

Systematic Reviews in Public Health

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In the era of evidence-based public health, systematic reviews are becoming more and more popular and being used more often both as a method of study and as a source of evidence for program and policy development. Thus, public health students and professionals should know and understand the concept, process and value of systematic reviews on different public health topics. Due to higher level of evidence ranking, findings from the systematic reviews are being used more often for policy and program development. Initially, systematic reviews only included findings from the randomized controlled trials, but now it also includes high-quality quasi-experimental studies as randomized control trials are not feasible in all public health topics. Primary purpose of this paper is to orient public health students and professionals about systematic review and thus presented in frequently asked questions and response format.

What is a systematic review?

A systematic review is a high-level overview of primary research on a particular research question that tries to identify, select, synthesize and appraise all high quality research

evidence relevant to that question in order to answer it. (1) The purpose of a systematic review is to sum up the best available research on a specific question. This is done by synthesizing the results of several studies using meta-analysis. (2) Meta-analysis is the statistical analysis of the data/results from studies included in a systematic review to produce an overall, pooled result. (3)

Why systematic reviews?

A systematic review answers the same research question and that conforms to set criteria based on the review of the methods and results of all individual studies; it, therefore, provides higher level of evidence than from a primary study. (3)

Though hierarchy of evidence is a matter of debate (4), evidence from the systematic reviews are considered "superior" compared to those from the randomized control trial, cohort study, case-control study, cross-sectional study and case study. Table 1 shows the strengths of evidence from different studies by the types of the research questions.

Table 1: Hierarchy of evidence by type of research questions (4)

Research-question	Qualitative research	Survey	Case-control studies	Cohort studies	RCTs	Quasi-experimental studies	Non-experimental evaluations	Systematic reviews
Effectiveness Does this work? Does doing this work better than doing that?				+	++	+		+++
Process of service delivery How does it work?	++	+					+	+++
Believability Does it matter?	++	++						+++
Safety Will it do more good than harm?	+		+	+	++	+	+	+++
Acceptability Will children/parents be willing to or want to take part in the service offered?	++				+	+	+	+++
Cost effectiveness Is it worth buying this service?					++			+++
Appropriateness Is this the right service for these children?	++	++						++
Satisfaction with the service Are users, providers, and other stakeholders satisfied with the service?	++	++	+	+				+

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What are the groups supporting systematic reviews?

The Cochrane Collaboration (1) is an international network of more than 28,000 dedicated people from over 100 countries. The Cochrane collaborators work together to help healthcare providers, policy-makers, patients, their advocates and carers, make well-informed decisions about health care, by preparing, updating, and promoting the accessibility of Cochrane Reviews. More than 5,000 systematic reviews are available online in the The Cochrane Library: www.thecochranelibrary.com. The library provides one-click free access to the resources in low income countries. The Cochrane Collaboration also developed and regularly updates the Handbook for Systematic Reviews of Interventions (www.cochrane-handbook.org) that provides guidance to authors for the preparation of Cochrane Intervention reviews.

The Campbell Collaboration (2) is an international research network that produces systematic reviews of the effects of social interventions. Campbell is based on voluntary cooperation among researchers of a variety of backgrounds. The Campbell Collaboration (C2) helps people make well-informed decisions by preparing, maintaining and disseminating systematic reviews in education, crime and justice, and social welfare. Systematic reviews conducted from the Campbell Collaboration are available at the Campbell online library: <http://www.campbellcollaboration.org/library.php>

The Evidence for Policy and Practice Information and Coordinating Centre (EPPI-Centre) (5) is part of the Social Science Research Unit at the Institute of Education, University of London. The EPPI-Centre has been carrying out systematic reviews and developing review methods in social science and public policy. The centre is dedicated to making reliable

research findings accessible to the people who need them, whether they are making policy, practice or personal decisions. The centre has a large number of systematic reviews in the fields of education, health promotion and public health, as well as social welfare and international development. The EPPI-Centre (www.eppi.ioe.ac.uk) provides online EPPI-Reviewer Software to manage different steps of systematic reviews and the Evidence-library to search systematic reviews.

International Initiatives for Impact Evaluations (3ie) (6) is supported by UK Department for International Development (DFID), Bill and Melinda Gates Foundation and other donors to funds impact evaluations and systematic reviews to generate evidence on what works in development programs and why. These evidences are used to inform policy and to improve the lives of poor people. Alike others, 3ie provides a database of systematic reviews (www.3ieimpact.org/en/evidence/systematic-reviews) and provide funds to examine the existing evidence on a particular intervention or program in low and middle income countries, drawing also on evidence from developed countries when pertinent.

There are other centers /groups involved in systematic reviews of their interest, and information from them can be obtained from their sites, such as Collaboration for Environmental Evidence and Center for Evidence Based Crime Policy. (7)

How to carry out systematic reviews?

Systematic review involves a structured, rigorous, and objective approach to provide a critical synthesis of the available evidence in a particular field. (8)The process generally involves multiple steps including defining research question, developing a protocol, searching and selecting studies, examining included studies (including data extraction

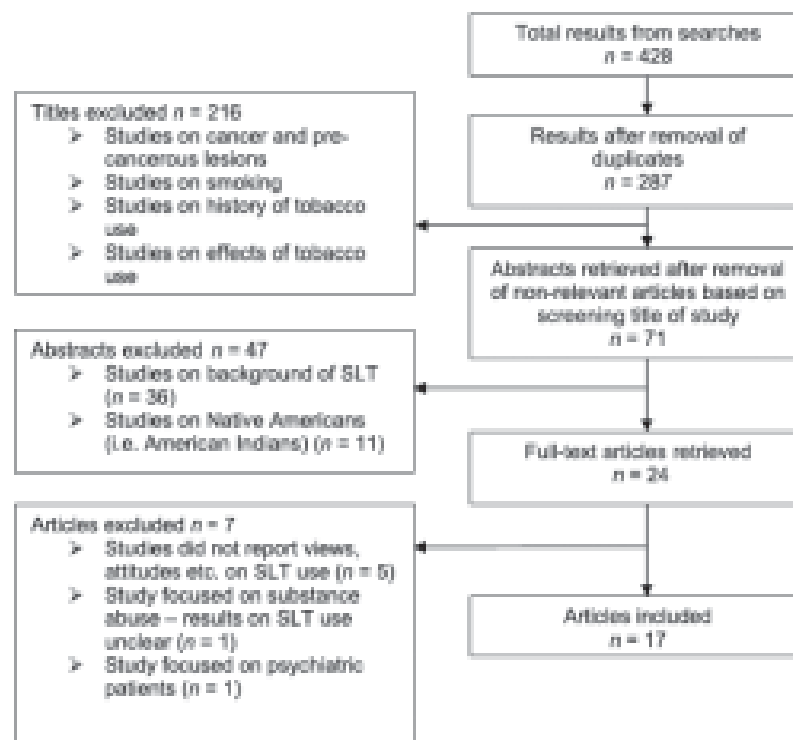


Figure 1: Example of a typical flow chart of a systematic review (10)

and quality appraisal), undertaking synthesis and presenting results. The whole process takes couple of months and requires individuals with multiple skills set, just like in primary studies.

The Cochrane handbook (9) suggests following steps in doing systematic reviews of interventions:

1. Defining the review question and developing criteria for including studies
2. Searching for studies
3. Selecting studies and collecting data
4. Assessing risk of bias in included studies
5. Analyzing data and undertaking meta-analyses
6. Addressing reporting biases
7. Presenting results and 'Summary of findings' tables
8. Interpreting results and drawing conclusions

A systematic review require extensive and comprehensive search of primary research from studies, typically from electronic database, filtrations of research papers based on pre-set inclusion and exclusion criteria, data extraction and meta-analysis. Figure 1 shows the typical example of a systematic review flow chart.

What is the difference between systematic review, literature review and meta-analysis ?

Systematic review is possible and appropriate where there are multiple primary studies available for review. However, some systematic reviews were concluded stating that there is not any primary research that fulfills the inclusion criteria of the systematic review. In other cases, hundreds of studies were included in the meta-analysis for a systematic review. Systematic review is not just the literature review or meta-analysis, and thus should be carefully differentiated while using these terms. Literature review is mainly descriptive, doesn't involve a systematic search of the literature, and thereby often focuses on a subset of studies in an area chosen based on availability or author selection, and thus can often have selection bias. (11) Meta-analysis is the statistical analysis to generate pooled results for the data/results from the studies included in a systematic review; however can be used separately than in a systematic review. Systematic reviews, as the name implies, typically involve a detailed and comprehensive plan and search strategy derived a priori, with the goal of reducing bias by identifying, appraising, and synthesizing all relevant studies on a particular topic. (11)

What are some examples of systematic reviews in Nepal?

Typically, systematic reviews are not country specific as they require multiple primary research studies with comparable methodology and common outcome. Systematic review covers evidence from all eligible primary research studies on the specific topic of interest from electronic database and library search available at the time of review.

However, many systematic reviews(10,12,13) included Nepal based primary research in the systematic reviews.

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