

Obesity prevention: a proposed framework for translating evidence into action

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Received 24 August 2004; revised 23

November 2004; accepted 24 November 2004

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Abstract

Obesity as a major public health and economic problem has risen to the top of policy and programme agendas in many countries, with prevention of childhood obesity providing a particularly compelling mandate for action. There is widespread agreement that action is needed urgently, that it should be comprehensive and sustained, and that it should be evidence-based. While policy and programme funding decisions are inevitably subject to a variety of historical, social, and political influences, a framework for defining their evidence base is needed. This paper describes the development of an evidence-based, decision-making framework that is particularly relevant to obesity prevention. Building upon existing work within the fields of public health and health promotion, the Prevention Group of the International Obesity Task Force (IOTF) developed a set of key issues and evidence requirements for obesity prevention. These were presented and discussed at an IOTF workshop in April 2004 and were then further developed into a practical framework. The framework is defined by five key policy and programme issues that form the basis of the framework. These are: (i) building a case for action on obesity; (ii) identifying contributing factors and points of intervention; (iii) defining the opportunities for action; (iv) evaluating potential interventions; and (v) selecting a portfolio of specific policies, programmes, and actions. Each issue has a different set of evidence requirements and analytical outputs to support policy and programme decision-making. Issue 4 was identified as currently the most problematic because of the relative lack of efficacy and effectiveness studies. Compared with clinical decision-making where the evidence base is dominated by randomized controlled trials with high internal validity, the evidence base for obesity prevention needs many different types of evidence and often needs the informed opinions of stakeholders to ensure external validity and contextual relevance.

Keywords: Prevention, evidence, public health.

obesity reviews (2005) **6**, 23–33

Introduction

Obesity is a major public health and economic problem of global significance because it is highly prevalent, it is rapidly increasing, and it is associated with a wide range of chronic conditions such as diabetes, hypertension, cardiovascular disease, and certain cancers (1,2). It greatly

reduces both length and quality of life and may be approaching cigarette smoking as the major preventable cause of mortality in countries like the United States (3,4). Obesity also places enormous financial burdens on governments and individuals and accounts for up to 6% of total healthcare expenditure in some developed countries (5). The mounting concern about obesity and increased aware-

ness of the need for societal-level action on obesity prevention are reflected in the outpouring of related reports from national governments (6–10) and international agencies and organizations (1,2,11) as well as a striking escalation of media attention to the topic (12).

It is now well accepted that the causal pathways driving the increases in obesity prevalence involve societal and environmental changes laid onto the underlying, but relatively stable, genetic and behavioural susceptibility among individuals (2). However, although it is clear that remedies will need to involve policies and programmes that change the relevant societal and environmental drivers in a direction that promotes healthy population weights, the ways to do this are not straightforward. The processes influencing food intake and physical activity are fundamental, complex, and dynamic. Furthermore, there are as yet no models to follow because no country has yet developed and implemented a coherent programme of action to prevent further weight gain in the population and to manage its current obesity burden.

Although considerable work has been done to assess the burden of obesity (13,14), its major determinants (1), and potential interventions (1,15), debate continues on the most appropriate set of specific actions that should be undertaken and the expected outcomes of those interventions. There is a clear need to develop a framework for systematically describing and guiding decision-making in obesity prevention that recognizes both the value and the limitations of existing evidence and integrates other key considerations in determining action on obesity.

The need for informed decisions and initiatives

Rychetnik and colleagues have noted that ‘evidence-based public health action is . . . often inhibited by a mismatch between the magnitude and importance of a public health problem, and the adequacy of evidence on potential interventions to address the problem’ (16). The rapid increase in the rates of obesity and the spontaneous initiation of preventive actions create a challenge for establishing an evidence base. The urgency to put solutions into place may appear to preclude opportunities to gather a *priori* evidence of effectiveness of interventions. Some programmes and policies proposed by health and nutrition experts based on public health principles may seem idealistic and expensive and may also trigger opposition from vested interests (17) who demand proof of effectiveness before interventions (especially regulatory measures) are instituted.

Courses of action taken to prevent obesity should be evidence-based and this means using the ‘best evidence available’, as distinct from the ‘best evidence possible’ (18). However, as well as a dearth of evidence available on obesity prevention (19) compared with treatment, there are also some fundamental differences between public health/

prevention and clinical medicine/treatment (16). Public health or prevention usually involves such actions as policies and programmes orientated towards whole populations, interventions in institutional processes and personal behaviours in the society at large, and social marketing that reaches diverse population segments. The impact of preventive approaches may be visible only indirectly (e.g. policy or environmental changes) or gradually (e.g. small incremental changes in average population behaviours or health indicators), whereas uptake and effects of therapeutic interventions can be assessed more readily from measurements of individuals or clinical populations (20).

Recommendations for population level changes in complex systems (incorporating policies, programmes, behaviours, environments, and community norms) require an inclusive framework for information-gathering and interpretation. In this sense, the term ‘evidence-based’ – a term now quite familiar to health professionals and policy makers – has become somewhat problematic because (i) it tends to be understood as referring only to frameworks used in ‘evidence-based medicine’ (EBM), which heavily weight internal validity as the defining characteristic of evidence (21); and (ii) it largely ignores, and therefore devalues, the importance of external validity as well as a host of additional social, political, and commercial considerations that actually drive decision-making on policies and programmes (16,21).

Broadening the evidence base

Evidence-based medicine has its origins in a medical treatment paradigm that becomes very limiting when applied outside the domain of clinical decision-making (21). EBM uses systematic evaluations of potential interventions, with close attention to the quality and quantity of research studies, to improve clinical decision-making. Contextual factors, such as patient characteristics and access to services are incorporated into decision-making ‘at the bedside’. For similar improvements in public health decision-making to occur, the systematic evaluation of research on potential interventions and the contextual factors, such as acceptability to stakeholders and implementation constraints, need to be considered together. This means that the EBM-type criteria are too narrow for public health purposes. For example, the EBM focus on protecting internal validity leads to adoption of randomized controlled trials (RCT) as the optimal quality standard, with the consequent stigmatization of any other type of evidence as less rigorous (meaning too susceptible to potential internal bias) and therefore less worthwhile (21). However, for public health purposes, RCT evidence is often inappropriate, unachievable, or irrelevant because the RCT requirement to manipulate a single or limited set of variables may be too artificial or unrealistic for the complex systems

affecting population health. Ongoing societal processes are rarely subject to experimental manipulation. When interventions are implemented in the general population, the level of control on potential confounding variables is often minimal.

Leaders in population health have been exploring how to apply the inherent strengths of an evidence-based approach to public health (16,20–29). Although these reviews vary in their focus, a consistent theme is that evidence-based public health or policy cannot be approached simply as either ‘watered-down’ or ‘scaled-up’ versions of EBM. Evidence-based public health incorporates many of the same concepts of rigor and attention to threats to internal validity, but also expands evidence considerations to explicitly address issues of contextual and policy relevance, implementation, and sustainability. Evidence of effectiveness is not sufficient by itself to guide appropriate decision-making (30), and true evidence-based policy-making is probably quite rare (31). Therefore, getting the process right and engaging decision-makers from the start moves towards ‘practice-based evidence’ (31) which is more relevant than the classical ‘evidence-based practice’ because an obesity prevention plan based only on the limited published trials available would patchy and probably ineffective.

Additional tools can contribute to the appropriate evidence base for public health decision-making. For example, logic models and theory can provide support for likely pathways of change between interventions and short- or long-term outcomes and mathematical modelling can provide estimates of the strengths of the relationships.

Hawe and Shiell developed the ‘portfolio approach’ to health promotion as a way to maintain health promotion momentum without having complete evidence about the effectiveness of interventions (32). This approach allows the selection of interventions to be based on the best available evidence whilst not excluding untried but promising strategies. This has particular appeal for the selection of the best options for the prevention of obesity.

The portfolio approach is based on the principles of financial planning, where the focus is on returning maximum financial yield on the investment of resources. Ideal investor portfolios contain a mix of low-risk assets with small to moderate return (e.g. bonds) through to high-risk but high-potential return assets (e.g. speculative stock). The same concept can be applied to decision-making about investments in health promotion actions to address obesity prevention. In health promotion, return is measured in terms of health gains and non-health outcomes instead of financial terms. Risk relates to the consistency of the impact of such a programme demonstrated by evaluated trials or by indications of its likely efficacy. Thus intensive interventions within small groups or individuals might be low-risk, as they consistently result in changes in behaviour and

other outcomes. However, the overall return may only be small to moderate as the effect of the intervention may be small and result in only a slight impact on the health status of the community as a whole. The process for assessing and weighing up potential gains and risks allows the adoption of a mix of interventions, or a portfolio, to balance the risks.

The need for a specific obesity prevention, decision-making framework

Obesity policy and research groups have identified the need to develop a specific framework to guide the development of policy and programmes to tackle the obesity epidemic using the best available information and evidence. In response, the International Obesity Task Force (IOTF) established a project to help define the key questions in relation to the development of obesity prevention policy and the types of evidence needed to answer them. This led to the development of a proposed obesity prevention decision-making framework which was further refined by a process of consultation.

A decision-making framework has two primary functions. First, it is a quality assurance tool, which formalizes decision-making as a consistent process with identifiable steps. The process is explicit and transparent and enables the identification of the different forms of evidence that inform decision-making at the different stages of the process. Second, it helps to identify the important principles and values that guide decision-making because they will vary across different situations and populations and therefore need to be addressed as an integral part of the decision-making process. A framework also helps identify areas where research is needed to create the evidence to inform decision-making.

Review of existing evidence-based public health frameworks

To develop the framework, the authors engaged in three overlapping processes: (i) an ongoing review of a variety of published conceptualizations and frameworks related to the use of evidence in prevention science, health promotion, and public health (22–27); (ii) identification of key questions and considerations that drive population-focused obesity prevention initiatives and reflection on the types of evidence needed to provide answers or inform decision-making; (iii) formal and informal discussions with colleagues working in obesity prevention or related fields on the framework and potential forms that it might take. Some frameworks for policy-making were also examined, although most of the relevance to policy was obtained through direct interactions with individuals involved in the policy process at organizational and governmental levels.

The development of this framework has been greatly facilitated by the prior and current involvement of the authors and other IOTF members in consultations or consensus activities in several countries and with international organizations where public health evidence issues in general, or obesity prevention specifically, were addressed. Reference to presentations and discussions at scientific meetings also informed the development of the framework.

The literature review identified a number of guidelines or frameworks for translating the available evidence into public health action (23,25,33–35). These frameworks were generally more recent and more tentative than in those of EBM where a substantial consensus has been developed. The framework proposed here has many commonalities with the above approaches, but has been specifically tailored towards obesity prevention. It is not intended that this framework replace established tools for health promotion planning, implementation, and evaluation (22,23,36,37). Rather, it has been designed to provide a platform for integrating established tools into a coherent and comprehensive approach for guiding the development of programmes of action that are specific to obesity prevention.

Drafting the framework

A preliminary framework was drafted around five key questions for which available evidence could sensibly inform decisions on obesity prevention policies and programmes at the population level: Why should we do something about obesity? What and who should we target? How and where should we intervene? Specifically, what could we do? Specifically, what should we do? These questions corresponded, respectively, to five issues of the obesity prevention process: (i) building a case for action on obesity, (ii) identifying contributing factors and points of intervention, (iii) defining the range of opportunities for action, (iv) evaluating potential interventions, and (v) selecting a portfolio of specific policies, programmes and actions. The types of evidence and information available were considered in relation to which ones would be potentially relevant to addressing each of the questions. The types of outputs to be obtained from considering the available evidence in relation to each stage were highlighted.

Types of 'admissible' evidence

Evidence can be considered in its broad sense to be a body of facts, information, or data that provides a level of certainty that a proposition is true or valid (16). Contextual and organizational information as well as informed opinion may also be considered important components of 'admissible' evidence (38). Drawing evidence-based conclusions means knowing and applying processes of selecting

and evaluating information and data, whilst recognizing that there is often not sufficient information to draw definite conclusions.

Evidence can be grouped in a variety of ways (16,28,33). For the purposes of addressing the questions on obesity prevention, it was broadly grouped into observational, experimental, extrapolated, and experience-based sources of evidence and information (Table 1). No hierarchy of evidence quality is offered for these types of evidence because their intrinsic strengths and weaknesses play out differently in each of the different questions posed for obesity prevention. The RCT therefore sits alongside other forms of evidence and each is judged on its ability to contribute to answering the question at hand.

Consultation and critique

This preliminary framework was presented at an IOTF workshop convened in Melbourne, Australia on 26 April 2004 just prior to the World Conference on Health Promotion and Health Education. The participants included 10 invited international experts and about 60 other workshop delegates from a wide variety of policy, programme, and research backgrounds. The objective of the workshop was to consider and critique the proposed framework and process for incorporating available evidence into recommendations for comprehensive action on obesity prevention. To provide participants with a common background prior to their review and critique of the preliminary framework, the following formal presentations were made: the IOTF experience of what governments and policy makers are asking for with respect to evidence on obesity prevention; what can be learned from examining ways in which evidence of various types has contributed to addressing other social or public health-related challenges (such as tobacco, automotive safety, drug abuse, breastfeeding promotion); evidence issues related to the World Health Organization (WHO) Global Strategy; ways that policy-makers generally use evidence; how to move recommendations through the policy process; and insights from the evidence-assessment processes used in the US Centers for Disease Control Guide to Community Preventive Services (23), the Assessment of Cost-Effectiveness Analyses (39), and Cochrane systematic reviews.

The framework was then evolved by the authors in response to the feedback from the workshop, further reference to the literature, and consultation with the IOTF leadership. The two primary modifications were: (i) the concept of 'stages' was changed to one of 'issues' to avoid implying a necessarily sequential or unidirectional progression and also to acknowledge the highly iterative nature of information gathering; and (ii) making explicit the potential policy relevance of information and outputs related to each objective.

Table 1 Description of types of evidence and information relevant to obesity prevention

Type of evidence or information	Description
Observational	
Observational epidemiology	Epidemiological studies that do not involve interventions but may involve comparisons of exposed and non-exposed individuals, e.g. cross-sectional, case-control, or cohort studies
Monitoring and surveillance	Population-level data that are collected on a regular basis to provide time series information, e.g. mortality and morbidity rates, food supply data, car and TV ownership, birth weights and infant anthropometry
Experimental	
Experimental studies	Intervention studies where the investigator has control over the allocations and/or timings of interventions, e.g. randomized controlled trials, or non-randomized trials in individuals, settings, or whole communities
Programme/policy evaluation	Assessment of whether a programme or policy meets both its overall aims (outcome) and specific objectives (impacts) and how the inputs and implementation experiences resulted in those changes (process)
Extrapolated	
Effectiveness analyses	Modelled estimates of the likely effectiveness of an intervention that incorporate data or estimates of the programme efficacy, programme uptake, and (for population effectiveness) population reach
Economic analyses	Modelled estimates that incorporate costs (and benefits), e.g. intervention costs, cost-effectiveness, or cost-utility
Indirect (or assumed) evidence	Information that strongly suggests that the evidence exists, e.g. a high and continued investment in food advertising is indirect evidence that there is positive (but proprietary) evidence that the food advertising increases the sales of those products and/or product categories
Experience	
Parallel evidence	Evidence of intervention effectiveness for another public health issue using similar strategies, e.g. the role of social marketing or policies or curriculum programmes or financial factors on changing health-related behaviours such as smoking, speeding, sun exposure, or dietary intake. It also includes evidence about the effectiveness of multiple strategies to influence behaviours in a sustainable way, e.g. health-promoting schools approach, comprehensive tobacco control programmes, or co-ordinated road toll reduction campaigns.
Theory and programme logic	The rationale and described pathways of effect based on theory and experience, e.g. linking changes in policy to changes in behaviours and energy balance, or ascribing higher levels of certainty of effect with policy strategies like regulation and pricing compared with other strategies such as education
Informed opinion	The considered opinion of experts in a particular field, e.g. scientists able to peer review and interpret the scientific literature, or practitioners, stakeholders, and policy-makers able to inform judgements on implementation issues and modelling assumptions (incorporates 'expert' and 'lay knowledge')

Proposed framework

The proposed framework for evidence-based obesity prevention is shown in Table 2. Although the progress of public health decision-making is increasingly required to be more evidence-based, transparent, and explicit, the reality is also that many of the decisions made about policies and programmes are driven by historical, economic, and political considerations (34). Also, as noted in the description of the approach, the questions in the framework need not be sequential although the issues are numbered for ease of reference. It is likely that all of the questions posed will need to be addressed at some point in time for any comprehensive obesity prevention initiative. Indeed, evidence for all of them tends to accumulate concurrently and the timing for a systematic review of any one of the questions is probably largely opportunistic. Also, the outputs from one issue inform the others adding to the iterative nature of the process.

Issue I – building a case for action on obesity

'Why should we do something about obesity?' is a common early question and the answers are often used to lift the

problem of obesity up the agenda. The question is usually answered by showing the current and predicted contribution of overweight and obesity to reductions in health expectancy and the potential gains in health outcomes that could be expected from reductions in obesity prevalence. The evidence contributing to these analyses include the prevalence and secular trends in obesity (and variations between population subgroups), the relationships with key disease states and quality of life, and economic analyses. The population burden of obesity is often described in terms of costs, years of life lost, disability-adjusted life years lost, or other similar measures (13). The models used for the assessments of burden are becoming increasingly sophisticated (13,14,40) and substantial information and informed opinion is needed to back up the key modelling assumptions.

The high and increasing burden of overweight and obesity has been reasonably well described for adults, although with better data (e.g. better prevalence and relative risk estimates) and more sophisticated modelling techniques this will continue to improve. Such modelling could also help to disentangle the burden of obesity independent of physical fitness (41), socioeconomic status (42), and other

Table 2 Proposed components of evidence-based obesity prevention

Issue (implied question)	Policy/programme relevance	Relevant evidence and information	Examples of outputs
I. Building a case for action on obesity (Why should we do something about obesity?)	<ul style="list-style-type: none"> Showing urgency of taking action on obesity Comparing costs, health burden, and gains from prevention with other risk factors and diseases Addressing prioritization of obesity over other issues Identifying populations of special interest Setting benchmarks and population goals 	<ul style="list-style-type: none"> Monitoring and surveillance data (e.g. prevalence, trends) Observational studies (e.g. relative risks, occurrence rates in different populations) Economic analyses (e.g. costs of obesity, DALYs lost) Informed opinion (e.g. for modelling assumptions) 	<ul style="list-style-type: none"> Prevalence estimates including projected trends Estimates of the social and economic burden of obesity (direct, indirect, intangible costs) Comparative health burdens in terms of years of life or DALYs lost Estimated potential reductions in burden with interventions
II. Identifying the contributing factors and points of intervention (How and where could we intervene?)	<ul style="list-style-type: none"> Identifying targets for intervening Relating obesity issues to other existing agendas Identifying congruent and conflicting policies and activities Identifying the key government, NGO, and private sector stakeholders that are central to obesity prevention 	<ul style="list-style-type: none"> Observational studies (e.g. cohort studies of diet and activity patterns on weight gain) Experimental studies (e.g. diet trials) Indirect evidence (e.g. advertising investment on marketing foods to children) Monitoring and surveillance data (e.g. on food supply, behaviour trends) Informed opinion (e.g. on what factors are modifiable) 	<ul style="list-style-type: none"> Evidence reviews of specific modifiable determinants of obesity including levels of certainty and likely size of impact Identified drivers of environmental change and pathways to weight gain or loss
III. Defining the range of opportunities for action (How and where could we intervene?)	<ul style="list-style-type: none"> Providing coherence, coordination, and comprehensiveness to planned actions Creating the links and overlaps with existing plans, policies, and programmes Identifying the settings and sectors and key strategies needed for action Demonstrating the feasibility of a population approach to obesity prevention Outlining the multidimensional nature of the action needed Providing evidence of precedent 	<ul style="list-style-type: none"> Parallel evidence from other public health initiatives (e.g. tobacco control) Pre-existing frameworks for action (e.g. Ottawa Charter, settings approaches) Informed opinion (e.g. about other successful frameworks, modifiable and feasible strategies) Information on current relevant initiatives Programme logic and theory 	<ul style="list-style-type: none"> Coherent obesity prevention strategic framework either as a stand-alone or as part of a broader plan of action for nutrition and physical activity, and/or non-communicable diseases Short and long-term population goals Identified settings, sectors, and support actions
IV. Evaluating potential interventions (What are the specific, potential interventions and their likely effectiveness and cost-effectiveness?)	<ul style="list-style-type: none"> Describing potential interventions in concrete terms Estimating their likely effectiveness in the target population (where possible) Identifying resource implications Progressing specific obesity initiatives through the necessary processes (engaging stakeholders, identifying capacity, setting agendas, etc.) 	<ul style="list-style-type: none"> Experimental studies Observational studies Effectiveness analyses (including modelling where data are sparse) Economic analyses Programme logic and theory Programme evaluation (e.g. from existing community or demonstration interventions) 	<ul style="list-style-type: none"> Specific descriptions of potential interventions and support actions Estimates of effectiveness, cost-effectiveness, or cost-utility for the interventions Sensitivity and uncertainty parameters around the above estimates
V. Selecting a portfolio of specific policies, programmes and actions (What is a balanced portfolio of initiatives that is achievable yet sufficient to reduce obesity?)	<ul style="list-style-type: none"> Gaining stakeholder input into judgements on the policy and implementation implications Gaining stakeholder input into and support for priority interventions with the portfolio Taking action 	<ul style="list-style-type: none"> Estimates of effectiveness and cost-effectiveness of interventions and their associated sensitivity and uncertainty (above) Informed opinion on specific interventions and actions about their: <ul style="list-style-type: none"> Feasibility Sustainability Other potential positive or negative effects Effects on equity Acceptability to stakeholders 	<ul style="list-style-type: none"> Balanced portfolio of specific policies, programmes and other actions to prevent obesity

NGO, Non-governmental Organization; DALY, disability-adjusted life year.

potential confounders if such analyses have policy and programme relevance. Substantial evidence gaps remain on the burden of childhood and adolescent obesity, the indirect and intangible costs for adults and children, and the differential risk burdens across subpopulations.

Issue II – identifying contributing factors and points of intervention

An understanding of the causative and protective factors for weight gain provides clear leads for interventions. The evidence also provides some assessment of the level of certainty that a particular factor (e.g. behaviour, environmental influence, type of food, nutrient) is a significant determinant or correlate of obesity. Ideally, quality experimental studies would be available to provide a high level of confidence in the aetiological relationship, but often only observational studies, with their higher likelihood of confounding or bias, are available. Reviews of the determinants, such as the WHO Report on Diet Nutrition and the Prevention of Chronic Diseases (1), have generally found that the amount of evidence and level of consensus around determinants of weight gain is reasonably high for behavioural factors (such as low levels of physical activity and high intakes of energy-dense foods), and some food supply factors (such as fibre content, fat content). The evidence around some potential determinants such as breastfeeding and glycaemic index of foods is less certain. There is less evidence available in relation to environmental factors, although there is reasonable consensus that certain aspects of the environment are both important and modifiable (15). Examples include the built environment, television advertising of food to young children, parental and family factors, and the school environment.

The concept of 'indirect evidence' is important for this objective, particularly in relation to the influence of food marketing strategies on the food consumption of young children. The evidence that young children respond to particular marketing strategies has been widely collected through focus groups with children and through monitoring the impact on product sales of marketing campaigns that are targeted at young children. Unfortunately, this evidence is proprietary to the food companies conducting this research. However, the continued high financial investment in those marketing campaigns is 'indirect evidence' that marketing energy-dense foods and beverages to young children does increase their consumption of those products.

After describing the key determinants of obesity, it is important to identify who and what to target at. Not all the determinants of obesity can be addressed directly by public health action and some (such as improved economic status and changing occupational structures) may be deemed beyond the scope of present action. In addition, it is important to determine which should be the priority

subpopulations to focus intervention efforts in. A common consensus is that the priority target populations for interventions should be children, adolescents and their families as well as high-risk adults (1).

Issue III – defining the range of opportunities for action

Often after awareness has been raised about the need for action, the question arises about: 'How and where can we intervene?' To answer this question, evidence and information is needed to help formulate a framework with strategies that comprehensively capture all the appropriate opportunities for action. The most useful forms of evidence and information for this issue are: successful strategies and approaches from other epidemics such as tobacco control, injury prevention, skin cancer prevention ('parallel evidence'); information about existing health promotion plans and programmes (such as Health Promoting Schools); programme logic and theory; and informed opinion.

The output for this stage is often a comprehensive plan of action that identifies the broad range of opportunities for intervention. It often builds on previous experiences in controlling epidemics (43) and incorporates existing knowledge and activities and recognizes current policies, systems, capacities, awareness, and will to change. Such a framework for action should ensure that all the main implementation areas (i.e. appropriate settings and sectors) and support actions (e.g. monitoring, capacity building, research, and social marketing) are included and that the main strategy options (e.g. policies, curriculum, parent support, regulations) are identified. It is important that this broad action plan clearly identifies the appropriate policy context for obesity prevention – is it a stand-alone obesity prevention plan (8), is it part of a non-communicable diseases reduction plan (44), or a nutrition and physical activity plan of action (10) or part of a Healthy Cities or Healthy Islands framework? This process may also involve setting targets for population nutrient or food intakes, levels of physical activity or inactivity and obesity prevalence.

Issue IV – evaluating potential interventions

This addresses the need to define specific, concrete interventions and to determine how effective and cost-effective such interventions are likely to be. Evidence needs to be collected to inform estimates of the relative population impact (with levels of uncertainty) and costs for the interventions so that the most promising ones can be considered for implementation. These technical analyses use evidence and information from a variety of sources. Tightly evaluated and costed intervention studies in real world settings are, of course, the ideal source of evidence but for obesity prevention such studies are unfortunately rare. Estimates

of the likely effectiveness of some interventions can potentially be modelled using data from experimental and observational studies, and programme evaluations (45). However, the development of this effectiveness modelling is at an early stage and, together with the lack of empirical data, makes this issue the most difficult to address.

The outputs would include the descriptions of specific programmes (e.g. curriculum for reducing television viewing), policies (e.g. regulations on food marketing to young children), or other actions (e.g. implementing specific active transport programmes) that could be undertaken to prevent unhealthy weight gain. Where possible, these would include some description of the efficacy, and likely reach and uptake to allow estimates of the effectiveness and cost-effectiveness of the proposed intervention on preventing unhealthy weight gain. Some actions may be considered supporting actions which are considered essential but, by themselves, may not directly influence behaviours. Examples of such supporting actions would be capacity building and workforce training, monitoring and surveillance, and research and programme evaluation (such as for demonstration programmes). Concentrating resources on one or several demonstration projects is a valuable approach to build the evidence and experience needed to run programmes across national populations. Social marketing programmes could also be considered in this category because the role of social marketing is more appropriate for setting the agenda, providing information and motivation, and changing perceptions and intentions rather than changing behaviours (46).

By using the principles of the 'portfolio approach' to health promotion planning discussed earlier, it may be possible to classify interventions within a matrix based on the estimated population impact (judged by effectiveness or cost-effectiveness) and the level of certainty around those estimates. Such a process would allow interventions to be assigned a level of 'promise' (high, medium, or low promise) based on their classification within this matrix (Table 3). This would ensure that interventions that have a high potential population impact but have less certainty of outcome (because of the difficulty to collecting such evidence or the lack of previous programmes that have been adequately evaluated) are not rejected at this point in planning. It is also important to recognize that effective action on obesity will not be achieved by a single intervention. Therefore, a set of interventions that individually produce only a modest effect on energy balance may make an important contribution when combined as part of a broader programme of action.

To classify interventions on their level of 'promise' will require a judgement on the quality of available evidence and an estimation of population impact by considering the likely efficacy of an intervention as well as its reach (the proportion of relevant settings in which the policy or pro-

gramme is instituted) and adoption (the uptake by individuals in the settings) (22). For example, a range of interventions conducted in schools such as programmes to reduce television viewing (47) or reduce soft drink consumption (48) and multi-strategy school interventions (49) have been implemented as controlled trials and have produced positive outcomes in terms of weight status. It is possible to make judgements about the relative 'promise' of these programmes because there is some efficacy evidence and the reach and adoption can be estimated (especially for curriculum-based interventions). Thus the potential population impact might be assessed as moderate to high. The certainty of evidence is less clear as the number of studies has been small but the quality of evidence provided by rigorous experimental design is good and there is obvious programme logic. Thus with moderate ratings for population impact and certainty of evidence such interventions may be classified in the 'promising' category (Table 3).

Other potential interventions may require additional data and modelling to allow a judgement to be made on their level of promise. For example, active transport to school could be selected as a potential intervention with the actions incorporating a variety of programmes, policies, environmental changes, and social marketing campaigns. By estimating (i) the effects on body weight for the child that responds to such a programme and goes from being mostly driven to school to mostly walking; and (ii) the proportion of schools that would undertake such a programme (reach), and; (iii) the proportion of children who would likely respond to the programme (adoption) it would be possible to define the likely population impact.

Other interventions for preventing childhood obesity that could be modelled in the same way include: reducing food marketing that targets young children (50); reducing the fat content of French fries (51); enhancing access for recreational activities (52); and taxing high fat or sugar products (53,54).

Table 3 'Promise table' for categorizing potential interventions

Certainty of effectiveness*	Potential population impact†		
	Low	Moderate	High
Quite high	Promising	Very promising	Most promising
Medium	Less promising	Promising	Very promising
Quite low	Least promising	Less promising	Promising

*The certainty of effectiveness is judged by the quality of the evidence, the strength of the programme logic, and the sensitivity and uncertainty parameters in the modelling of the population impact.

†Potential population impact takes into account efficacy (impact under ideal conditions), reach, and uptake and it can be measured in a number of ways such as effectiveness, cost-effectiveness, or cost-utility.

As more work is done on the details of each of these potential interventions, the most promising ones will start to emerge. It may be possible to develop a detailed 'menu' of such interventions, but it is important to realize that what is developed for one population or country may not apply to another because of the wide range of contextual factors that influence such analyses. Also just choosing interventions from a 'menu' developed for another country means that local stakeholders have not been through the process of formulating, assessing, and judging potential interventions.

The paucity of effectiveness evidence for obesity prevention is the single greatest challenge in being able to populate the 'promise table' with appropriate interventions. If studies are available, a system for assessing the robustness of the evidence (55) can be helpful in providing a level of certainty that the demonstrated efficacy is not a result of bias or chance. However, as previously discussed, in contrast to assessing evidence for clinical interventions, the classical evidence hierarchies are less valuable in assessing overall evidence for public health action. The programme logic of the intervention can contribute to assessment of certainty. For example, rules, policies, and environments that promote water consumption and ban soft drinks in schools are more likely to influence behaviours than an approach that provides general healthy eating guidelines to parents via school newsletters. Similarly, government regulations and monitoring of restrictions on marketing foods to young children have a higher certainty of impact than industry self-regulation. The uncertainty and sensitivity limits contained within the modelling of population impact provide a quantitative guide to the level of certainty.

Issue V – selecting a portfolio of policies, programmes, and actions

This question takes the collective information, especially that from objectives 3 and 4 above, and asks what specific

policies *should* be implemented and what specific programmes and other actions *should* be supported and resourced? To move from 'could do' to 'should do' requires a set of judgements from the key stakeholders, particularly the government agencies that would be responsible for policy development and programme funding.

The key stakeholder judgements are based around a set of 'filter criteria' that have implementation implications (Table 4). The judgements are usually qualitative but nevertheless need to be articulated and transparent. These judgements materially alter the balance of actions that would be contained in a portfolio of actions. For example, a programme with relatively low 'promise' may be included in a portfolio of action because it is cheap and easy to implement, is likely to be sustainable, and has other beneficial side-effects. Another programme or policy with a high cost-effectiveness may be rejected because it is unacceptable to key stakeholders, or runs a high risk of increasing stigmatization. Yet another programme may be included in the portfolio but only if it is implemented in a way to reduce inequalities such as being targeted at low income areas.

The engagement of stakeholders is important for each of the issues in Table 2, but it is central to this issue. These implementation factors may be less quantifiable but they have a profound effect on the achievability of the action plan. This process of combining technical analyses (like cost-utility assessments) with stakeholder judgements of filter criteria has been successfully used in other areas of health such as mental health, cardiovascular disease and cancer prevention (39).

Conclusions

This proposed framework for evidence-based obesity prevention was developed by the IOTF Prevention Group using other public health frameworks and the input from experts and delegates at an IOTF workshop. It is recognized that a number of variations on this framework would

Table 4 Suggested filter criteria for stakeholder judgements on implementation

Filter criteria	Description
Feasibility	The ease of implementation considering such factors as: the availability of a trained workforce; the strength of the organizations, networks, systems and leadership involved; existing pilot or demonstration programmes
Sustainability	The durability of the intervention considering such factors as: the degree of environmental or structural change; the level of policy support; the likelihood of behaviours, practices, attitudes, etc. becoming normalized; the level of ongoing funding support needed
Effects on equity	The likelihood that the intervention will affect the inequalities in the distribution of obesity in relation to: socioeconomic status; ethnicity; locality; gender
Potential side-effects	The potential for the intervention to result in positive or negative side-effects such as on: other health consequences; stigmatization; the environment; social capital; traffic congestion; household costs; other economic consequences
Acceptability to stakeholders	The degree of acceptance of the intervention by the various stakeholders including: parents and carers; teachers; health care professionals; the general community; policy makers; the private sector; government and other third party funders

also provide an evidence-based outcome. It is also recognized that, in reality, current decisions on policies and funding allocations are usually dominated by political, economic, and historical forces rather than the considered evidence base. This makes the task of defining what is meant by an evidence-based approach to obesity prevention all the more urgent.

Several key features have emerged from the development of this framework. First, the definition of what constitutes evidence needs to be very broad and tailored to the question being addressed. The application of traditional evidence hierarchies, as used within evidence-based medicine, were found to be of less value in guiding obesity policy developments whereas modelling and expert and stakeholder opinion emerged as major contributors to the evidence base. Second, assumptions and decisions within the policy development process need to be explicit and transparent because the evidence is complex and there is a heavy reliance on modelling and informed opinion. Third, stakeholders, especially from within government, need to be involved at each level, but especially at the stage of selecting the portfolio of interventions. Fourth, the 'promise table' approach and the explicit application of stakeholder judgements mean that the final portfolio of actions can contain interventions with a variety of likely impact levels and a variety of certainty of overall effectiveness. This allows a more comprehensive approach to be taken even in the absence of strong evidence of effectiveness. It also allows actions to be included (such as research, monitoring, training, co-ordination) which are not effective in themselves but are essential for the effectiveness of the overall plan. Finally, if the process has been inclusive, evidence-based, and explicit, the interventions selected have a higher chance of actually being implemented and sustained.

Acknowledgements

The input of the invited speakers and the attendees at the IOTF Obesity Prevention Workshop in Melbourne in April 2004 and other colleagues was critical to the development of this framework. The speakers at the workshop (apart from the authors) were: Robert Beaglehole, Robert Carter, John Catford, Philip James, David McQueen, Pekka Puska, and Elizabeth Waters. The authors also thank Lesley King for her critical review and comments.

References

- World Health Organization. Technical report Series 916. *Diet, Nutrition and the Prevention of Chronic Diseases*. Geneva: Joint FAO/WHO Expert Consultation; 2003.
- World Health Organization. Technical Report Series 894. *Obesity, Preventing and Managing the Global Epidemic*. Report of a WHO consultation. World Health Organization: Geneva, 2000.
- Finkelstein EA, Fiebelkorn IC, Wang G. National medical spending attributable to overweight and obesity: how much, and who's paying? *Health Aff (Millwood)* 2003 (Suppl.): W3–219–26.
- Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA* 2004; **291**: 1238–1245.
- Wolf AM, Colditz GA. Current estimates of the economic cost of obesity in the United States. *Obes Res* 1998; **6**: 97–106.
- U.S. Department of Health and Human Services. *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity*, 2001. US Department of Health and Human Services, Public Health Service: Washington, DC, 2001.
- Department of Health. *Obesity: Reversing the Increasing Problem of Obesity in England*. A report from the Nutrition and Physical Activity Task Forces. Department of Health: London, 1995.
- National Obesity Task Force. *Healthy Weight 2008 – Australia's Future*. Department of Health & Ageing: Canberra, 2003.
- Center for Health Promotion and Prevention. *National Action Plan against Obesity, Recommendations and Perspectives*. National Board of Health: Copenhagen, 2003.
- Ministry of Health New Zealand. *Healthy Eating – Healthy Action, Oranga Pūmau – Oranga Kai*. Ministry of Health: Wellington, New Zealand, 2002.
- World Cancer Research Fund. *Food, Nutrition, and the Prevention of Cancer: a Global Perspective*. American Institute for Cancer Research: Washington, 1997.
- International Food Information Council. *Trends in obesity related media coverage*. <http://www.ific.org/research/obesitytrends.cfm>.
- World Health Organization. *World Health Report 2002: Reducing Risks, Promoting Healthy Life*. World Health Organization: Geneva, 2002.
- Mathers C, Vos T, Stevenson C. *The Burden of Disease and Injury in Australia*. Australian Institute of Health and Welfare; AIHW Cat. No. PHE 17: Canberra, 1999.
- Swinburn B, Egger G. Preventive strategies against weight gain and obesity. *Obes Rev* 2002; **3**: 289–301.
- Rychetnik L, Hawe P, Waters E, Barratt A, Frommer M. A glossary for evidence based public health. *J Epidemiol Community Health* 2004; **58**: 538–545.
- Jain A. Fighting obesity. *BMJ* 2004; **328**: 1327–1328.
- Muir Gray JA, Hayner RD, Sackett DL, Cool DJ, Guyat GH. Transferring evidence from research into practice: 3. developing evidence-based clinical policy. *ACP J Club* 1997; **126**: A14–A16.
- Campbell K, Waters E, O'Meara S, Kelly S, Summerbell C. Interventions for preventing obesity in children. *Cochrane Database Syst Rev* 2002; (2): CD001871.
- Heller RF, Page J. A population perspective to evidence based medicine: 'evidence for population health'. *J Epidemiol Community Health* 2002; **56**: 45–47.
- Kroke A, Boeing H, Rossnagel K, Willich SN. History of the concept of 'levels of evidence' and their current status in relation to primary prevention through lifestyle interventions. *Public Health Nutr* 2004; **7**: 279–284.
- Glasgow RE, Vogt TM, Boles SM. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health* 1999; **89**: 1322–1327.
- Briss PA, Zaza S, Pappaioanou M, Fielding J, Wright-De Agüero L, Truman BI, Hopkins DP, Mullen PD, Thompson RS, Woolf SH, Carande-Kulis VG, Anderson L, Hinman AR, McQueen DV, Teutsch SM, Harris JR. Developing an evidence-based Guide to Community Preventive Services – methods. The Task Force on Community Preventive Services. *Am J Prev Med* 2000; **18**: 35–43.

24. McQueen DV. Strengthening the evidence base for health promotion. *Health Promot Int* 2001; **16**: 261–268.
25. Truswell AS. Levels and kinds of evidence for public-health nutrition [commentary]. *Lancet* 2001; **357**: 1061–1062.
26. McQueen D. The evidence debate. *J Epidemiol Community Health* 2002; **56**: 83–84.
27. Rychetnik L, Frommer M. *A Schema for Evaluating Evidence on Public Health Interventions*, Version 4. National Public Health Partnership: Sydney, 2001.
28. Kellam SG, Langevin DJ. A framework for understanding 'evidence' in prevention research and programs. *Prev Sci* 2003; **4**: 137–153.
29. Victora CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond randomized trials. *Am J Public Health* 2004; **94**: 400–405.
30. Green L. From research to best practice in other settings and populations. *Am J Health Behav* 2001; **25**: 165–178.
31. Marmot MG. Evidence based policy or policy based evidence? *BMJ* 2004; **328**: 906–907.
32. Hawe P, Shiell A. Preserving innovation under increasing accountability pressures: the health promotion investment portfolio approach. *Health Prom Aust* 1995; **5**: 4–9.
33. Brownson RCBEA, Leet TL, Gillespie KN. *Evidence-Based Public Health*. Oxford University Press: New York, 2003.
34. Nutbeam D. Evidence-based public policy for health: matching research to policy need. *Prom Educ* 2001; **2**: 15–19.
35. Health Canada. *Health Canada Decision-Making Framework for Identifying, Assessing and Managing Health Risks*. Health Canada: Ontario, 2000.
36. Ottawa Charter for Health Promotion. *Can J Public Health* 1986; **77**: 425–430.
37. Baker EA, Homan S, Schonohoff R, Kreuter M. Principles of practice in academic community partnerships. *Am J Prev Med* 1999; **16**: 86–93.
38. Rychetnik L, Hawe P, Shiell A. Criteria for evaluating evidence on public health interventions. *J Epidemiol Comm Health* 2002; **56**: 119–127.
39. Haby MM, Carter R, Mihalopoulos C, Magnus A, Sanderson K, Andrews G, Vos T. Assessing cost-effectiveness – mental health: introduction to the study and methods. *Aust N Z J Psychiatry* 2004; **38**: 569–578.
40. Mathers CD, Vos ET, Stevenson CE, Begg SJ. The Australian Burden of Disease Study: measuring the loss of health from diseases, injuries and risk factors. *Med J Aust* 2000; **172**: 592–596.
41. Farrell SW, Braun L, Barlow CE, Cheng YJ, Blair SN. The relation of body mass index, cardiorespiratory fitness, and all-cause mortality in women. *Obes Res* 2002; **10**: 417–423.
42. Pena M, Bacallao J, eds. *Obesity and Poverty: A New Public Health Challenge*. Pan American Health Organization (PAHO): Washington, DC, 2000.
43. Mercer SL, Green LW, Rosenthal AC, Husten CG, Khan LK, Dietz WH. Possible lessons from the tobacco experience for obesity control. *Am J Clin Nutr* 2003; **77**(Suppl.): 1073S–1082S.
44. Ministry of Health, Tonga. *A National Strategy to Prevent and Control Non-Communicable Diseases in Tonga*. Nuku'alofa: Tonga, 2003.
45. Swinburn B, Gill T. *Best Investments to Address Childhood Obesity: A Scoping Exercise: Report to the Commonwealth Department of Health and Aging*. Canberra: Department of Health and Ageing, 2002.
46. Lefebvre RC, Flora JA. Social marketing and public health intervention. *Health Educ Q* 1988; **15**: 299–315.
47. Robinson TN. Reducing children's television viewing to prevent obesity: a randomized controlled trial. *JAMA* 1999; **282**: 1561–1567.
48. James J, Thomas P, Cavan D, Kerr D. Preventing childhood obesity by reducing consumption of carbonated drinks: cluster randomised controlled trial. *BMJ* 2004; **328**: 1237.
49. Gortmaker SL, Peterson K, Wiecha J, Sobol AM, Dixit S, Fox MK, Laird N. Reducing obesity via a school-based interdisciplinary intervention among youth. *Planet Health Arch Pediatr Adolesc Med* 1999; **153**: 409–418.
50. Hastings G, Stead M, McDermott L, Forsyth A, MacKintosh A, Raynor M, Godfrey C, Caraher M, Angus K. *Review of the Research on the Effects of Food Promotion to Children*. Centre for Social Marketing, University of Strathclyde: Glasgow, 2003.
51. Morley-John J, Swinburn B, Metcalf P, Raza F, Wright H. Fat content of chips, quality of frying fat and deep-frying practices in New Zealand fast food outlets. *Aust N Z J Public Health* 2002; **26**: 101–107.
52. Kahn EB, Ramsey LT, Brownson RC, Heath GW, Howze EH, Powell KE, Stone EJ, Rajab MW, Corso P. The effectiveness of interventions to increase physical activity. A systematic review. *Am J Prev Med* 2002; **22**: 73–107.
53. Crawford I, Leicester A, Windmeijer F. *The 'Fat Tax': Economic Incentives to Reduce Obesity*. Institute for Fiscal Studies: London, 2003.
54. National Conference of State Legislatures. Taxes on soft drinks and snack foods. Soft drink and snack food tax legislation by state. In: National Conference of State Legislatures; 2002.
55. National Health and Medical Research Council. *A Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines*. NHMRC: Canberra, 1999.