

# WASH and nutrition outcomes in children



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## Water, Sanitation and Hygiene

Evidence paper

May 2013



- 2.5 billion people do not have access to improved sanitation (UNICEF 2012)
- 780 million people do not have access to an improved water supply (WHO 2010)
- Diarrhoea is cause of 760,000 child deaths/year (WHO 2013)
- “There is good evidence that inadequate WASH contributes substantially to [diarrhoeal disease] mortality burden”

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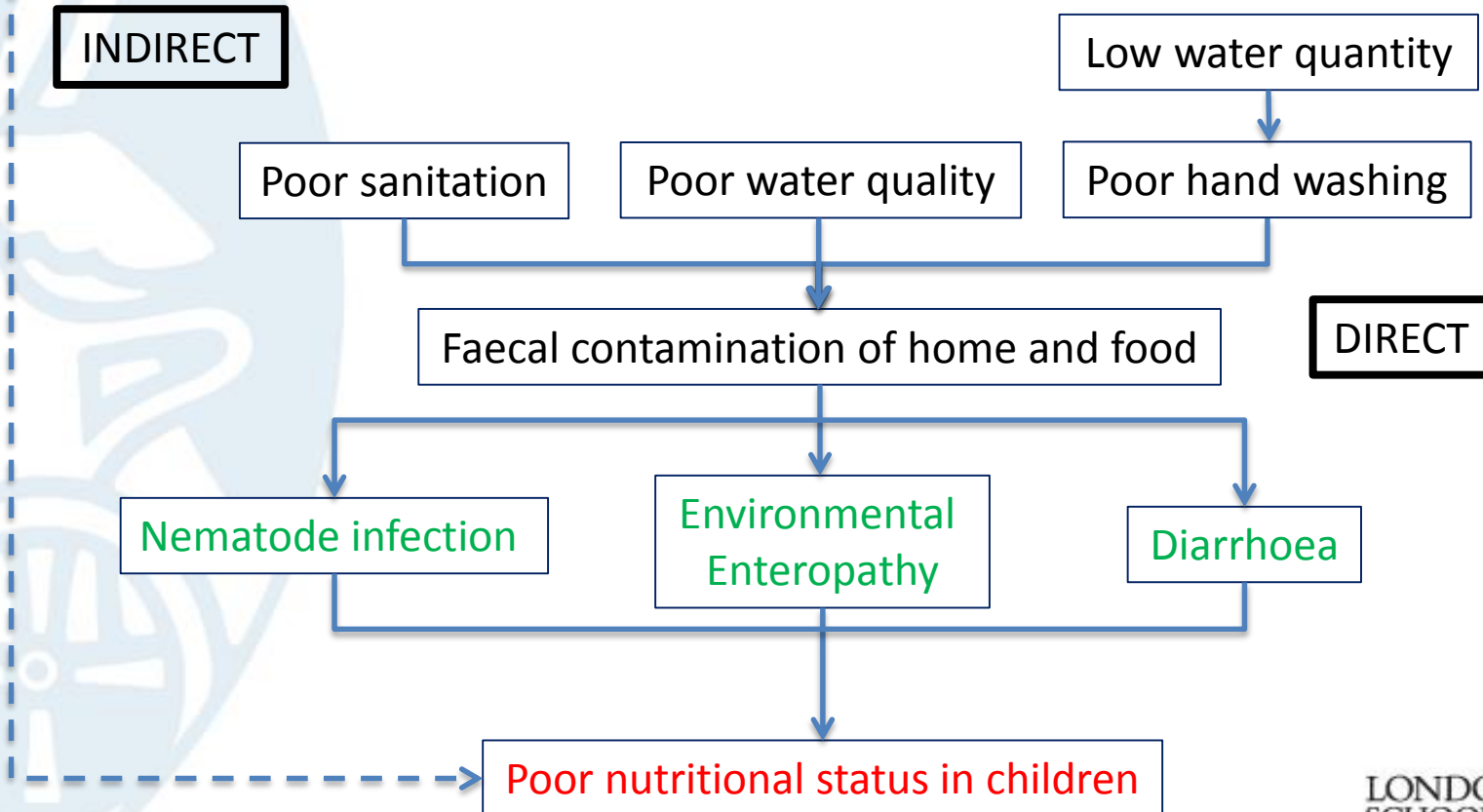
# Diarrhoea and stunting

- Diarrhoea is associated with nutritional status, but:
  - does diarrhoea cause poor nutritional status?
  - does poor nutritional status increase the risk of diarrhoea?
- Analysis of 9 studies with daily diarrhoea morbidity data and longitudinal anthropometry showed:
  - Odds of stunting at 24 mo raised (1.13; 95% CI 1.07, 1.19) for every five episodes of diarrhoea (Checkley, 2008)
- Consistent with hypothesis that higher cumulative burden of diarrhoea increases risk of stunting

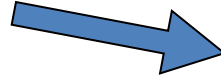


# Links between WASH and nutrition

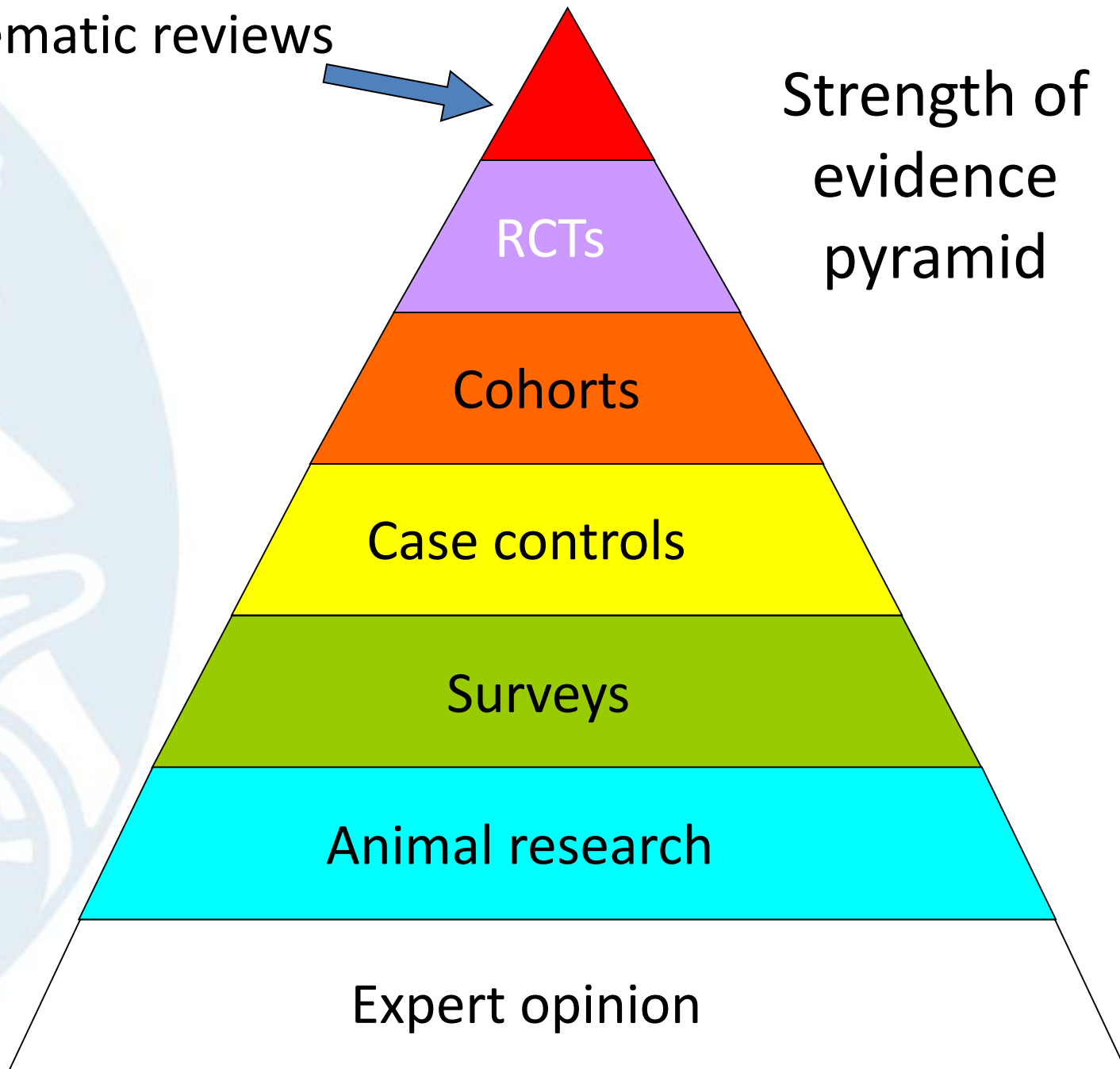
Distant water source : Less time to prepare food and care for children  
Expensive water: Less money for food and other public goods



Systematic reviews



Strength of  
evidence  
pyramid



# **Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children (Review)**

Dangour AD, Watson L, Cumming O, Boisson S, Che Y, Velleman Y, Cavill S, Allen E, Uauy R



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# Systematic review with meta-analysis

- Estimate strength of evidence from totality of available evidence
  - reduces bias and increases precision of estimate
- Systematic search
  - all types of WASH intervention
  - studies including children aged <18 years
  - 6 English and 3 Chinese databases, books, conference reports, author contact etc.
  - primary outcomes: weight-for-height (wasting)  
height-for-age (stunting)
  - secondary outcomes: height, weight



# Included studies

- 14 studies from 10 countries
  - Bangladesh
  - Cambodia
  - Chile
  - Ethiopia
  - Guatemala
  - Kenya
  - Nepal
  - Nigeria
  - Pakistan
  - South Africa
- Duration: 6 months to 5 years
- Sample: n=9,469; all children <5 years
- No study considered to be “high quality”





# Study designs

- Multiple designs
  - Cluster randomised controlled trials
  - Follow-up of cluster randomised controlled trial
  - Longitudinal study with control group
  - Repeat cross-sectional with control group
  - Controlled before-and-after study
  - Cross-sectional with intervention and historic control group matched by propensity score matching



# Interventions

- Studies included from 1 to 4 WASH interventions
  - Treatment of water with bleach
  - Treatment of water with flocculent disinfectant
  - Solar water disinfection (SODIS)
  - Provision of a protected water supply
  - Installation of boreholes and hand pumps
  - Sanitation education
  - Construction of sanitary facilities
  - Provision of soap
  - Promotion of hand washing with soap

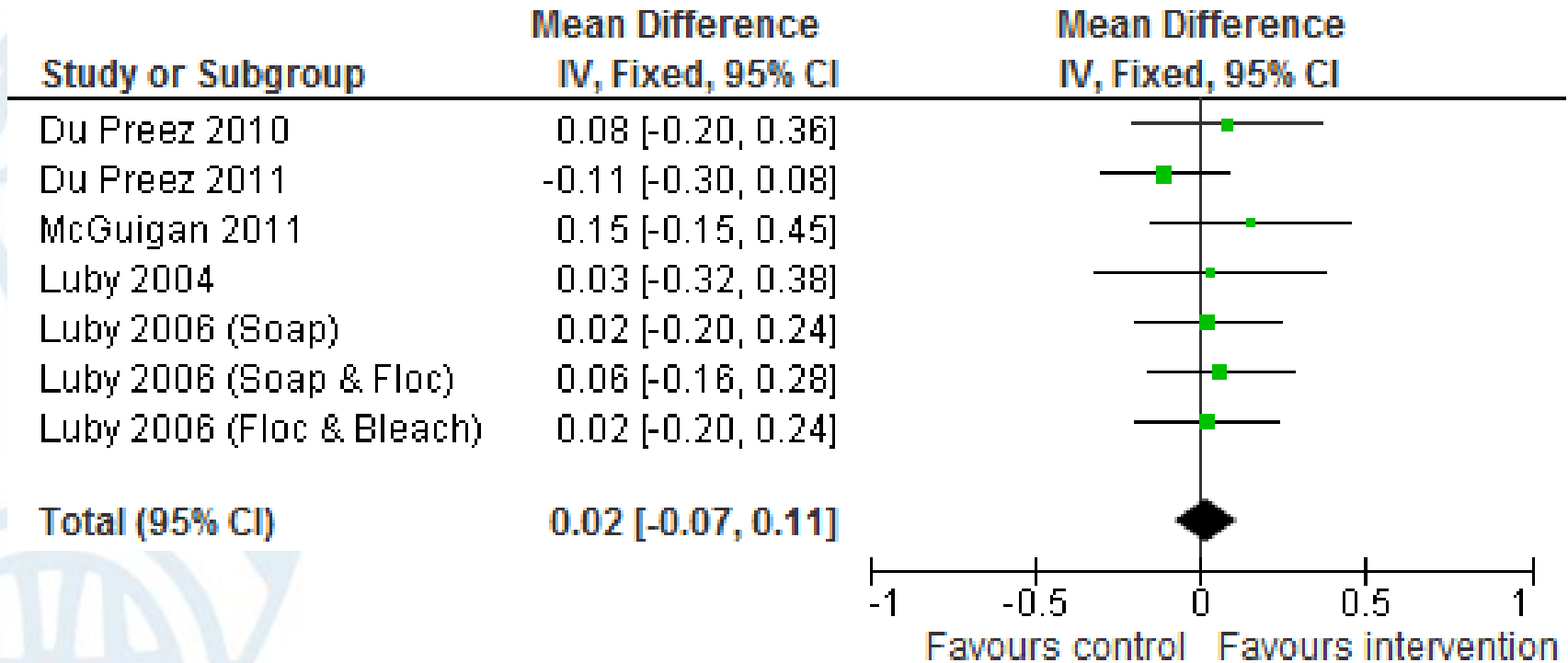


# Meta-analysis

- Restricted to studies of the same design (cRCTs)
- Study level analysis
  - Mean difference between trial arms at study end-point
  - Included final data by trial arm from cRCTs (n=5 studies)
- Individual participant data (IPD) analysis
  - Change in outcome of interest between study baseline and end-point by trial arm allowing for age, sex and duration
  - Included individual data of study children from cRCTs (n=5,380 children)



# No evidence that WASH improves weight-for-height

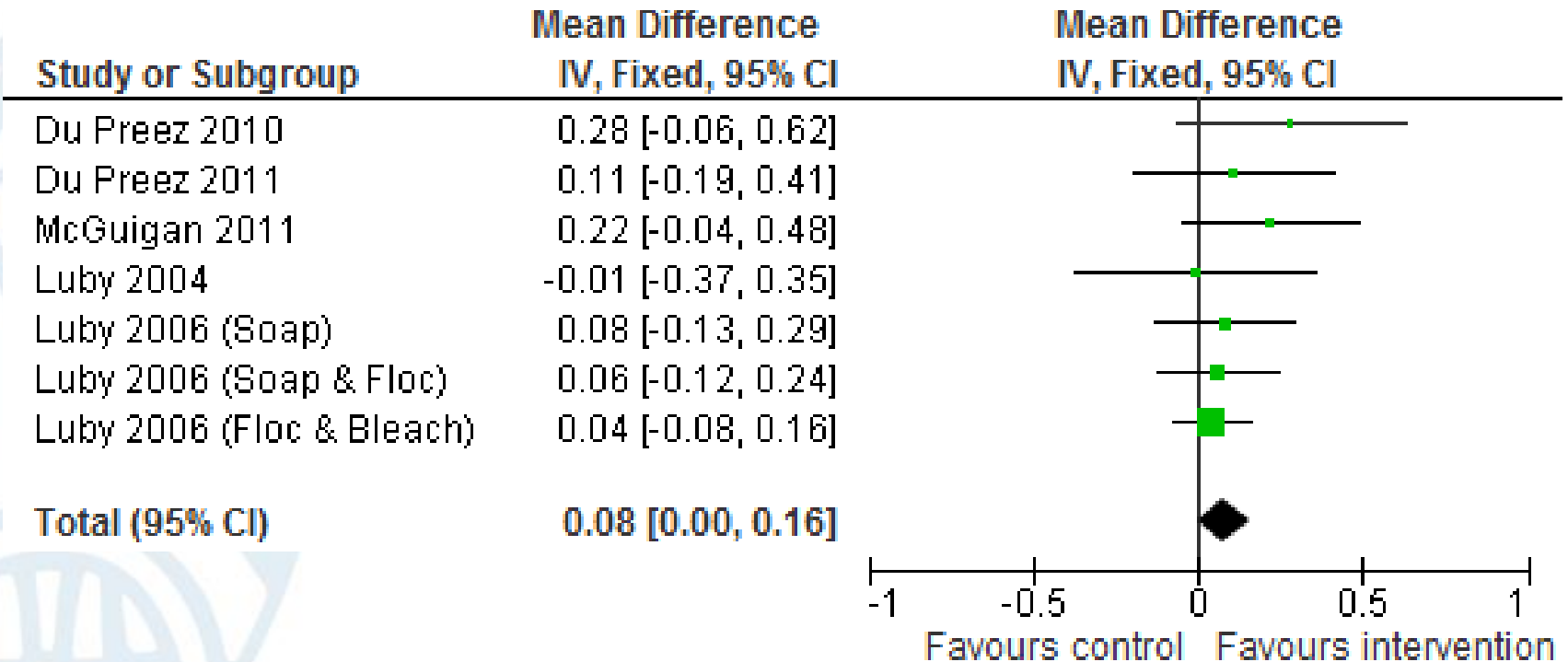


Analysis includes:

- 5 cRCTs involving 4,622 children aged <5 years



# Suggestive evidence that WASH improves height-for-age



Analysis includes:

- 5 cRCTs involving 4,627 children aged <5 years



# Individual Participant Data

- 5 studies included in IPD analysis; n=5,375 – 5,386
- No evidence that WASH improves weight-for-height
  - Mean difference 0.10 z-score (95% CI: -0.09, 0.23)
- Evidence that WASH improves height-for-age
  - Mean difference 0.11 z-score (95% CI: 0.03, 0.18)
- Secondary outcomes
  - Height: Mean difference 0.53 cm (95% CI: 0.20, 0.86)
  - Weight: Mean difference 0.23 kg (95% CI: -0.02, 0.49)



# Interpretation

- First systematic review estimating effect of WASH on nutrition outcomes
- Identified reasonable number of studies including a good number of children
- Limited quality of studies reduces certainty of findings
- Suggestive evidence that WASH interventions slightly improve linear growth in children
- Must be updated periodically as new evidence becomes available

