Brief Introduction to Systematic Review

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What is the need to do Systematic Review?

- A systematic review is a study of studies.
- It attempts to collect all existing evidence on a specific topic in order to answer a specific research question.
- Authors create criteria for deciding on which evidence is included or excluded before starting the systematic review.
- This helps reduce the risk of bias and makes its findings more reliable.
- Systematic reviews should:
  - clearly state objectives with an explicit and reproducible methodology;
  - attempt to identify all studies that meet the eligibility criteria through a detailed search strategy;
  - assess the validity of the findings of the included studies; and
  - synthesize the studies' findings in a systematic way.

Steps to do a systematic review

- Identify a precise problem statement using PICO framework. P – Patient, Problem or Population I – Intervention C – Comparison, control or comparator O – Outcome(s) (e.g. pain, fatigue, nausea, infections, death)
- Develop a research protocol.
- Conduct literature search.
- Select studies as per the research protocol.
- Appraise studies as per the protocol.
- Extract data.
- Analyse results.
- Interpret results.
- In the protocol focus on:
  - Writing a clear search strategy.
  - Developing a clear inclusion and exclusion critieria.
  - Method of screening all collected papers.
  - Data you will extract from papers. Form a data extraction strategy.

Example of inclusion/exclusion strategy

- Studies were included if they assessed children between 4 and 18 years old.
- If their age was not mentioned, the school type or class/ grade was used as proxy for their age.
- The studies had to measure directly or indirectly distance to fast food outlets and its relationship with overweight/obesity in children or dietary intake.
- Studies with no description of Food environment around schools and those not relating to the relationship between proximity of retail food outlets to schools and the outcome measure(s) were excluded.
- Qualitative studies, and those written in a different language to English were excluded.

Data Extraction Form Details

1. Title/ Reference of the paper.
2. Year of publication.
3. Country of study.
4. Students' age/grade/class/type of school.
5. Food outlets used to characterise Food environment around schools.
6. Distance specified to measure proximity of food outlets to schools.
7. Health outcome(s) used in the study.
8. Research question.
9. Result.

Suggested Readings

- Cochrane Handbook for Systematic Reviews of Interventions
- Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)
- Five steps to conducting a systematic review
- A step by step guide for conducting a systematic review and meta-analysis with simulation data
- Welcome to the JBI Manual for Evidence Synthesis

What is a meta-analysis?

- Is a statistical technique, or a set of statistical techniques, for summarizing the results of several studies into a single estimate.
- Meta-analysis takes data from several different studies and produces a single estimate of the effect, usually of a treatment or risk factor.
- Meta-analysis is often linked to systematic review and many systematic reviews include a meta-analysis, but not all.
- For us to do a meta-analysis, we must have more than one study which has estimated something, usually the effect of an intervention or of a risk factor.
- The participants, interventions, or risk factors, and settings in which the studies were carried out need to be sufficiently similar for us to say that there is something in common for us to investigate.
- We might not want to do a meta-analysis of two studies, one of which was in adults and the other in children.

- Meta-analysis can be done whenever we have more than one study addressing the same issue. The sort of subjects addressed in meta-analysis include:
  - interventions: usually randomised trials to give treatment effect,
  - epidemiological: usually case-control and cohort studies to give relative risk,
  - diagnostic: combined estimates of sensitivity, specificity, positive predictive value,
  - population estimates, such as prevalence.
- Systematic review and accompanying meta-analysis has been a great advance in the study of medical evidence.
- Meta-analysis is a rapidly advancing field.

The forest plot

- A graphical representation of the results of a meta-analysis, in this case association between migraine and ischaemic stroke.
- A forest plot shows the estimate and associated interval for each of the studies.
- It is called a forest plot because the vertical lines are thought to resemble trees in a forest.

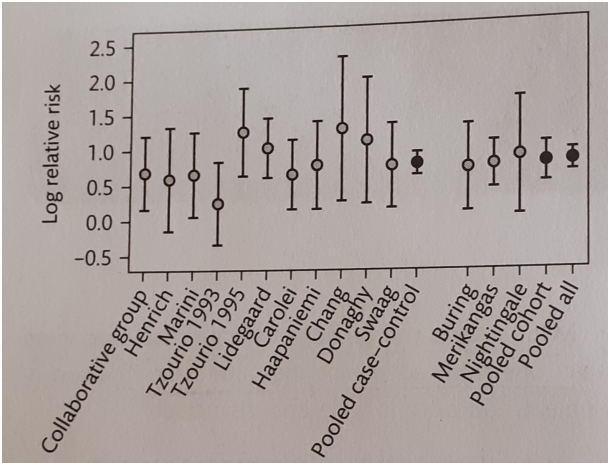

Figure 17.1 Meta-analysis of the association between migraine and ischaemic stroke (data from Etminan *et al.* 2005). (Log relative risks for case–control studies are in fact log odds ratios, Section 13.7.)

Observations from the forest plot

- There are three pooled or meta-analysis estimates: one for all the studies combined, at the extreme right of the picture, and one each for the case-control and the cohort studies, shown as black circles.
- The pooled estimates have much narrower confidence intervals than any of the individual studies and are therefore much more precise estimates than any one study can give.
- The study difference is shown as the log of the relative risk.
- The value of for no difference in stroke incidence because migraine sufferers and non-sufferers it therefore, zero.
- The pooled estimate is well outside the confidence interval for the pooled estimates, showing good evidence that migraine is a risk factor for stroke.

- Best way to learn is to do one Systematic Review and then try Meta-analysis.
- Read COCHRANE and PRISMA guidelines before conducting a systematic review.
- You can do it in your Masters thesis.