resources				
	Technologies				
	Physical environment				
	Socio-cultural factors				
	Other				

Identifying what needs to be in place to create the optimal obesity prevention system

Agreeing the building blocks for system change provides indicators to represent systemic change. These building blocks are identified and elucidated through concept mapping; a systematic grounded approach for identifying and organising ideas from stakeholders (Reavley et al., 2010). This process builds from the application of an appropriate seeding question to; generation of statements through nominal group techniques; statement sorting; factor analysis of statements; and, concept mapping.

What are the indicators of the right process for systems change?

The identification of key indicators will be as part of the basis for a community capacity development approach extending previous work by the WHOCC group using a variation of the ANGELO (Analysis Grid for Elements Linked to Obesity) Framework (Swinburn et al., 1999). This framework represents one of the real strengths in the previous intervention design as it combines stakeholder engagement workshops with knowledge of environmental barriers, targeted behaviours, gaps in skills and knowledge to create action plans for obesity prevention within specific settings. The approach has been replicated worldwide (Simmons et al., 2009) and is a key tool for many community based interventions. The ANGELO framework and associated processes will be adapted to include the systems elements mapped under the previous stages and key change indicators to create the SYSANGELO process; an efficient, stakeholder driven means to identify the key areas for, and indicators of, system change to prevent obesity within settings.

This process in turn results in a fully specified action plan for implementation by the community towards shifting existing systems (such as the education system, health system) and in so doing creating a new preventive health system which will optimize the possibilities for obesity prevention.

Has the shift in the system resulted in a change in obesity?

The initial stages identified above will establish baseline data for the existing system and obesity prevalence in early childhood settings in BSW. The development of existing, validated tools to define systems will provide an efficient process for regular data collection

on the state of the system. System audits will be collected regularly over the four years of the program to assess the level of change (system dynamics) resulting from state level intervention.

Efficiently collected system maps will provide the basis for assessing the effectiveness of system change in preventing obesity at a population level. Change in weight status across the region will be analysed from; the Victorian Population Health Survey; computer aided telephone interviews (CATI) specific to the Healthy Children initiative; maternal and child health data; and, through a new monitoring system for childhood obesity.

Steve Allender

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