

# Research synthesis

*A. Metin Gülmezoglu*

From Research to Practice  
Postgraduate Training in Reproductive Health, Geneva, 2005



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank  
Special Programme of Research, Development  
and Research Training in Human Reproduction

# What is research synthesis?

- The process through which two or more research studies are assessed with the objective of summarizing the evidence relating to a particular question.



# Why do we need research synthesis?

- To make sense of current research (science is cumulative)
  - volume of research is overwhelming
  - access to reports of research is haphazard, and often biased
  - the quality of research is very variable
  - most studies are too small





World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank  
Special Programme of Research, Development  
and Research Training in Human Reproduction

# What is the science of research synthesis?



**The medical review article:  
state of the science.  
[Mulrow. Ann Int Med, 1987]**

**"Current medical reviews do not routinely use scientific methods to identify, assess, and synthesize information."**



# Research synthesis is required for which types of research?

- **Basic science research**

Johanna Horn et al. Nimodipine in animal model experiments of focal cerebral ischaemia. Stroke 2001;32:2433-2438

- **Screening/diagnostic tests** (preeclampsia, preterm birth)

- **Prevalence/incidence studies** (CPP, morbidities)

- **Prognosis studies**

- **Effects of practices**



# Why is research synthesis important?

- Patients (and the public more generally) suffer directly and indirectly
- Policymakers, practitioners, and patients have inadequate information to guide their choices among alternatives
- Limited resources for health care and new research are used inefficiently





# The science of research synthesis

- Systematic reviews
  - protocol development
  - critical appraisal
  - meta-analysis
- Updating/electronic publication



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank  
Special Programme of Research, Development  
and Research Training in Human Reproduction

# “Reviews”

- Why do we need reviews?
- Traditional (narrative) reviews
- Systematic reviews
- By definition a “review” is a retrospective study



# Essentials of a systematic review

- Clear, explicit strategy
- Comprehensive
- Reproducible



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank  
Special Programme of Research, Development  
and Research Training in Human Reproduction

# What constitutes a systematic review?

- **Clearly formulated question**
- Methods to identify studies (searching)
- Selecting studies
- Critical appraisal



# What is a systematic review?

- 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 that are included in the review. Statistical methods (meta-analysis) may or may not be used to analyse and summarise the results of the included studies.



# Review protocol

- Systematic reviews are research projects
- Systematic reviews are retrospective studies
- Protocol preparation allows ‘a priori’ decisions
- To obtain feedback and criticism for the review before it is finalised



# Sections of a protocol

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- Methods



# Selection criteria

- Types of studies
  - RCTs, placebo-controlled etc.
- Participants
  - sex, age groups, community vs hospital
- Interventions
  - Treatment vs nothing? Placebo?
  - Treatment vs another treatment
- Outcomes
  - Substantive outcomes vs surrogate outcomes
  - Outcomes important for decision-making
  - Outcomes important for users (consumers)





# Sections of a protocol

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- Methods



# Search strategy

- Search terms
- Databases
- Handsearching
- Expert help usually needed



# Sections of a protocol

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- **Methods**



# Methods

- How will you decide to include or exclude a study from the review (critical appraisal)?
  - A priori description
  - Duplicate assessments
  - Quality assessment
  - Missing data



# Sections of a systematic review

- Cover sheet
- Background
- Objectives
- Selection criteria
- Search strategy
- Methods
- Description of studies
- Methodological quality of included studies
- Results
- Discussion
- Conclusions
  - Implications for practice
  - Implications for research
- Acknowledgements
- Conflict of interest

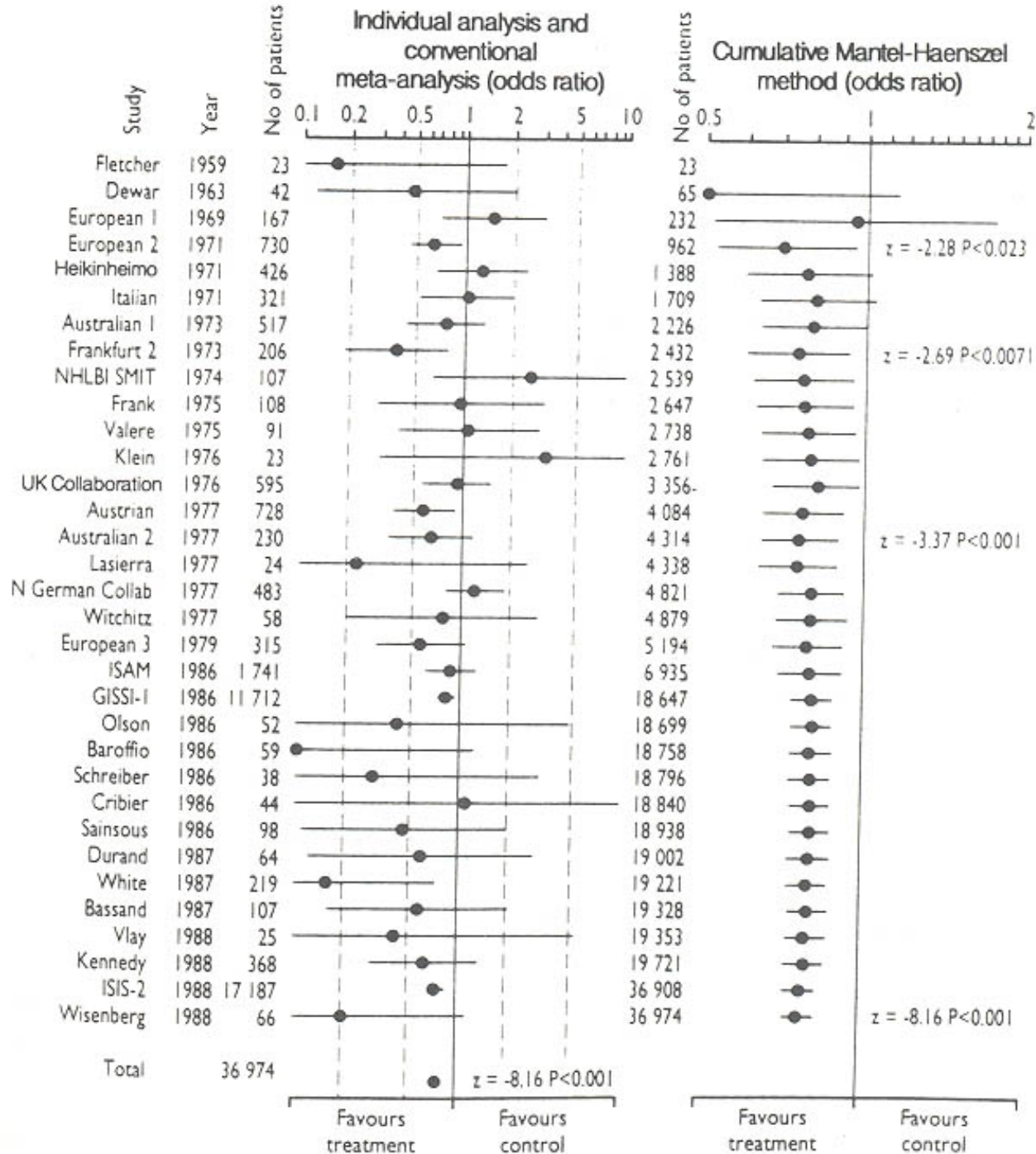


# What is a meta-analysis?

- The use of statistical techniques in a systematic review to integrate the results of the included studies.
  - Also used to refer to systematic reviews that use meta-analysis.



1977



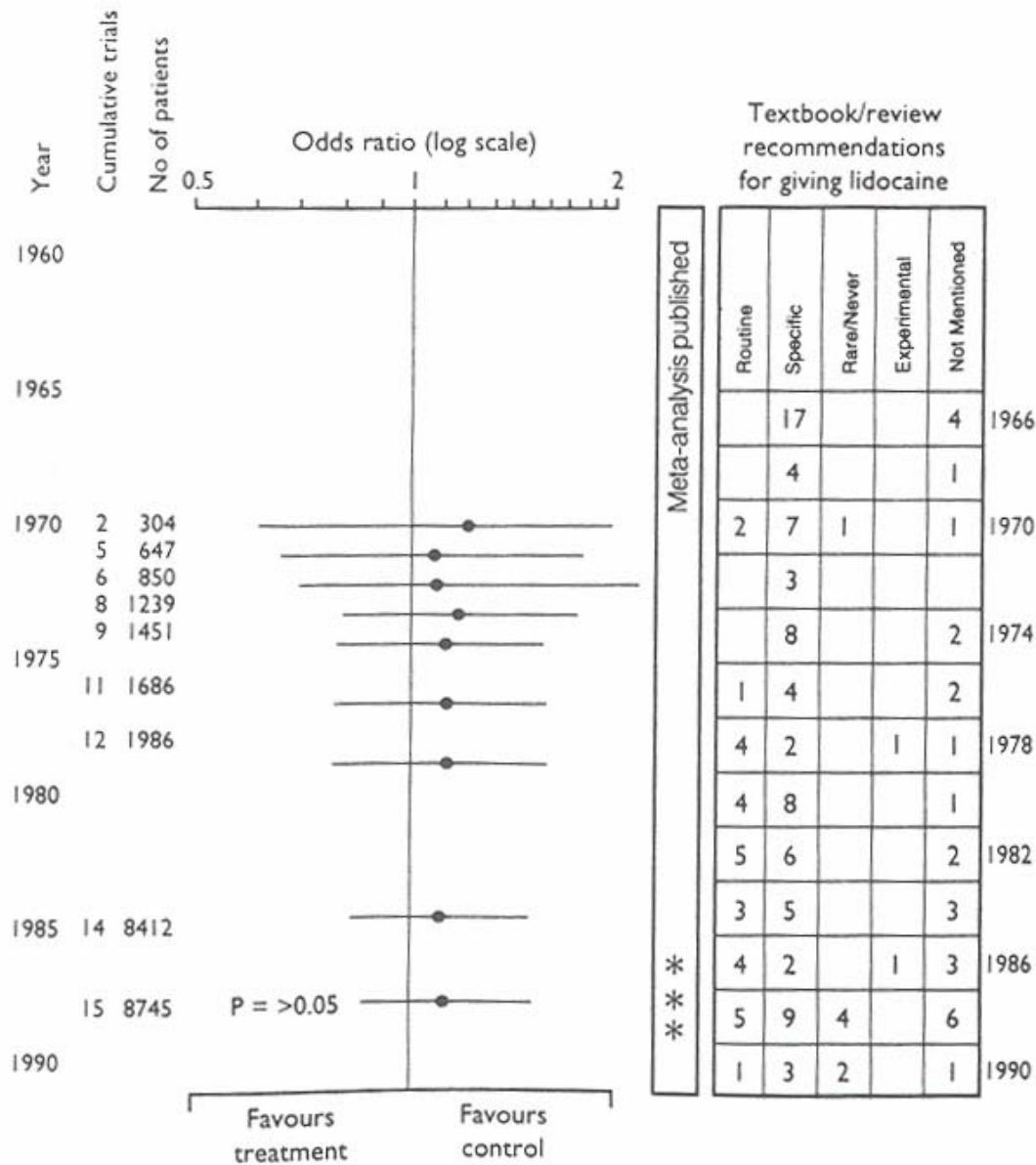
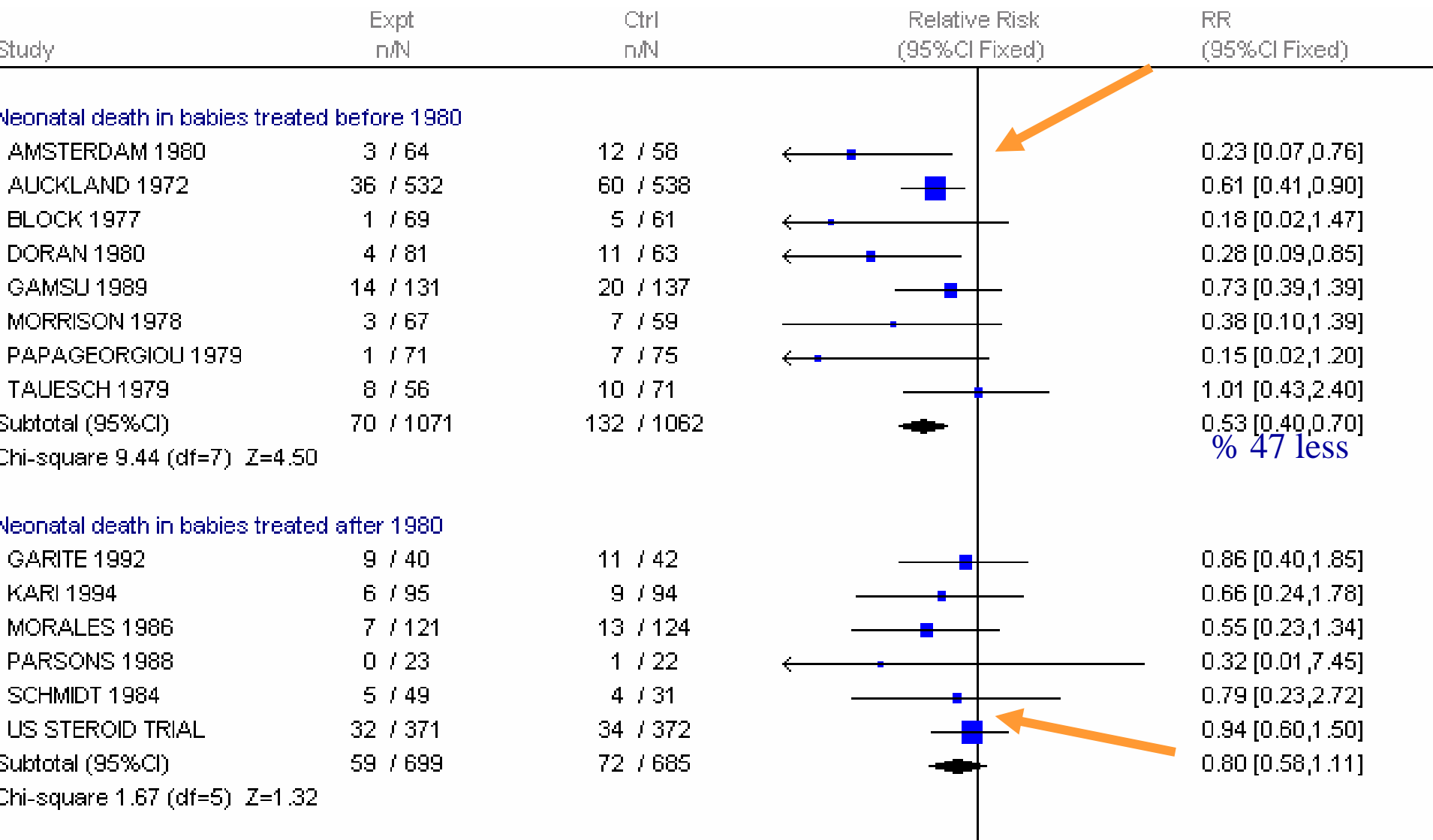


Figure 1.3 Cumulative meta-analysis by year of publication or randomised controlled trials of prophylactic lidocaine for acute myocardial infarction, and recommendations of clinical expert reviewers (adapted from Antman *et al*<sup>14</sup>)



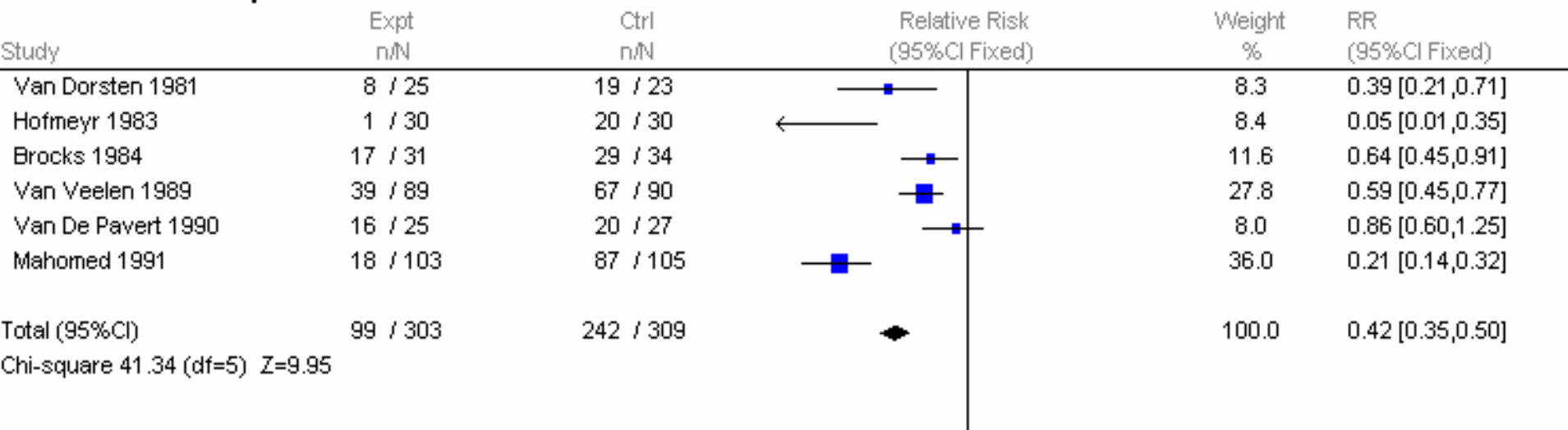
# Corticosteroid treatment for women in preterm labour: effects on neonatal death



# External cephalic version

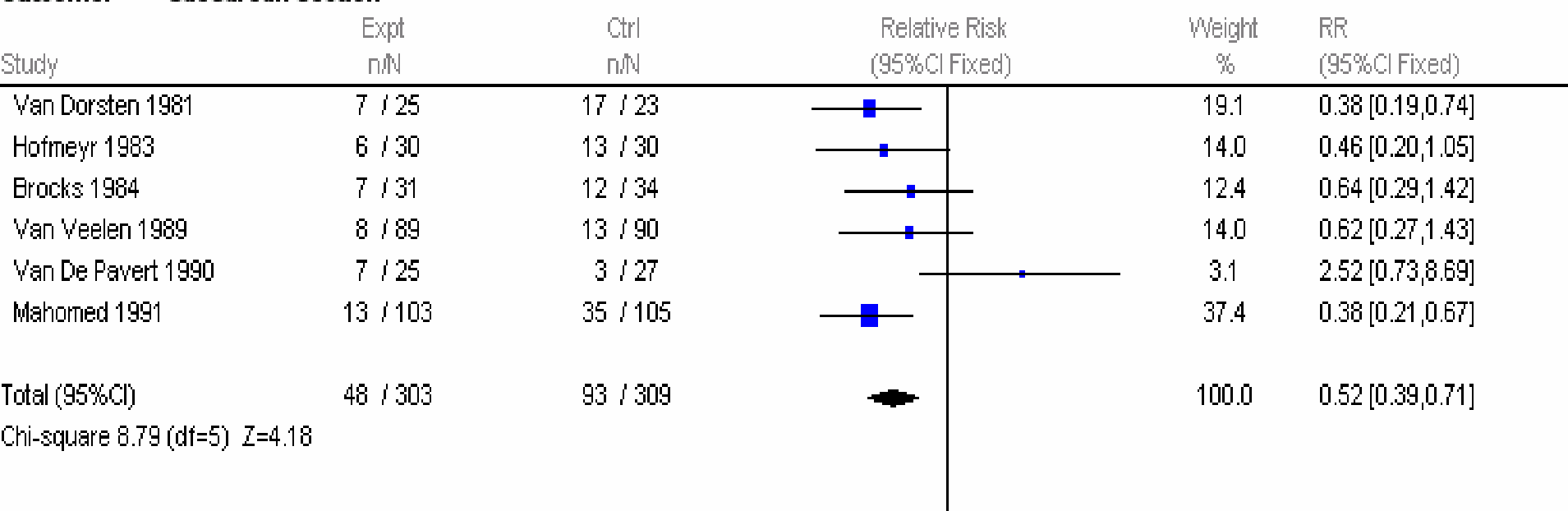
**Comparison: External cephalic version at term**

**Outcome: Non-cephalic births**



**Comparison: External cephalic version at term**

**Outcome: Caesarean section**



# Conclusions

- The methodology is well-established for RCTs
- For other types of studies (answering other types of questions) methodology is being developed
  - search
  - critical appraisal
- The principle remains the same



# Research should begin and end with a systematic review



World Health Organization



Reproductive Health and Research



UNDP • UNFPA • WHO • World Bank  
Special Programme of Research, Development  
and Research Training in Human Reproduction

# Useful resources

- WHO Programme to Map Best Reproductive Health Practices web site  
(<http://www.who.int/reproductive-health/hrp/practices/index.htm>)
- WHO Reproductive Health Library
- Cochrane Library
- Cochrane Collaboration web site  
(<http://www.cochrane.org>)
- Netting the evidence:  
(<http://www.shef.ac.uk/~scharr/ir/netting/>)



## The science of research synthesis implies:

- stating the objectives of the research
- defining eligibility criteria for studies to be included
- identifying (all) potentially eligible studies
- applying eligibility criteria
- assembling the most complete dataset feasible
- analysing this dataset, using statistical synthesis and