Abstract

Background

Public health interventions include organized measures to prevent disease, promote health and prolong life among the population as a whole. Their primary focus is to create cordial conditions where people can be healthy. The public health interventions are usually deemed to be “complex”. Systematic reviews involve scientific processes to collect, combine, analyze and summarize all available evidence with minimum or no bias. Meta-analysis is a technique by which the quantitative results from several studies are integrated to yield a summary result. Systematic review combined with meta-analysis has been accepted as a potential robust method of health care research evidence synthesis. Application of routine meta-analysis technique to synthesize the results of studies pertaining to public health interventions provides a pooled estimate which is diluted with the effect of complexity. This study demonstrates a mechanism to obtain the pooled estimate from meta-analysis of such studies which is adjusted for the effect of complexity. This includes measuring the complexity in public health interventions numerically and adjusting the measured complexity in meta-analysis using a suitable statistical technique.

Methodology

A qualitative study was conducted to identify the complexities in public health interventions. It involved semi-structured interviews/focus group discussions among public health professionals on their perception about complexity in public health interventions. Tool to measure complexity in public health interventions was developed, which consisted of four major domains namely population, intervention,
context and outcome. The items included in the tool were derived from three sources: (1) Theories deduced from qualitative study (2) Meticulous examination of published public health interventions and (3) Expert opinion. The tool provides four domain specific complexity scores (obtained by adding scores of all items of the domain) and one total complexity score (obtained by adding four domain specific complexity scores). The tool was validated by collecting the feedback from seven public health experts. Reliability of the tool was assessed by computing Intra-class Correlation Coefficient (ICC) for the scores of same set of 20 studies scored independently by three raters. The tool was applied to assess the complexity of 259 studies collected from 30 public health systematic reviews to explore the statistical properties of the (total) complexity score. The studies were classified into four classes of complexity by the method of composite dynamic index for the purpose of meaningful interpretation of the complexity score. The complexity score was considered as a covariate and adjusted in meta-analysis by the technique of meta-regression. Sensitivity analysis was undertaken to determine the effect of extreme scores on the adjusted estimate.

**Results**

ICC with 95% CI was found to be 0.85 (0.71, 0.93) for the population domain, 0.74 (0.55, 0.88) for intervention domain, 0.43 (0.17, 0.69) for context domain, 0.81 (0.66, 0.91) for outcome domain and 0.69 (0.47, 0.85) for the total complexity score. Lognormal distribution was obtained as the the best fit for complexity score. It was observed that meta-regression changed the estimates and complexity adjusted estimates had wider 95% CI than unadjusted estimates. Sensitivity analysis revealed that the adjusted estimate is robust to extreme scores.
Conclusion

The present study, which is a new contribution to public health evidence consolidation involves measuring the complexity in public health interventions and adjusting it with the help of a score in meta-analysis is a unique approach and first of its kind. The developed tool captures complexity in four major domains which are the potential sources of complexity in public health interventions. The estimate adjusted for complexity is more representative and generalizable.

*****