

The challenges of systematically reviewing public health interventions

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Introduction

Evidence-based public health concerns the development and implementation of effective programmes and policies.¹ For policy makers and practitioners to implement effective programmes they must have considered the information that is available on which interventions have been shown to work, or not to work (or caused harm).² One form of high quality evidence-based information available to decision makers is a systematic review of research of effectiveness. A systematic review is defined as ‘a review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from the studies included in the review’.³

Many of the tools of research synthesis were developed by American social scientists in the 1960s.⁴ However, today’s focus on evidence in health has been largely driven by the evidence-based medicine movement. Some authors have argued that there are concerns that in cost-conscious environments only those interventions for which there is sufficient evidence to complete a review would be supported.⁵ In public health the infrastructure that supports and enables the conduct of a review lags behind that of evidence-based medicine and extends beyond the employment of randomized controlled trials. This increased complexity has resulted in an unfortunate focus on the appropriateness (or not) of randomized controlled trials as the priority study design rather than what constitutes evidence in public health and how this should be evaluated.^{6,7} However, after diverging views, the focus has now moved towards ensuring that reviews in public health meet the needs of public health practitioners.

Conducting systematic reviews of complex public health interventions is methodologically challenging. The following section outlines many of the issues faced when reviewing evidence of public health intervention effectiveness.

Asking the right question

Reviewers need to address the questions of importance to stakeholders and include relevant interventions, outcomes and populations. The questions of effectiveness that decision makers and consumers have may be different to those who are undertaking

a systematic review. Generally, public health reviews should seek to answer two questions: (1) does the intervention work and (2) why does the intervention work (or not work)?

Reviewers may choose to address a wide range of interventions in their review, which is likely to be time-consuming because of the searching and selecting processes. This type of broad review will help to better inform decision makers about which interventions to implement when there may be a range of options. Reviews limited by interventions may be more likely to inform more immediate decisions of policy relevance. It is also suggested that reviews should include a measure the impact of interventions on the ‘upstream’ influences of health such as systems and organizational development, in addition to the standard outcomes of changes in individual behaviour.^{8,9}

What constitutes public health evidence?

The criteria used to select studies should primarily reflect the question/s being answered in the review, rather than any pre-determined hierarchy.¹⁰ A wide variety of study designs may be used in the evaluation of public health activities, ranging from randomized controlled trials (RCTs) to case studies, with no single method being able to answer all relevant questions about the effectiveness of all public health interventions. The use of

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RCTs may be precluded in some public health interventions for political or ethical reasons^{11,12} or because some interventions are not able to take the 'neatly packaged' form which would make random allocation of individuals to experimental and control groups possible.¹³ Qualitative research can also be included in a review to provide valuable information on the process and implementation of interventions, what they mean to the end users, and the wider context. These methods can describe the information that is of interest to decision makers including what can go wrong, and what the unexpected adverse effects might be when an intervention, which has been successful in an experimental situation, is rolled out to a larger population. Including a breadth of study designs within a public health review provides a more integrated picture of the existing evidence but presents challenges in the searching, appraising and synthesis of such diverse study designs.

Searching for public health evidence

Retrieval of primary studies in public health may be difficult due to (1) literature being widely dispersed, (2) imprecise and diffuse terminology used in studies to locate articles, and (3) literature being located in a wide range of bibliographic tools of varying coverage and quality.¹⁴ As much of the public health literature is likely to be found outside of electronic databases methods other searching methods need to be employed (e.g. hand-searching journals, internet searching, etc). A broad search for all types of study designs presents further challenges as this often results in a large number of citations to apply the inclusion and exclusion criteria.

Assessment of the quality of public health evidence

Assessing the quality of public health and health promotion studies within systematic reviews is difficult, due in part to the wide variety of study designs employed. Although recommendations based on empirical evidence exist on the dimensions of quality of RCTs most associated with bias,^{15–18} information relating to non-randomized controlled studies and qualitative research is limited. Many public health studies will never meet all of the criteria for quality, for example, blinding, which is usually impossible to achieve in educational interventions.

Assessing the theoretical framework

Systematic reviews gather evidence to assess whether the effectiveness of an intervention that is expected theoretically does indeed occur. Every review, just like every intervention, is based on a theory, although this may not be explicit or well explored. Theories relevant to health promotion and public health seek to explain individual behaviour, interpersonal influences and activities throughout communities. Although controversy remains about whether or not theory makes a difference to

intervention effectiveness, as Oakley¹⁹ points out 'the importance or unimportance of theory is unlikely to emerge unless review activity is structured to cross problem/outcome areas, and allow for the classification of interventions according to their theoretical base.'

The quality of the intervention

Policy makers and prevention researchers regularly confront the realization that the effectiveness of different interventions is difficult, if not impossible, to compare.²⁰ Evidence on what the intervention entailed and the extent to which participants were exposed is essential in prevention activities, which are often implemented in conditions that present numerous obstacles to complete delivery.²¹

The degree to which the intervention was implemented (delivered) as planned is called intervention integrity. Dane and Schneider²¹ describe five aspects related to integrity: adherence, exposure, quality of delivery, participant responsiveness and programme differentiation. Incorporating information relating to integrity in a review is important when determining whether non-significant results are due to a poorly conceptualized intervention or to an incomplete delivery of the prescribed components,²¹ also known as Type III error.²²

Heterogeneity of studies

Public health interventions are often complex. Complexity is often due to the characteristics of the interventions, study population/s, outcomes, or other methodological issues relating to the conduct of the primary studies.²³ Variability in study populations in public health studies may be particularly great as the populations will often not be selected according to the same pre-defined criteria. Variability may also arise due to the interventions themselves, in addition to methodological diversity due to the range of study designs used. Furthermore, complexity may be introduced because the effectiveness of the interventions may be modified by the context in which it operates.^{6,23} Because of the potential variations between studies reviewers may expect considerable heterogeneity (i.e. differences in results) across studies and need to consider this when synthesizing results.

Addressing inequalities

Most systematic reviews of intervention effectiveness have focused on the population level effects and have generally incorporated the utilitarian focus, i.e. aiming to identify effective interventions that will achieve the greatest health gains for the greatest number of patients or populations. However, interventions which work for the middle and upper socioeconomic positions may not be as effective for those who are disadvantaged and experience a higher prevalence of health problems. In order to reduce inequalities in many areas of health the evidence needs to be systematically reviewed to identify who is benefiting from

interventions, who is not benefiting, and who may have been caused harm. Methodological work relating to systematic review methods for distilling and using information on relative effectiveness is underway.

The sustainability of interventions

Sustainability refers to the continuation of a programme or intervention or its effects.²⁴⁻²⁵ Although many studies in public health may show a positive effect of the intervention, policy and decision makers are also interested in knowing whether health benefits, such as reductions in specific diseases or general improvements in health levels, are going to be sustained beyond the life of the interventions reviewed. Variables relating to sustainability may include the political and economic climate, institutional strength, integration of activities, capacity building and community participation.²⁶ Systematic reviews of public health interventions should incorporate some assessment of the sustainability of interventions, and of the extent to which intended outcomes are sustained.

The effect of context on effectiveness

Inherent in all studies of programmes in public health is the problem of how to disentangle 'intervention' effectiveness from effectiveness that should be more appropriately called programme context interactions.²⁷ That is, interventions which are effective may be effective due to pre-existing factors of the context into which the intervention was introduced. Such factors might pertain to the host organization (e.g. staff, local resourcing), the system within which the host organization operates, and the characteristics of the target group or population (e.g. cultural and linguist diversity, socioeconomic position, rural/urban setting).

Applicability of the findings

The process of deciding how the results of the review relate to another specific situation is a critical part of the evidence-based decision-making process. The complexity of public health interventions may complicate the determination of applicability. For example, the inclusion criteria, settings and interventions may not be well defined in some public health studies and in a great number of multi-component interventions it is difficult to determine what specific intervention had the noted effect or the synergy between components.

It is important that reviewers address all of the above issues to ensure that reviews are more useful to public health practitioners. Many organizations are emphasizing²⁸⁻³⁴ the use of public health studies to underpin organizational decision making and advice to community, and these projects have contributed to methodological advances in this area. The Cochrane Health Promotion and Public Health Field is assisting reviewers by developing a framework, or a useful set of

guidelines for the conduct of Cochrane systematic reviews of health promotion and public health interventions. This project is in collaboration with a number of individuals with expertise and experience in conducting reviews of public health topics. The key audience for the guidelines is Cochrane Collaboration systematic reviewers of health promotion and public health interventions, although the guidelines will also be invaluable to any reviewer embarking upon a systematic review in areas other than public health. Peer-reviewers could benefit from these guidelines, giving them a standard to which all protocols and reviews could be assessed, ensuring that all new reviews are of a consistent, high quality. The guidelines may also be useful to policy and decision makers who commission reviews of public health interventions. Dissemination of the guidelines will be through the current Cochrane training materials and will also be available from the Cochrane Health Promotion and Public Health Field website (<http://www.vichealth.vic.gov.au/cochrane>).

We aim to present and disseminate these guidelines widely throughout the public health community and seek input from the public health workforce regarding their appropriateness and usefulness. We will update the guidelines on a regular basis as results of relevant methodological work become available.

Conclusion

There are many issues that challenge the public health systematic reviewer. We await the results of relevant methodological research to be able to fully address many of the issues. However, the current development of guidelines for systematic reviewers of public health interventions by the Cochrane Health Promotion and Public Health Field will go a long way to ensuring that future public health reviews are of a consistent high quality and meet the needs of the many users.

Update of Cochrane public health protocols and reviews

This list is updated on a regular basis on the Field's website (<http://www.vichealth.vic.gov.au/cochrane>). Recently published relevant public health reviews in The Cochrane Library and summarized by Informed Health Online (<http://www.informedhealthonline.org>) include the following.

Exercise to improve self-esteem in children and young people

The results indicate that exercise has positive short-term effects on self-esteem in children and young people. These conclusions are based on several small low-quality trials.

Community pharmacy personnel interventions for smoking cessation

The limited number of studies available suggests that trained community pharmacists, providing a counselling and record

keeping support programme for their customers, may have a positive effect on smoking cessation rates.

Psychological and/or educational interventions for the prevention of depression in children and adolescents

There is insufficient evidence to warrant the introduction of depression prevention programmes although results indicate that further study would be worthwhile. There is a need to compare interventions with a placebo or active comparison, to investigate the impact of booster sessions, and to consider the practical implementation of prevention programmes when choosing target populations.

Graduated driver licensing (GDL) for reducing motor vehicle crashes among young drivers

All of the 13 studies included in the review reported reductions for all types of crashes among teenage drivers participating in GDL programmes. The size of the reductions varied and, from the evidence available, it is not possible to say which aspects of GDL programmes have the biggest effect.

Helmets for preventing injury in motorcycle riders

This review concluded that helmets reduce the risk of head injury by ~72 per cent. The use of helmets also reduces the risk of death, although it was not possible to estimate a percentage figure for this reduction from the available evidence. The protective effect of the helmet may depend on other factors such as speed. At present there is insufficient evidence to compare the effectiveness of different types of helmets.

Iodine supplementation for preventing iodine deficiency disorders in children

This review of 26 studies (of generally poor quality) found that giving iodine (as iodized oil, salt or water) generally decreased thyroid size and increased iodine in the urine. One study also suggested a reduction in infant mortality. In some studies there was a trend towards better developmental outcomes after iodine prophylaxis.

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