

What have taps and toilets got to do with nutrition?

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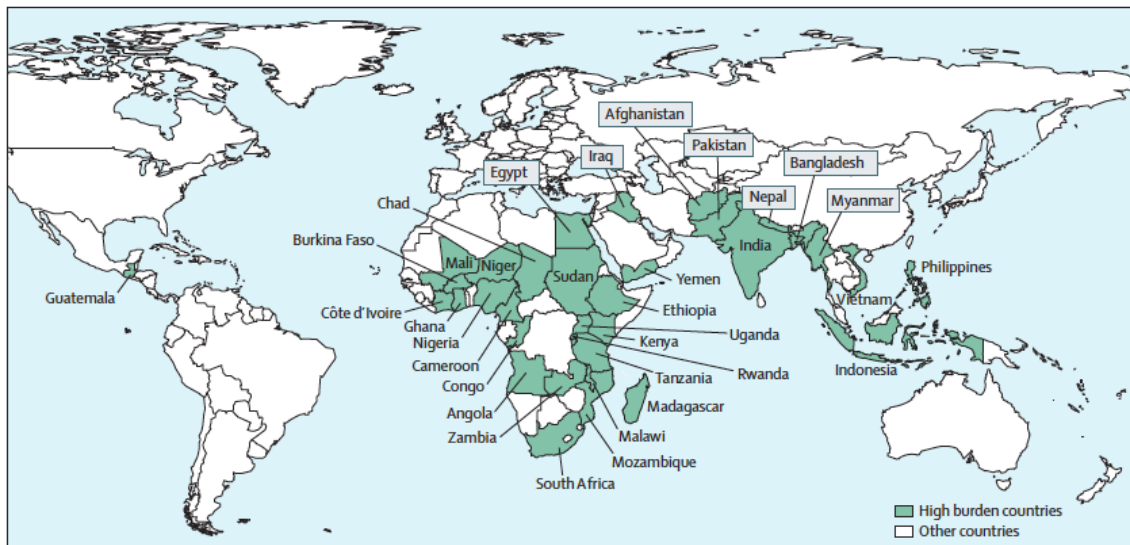
Global picture

Short-term

- ↑ risk of mortality
- ↑ susceptibility to infections/morbidity

Long-term

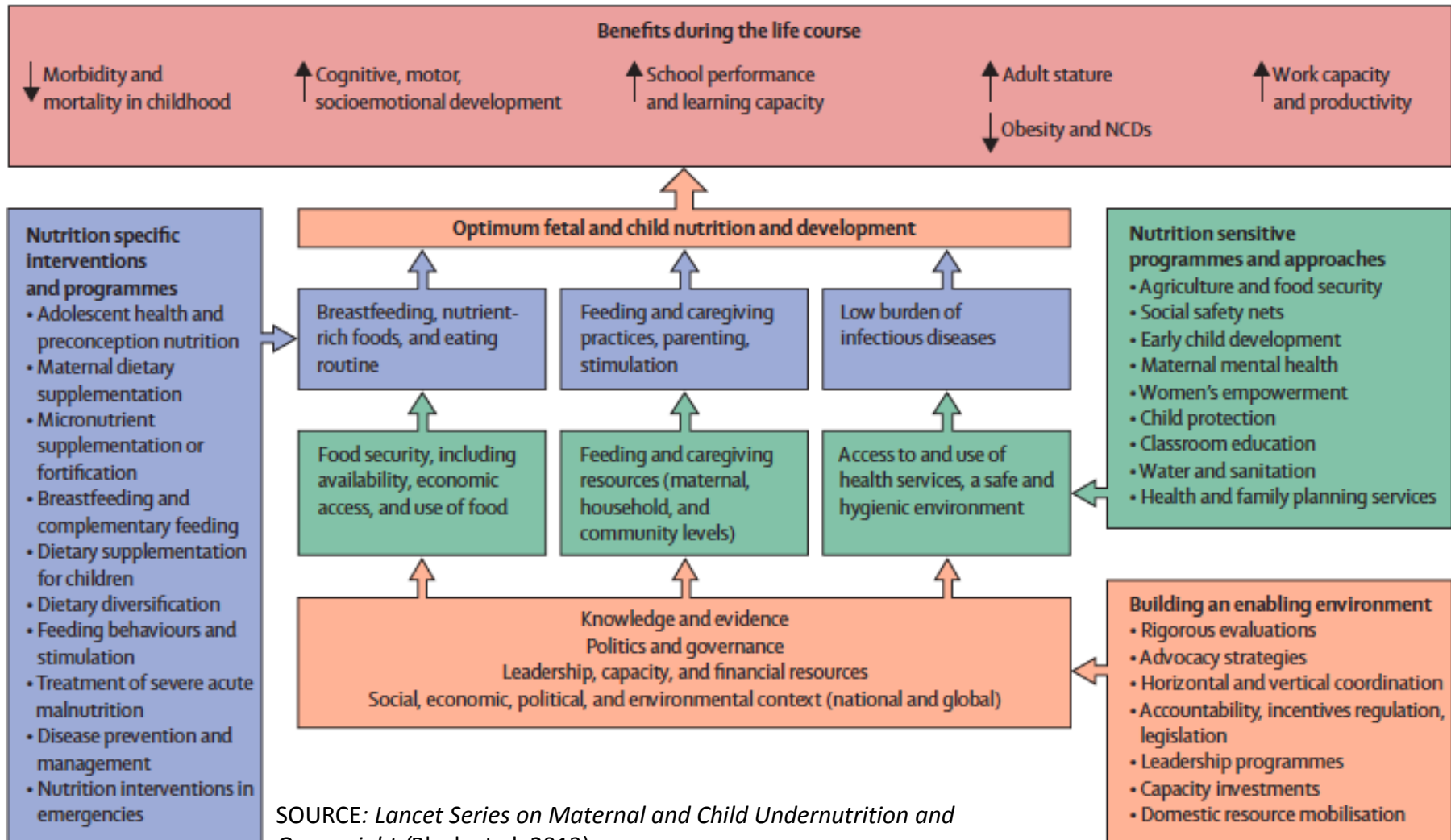
- Educational achievement
- Work capacity
- Economic productivity



34 countries which account for 90% of undernutrition. Source: Bhutta et al, 2013



A tough nut to crack



SOURCE: *Lancet Series on Maternal and Child Undernutrition and Overweight* (Black et al, 2013)

Nutrition-specific interventions

Nutrition specific interventions and programmes

- Adolescent health and preconception nutrition
- Maternal dietary supplementation
- Micronutrient supplementation or fortification
- Breastfeeding and complementary feeding
- Dietary supplementation for children
- Dietary diversification
- Feeding behaviours and stimulation
- Treatment of severe acute malnutrition
- Disease prevention and management
- Nutrition interventions in emergencies

If 10 core nutrition specific interventions were scaled up at 90% coverage, could reduce stunting by 20%

(Bhutta et al 2013)

How do we close the gap?



Nutrition-sensitive interventions

What is the contribution of sanitation and water... and hygiene?

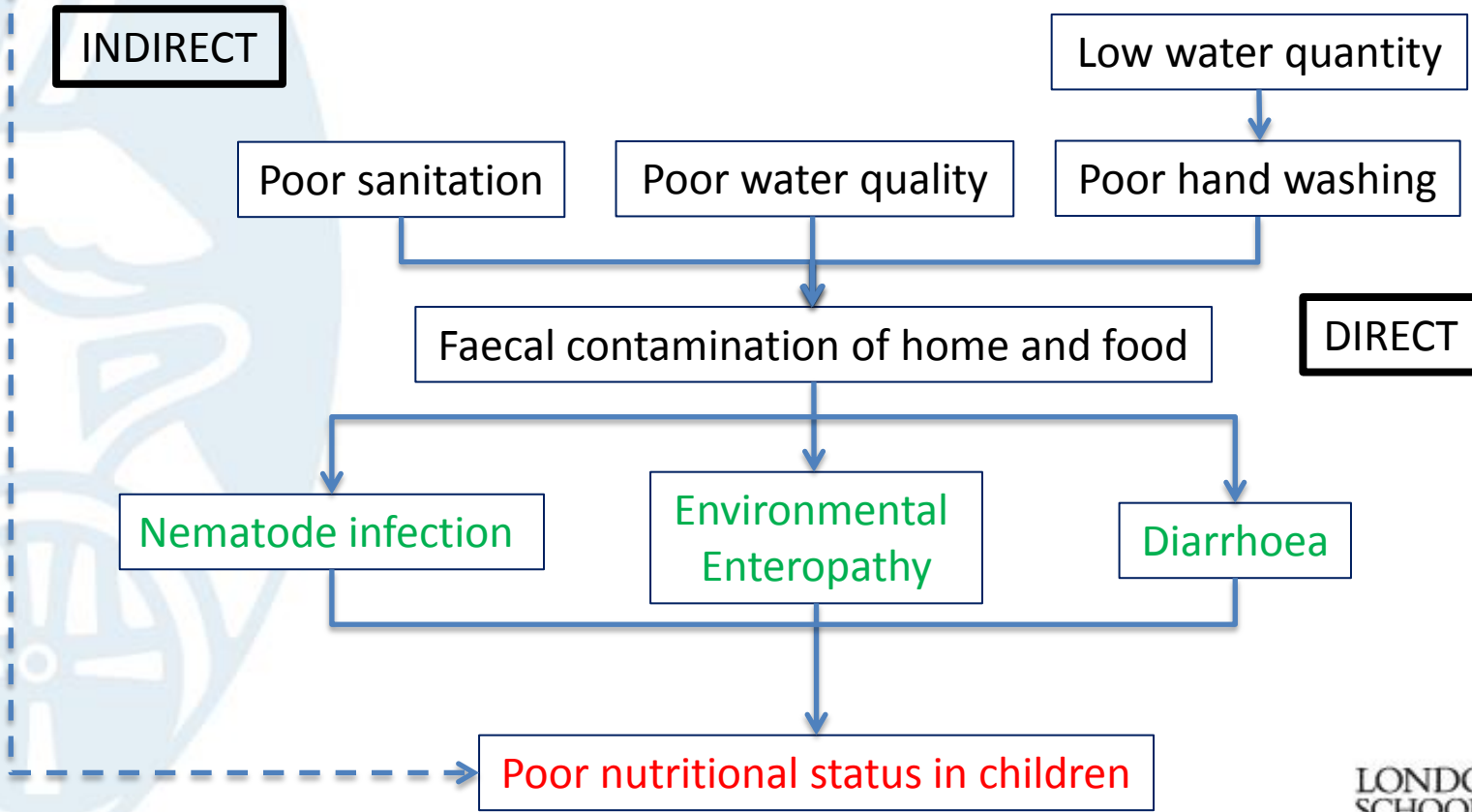
Nutrition sensitive programmes and approaches

- Agriculture and food security
- Social safety nets
- Early child development
- Maternal mental health
- Women's empowerment
- Child protection
- Classroom education
- Water and sanitation
- Health and family planning services

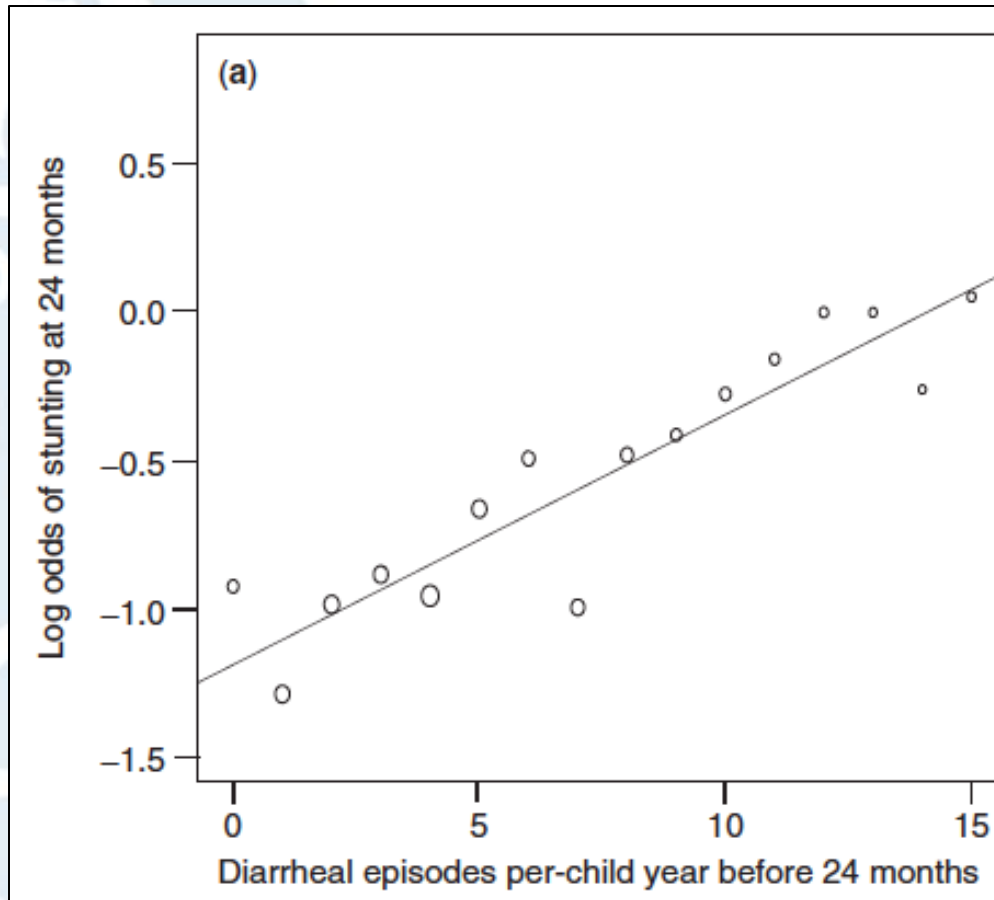


Links between WASH and nutrition

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



Diarrhoea



Diarrhoea is associated with poor nutritional status but causal link is hard to demonstrate

Recent analysis of 9 studies with daily diarrhoea morbidity data and longitudinal anthropometry (Checkley et al, 2008):

Odds of stunting at age 24 months increased by 1.13 (95% C.I. 1.07, 1.19) for every five episodes

Consistent with hypothesis that higher cumulative burden of diarrhoea increases risk of stunting



Nematode infections

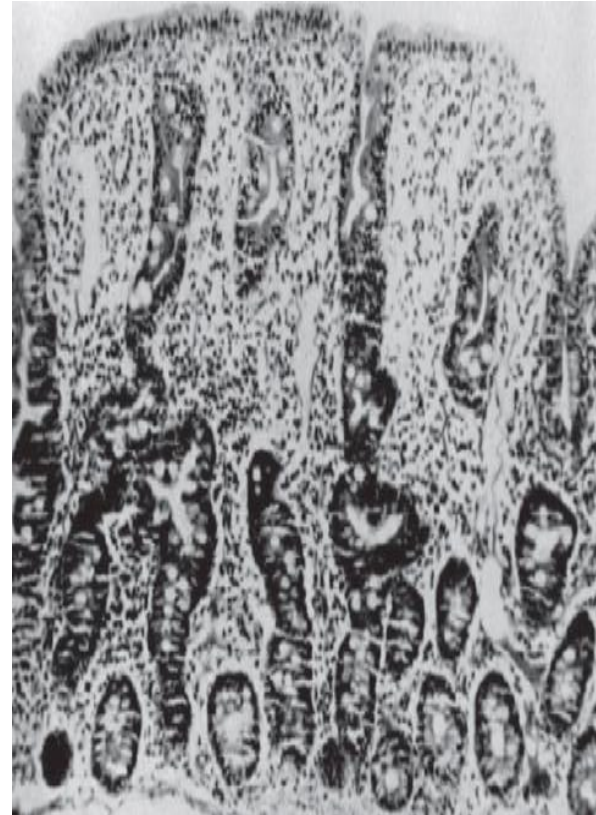
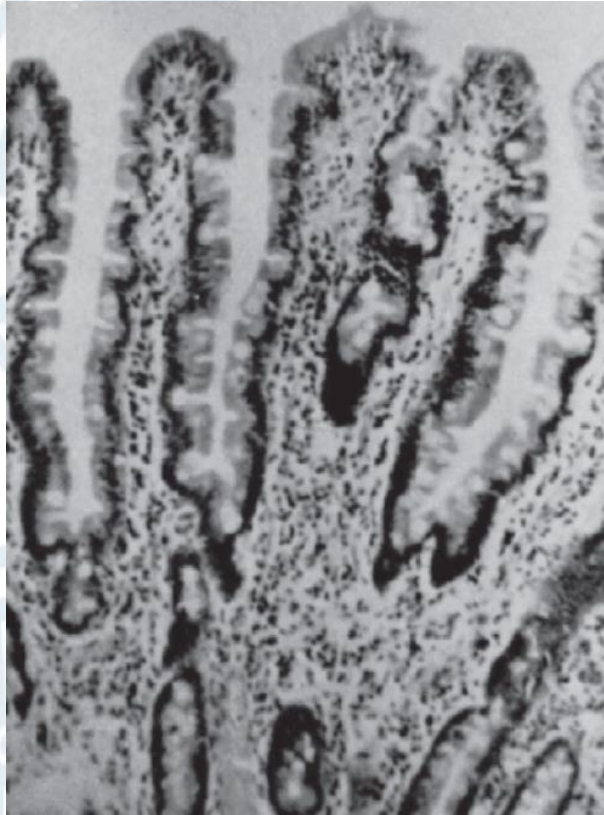
Parasitic worm infections associated with poor sanitation that limit growth and cognitive development:

- *Ascaris lumbricoides* (Roundworm)
Intestinal obstruction & Vit A malabsorption
- *Trichuris trichiura* (Whipworm)
Dysentery syndrome, colitis
- *N. americanus* & *A. duodenale* (Hookworm)
Intestinal blood loss, iron deficiency, PEM



SOURCE: Bethony et al, 2006

Environmental Enteropathy



Garcia, S. (1968) Malabsorption and malnutrition in Mexico. *Am. J. Clin. Nutr.* 21, 1066–1076

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1. Lots of ways in which faecally contaminated environments might influence nutritional status.

2. Nutrition-specific interventions alone will not address undernutrition

3. What evidence is there that WASH interventions are effective in improving childhood nutrition?



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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Review protocol

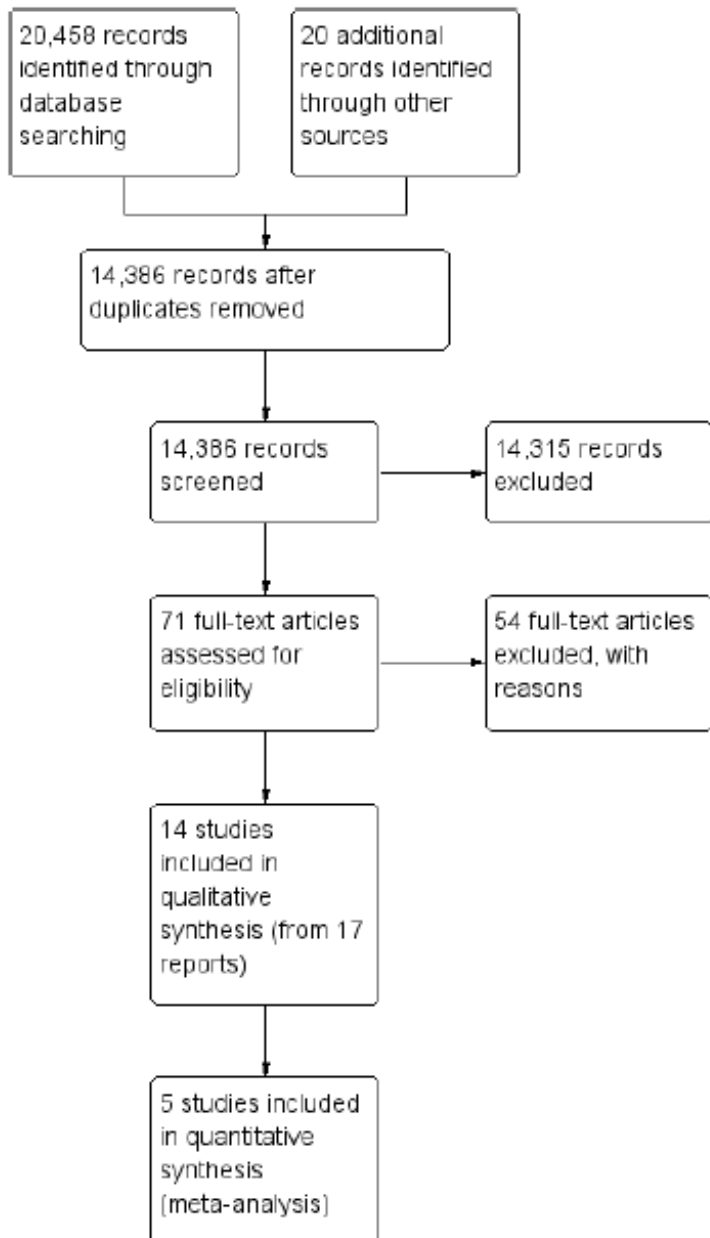
- All included studies to have controlled design
 - RCTs, CBA, ITS
- Participants: children < 5 years old
- Intervention types
 - Improving access to facilities which ensure the hygienic separation of human excreta from human contact
 - Promotion of hand washing with soap
 - Introducing a new/improved water supply and/or improved distribution
 - Improving the microbiological quality of drinking water



Outcomes, search strategy

- Primary outcomes (z-scores)
 - Weight-for-height (wasting)
 - Weight-for-age (underweight)
 - Height-for-age (stunting)
- Secondary outcomes
 - All other child anthropometric measures
 - Biochemical measures of micronutrient status
- 6 databases searched; keyword and MeSH terms
- 3 main Chinese databases searched





Search results



Included studies

- 12 studies from 10 countries (not India unfortunately)
- Wide range of WASH interventions (including sanitation)
- Duration: 6 mo to 5 years
- Large sample of <5 observations: n=8,500
- Range of study designs; generally poor quality (risk of bias)
 - Randomised controlled trials (3)
 - Follow-up of cluster randomised controlled trial (1)
 - Longitudinal study with control group (3)
 - Repeat cross-sectional with control group (3)
 - Controlled before-and-after study (1)
 - Cross-sectional with intervention and historic control group matched by propensity score matching (1)

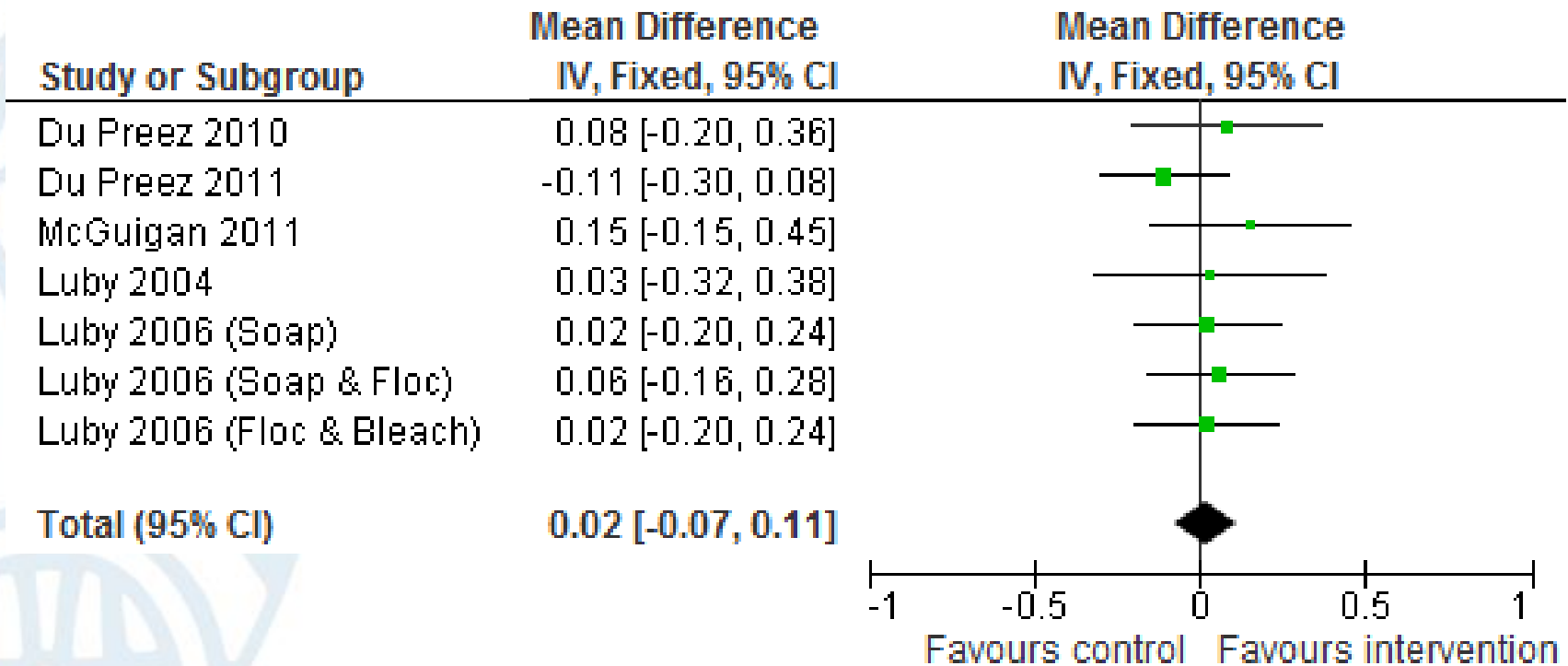


Meta-analysis

- 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

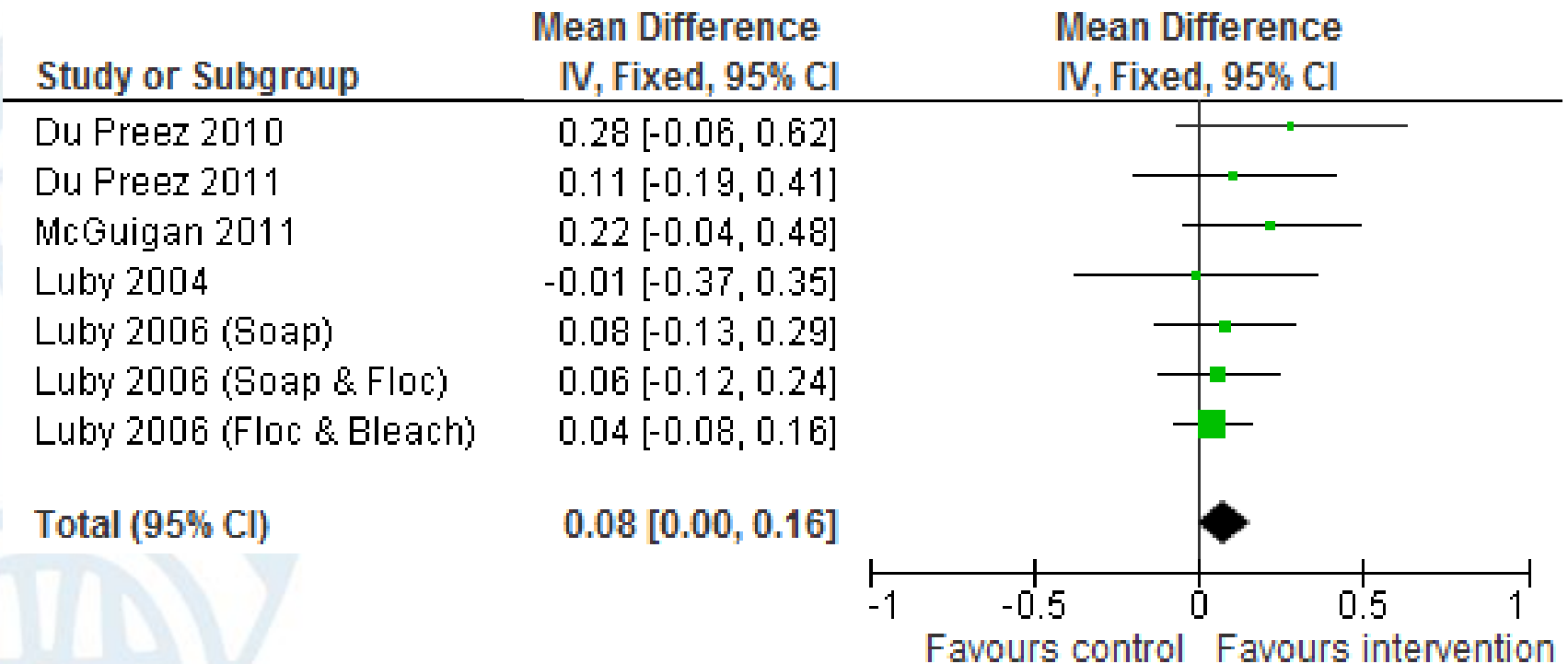


Analysis includes:

- 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

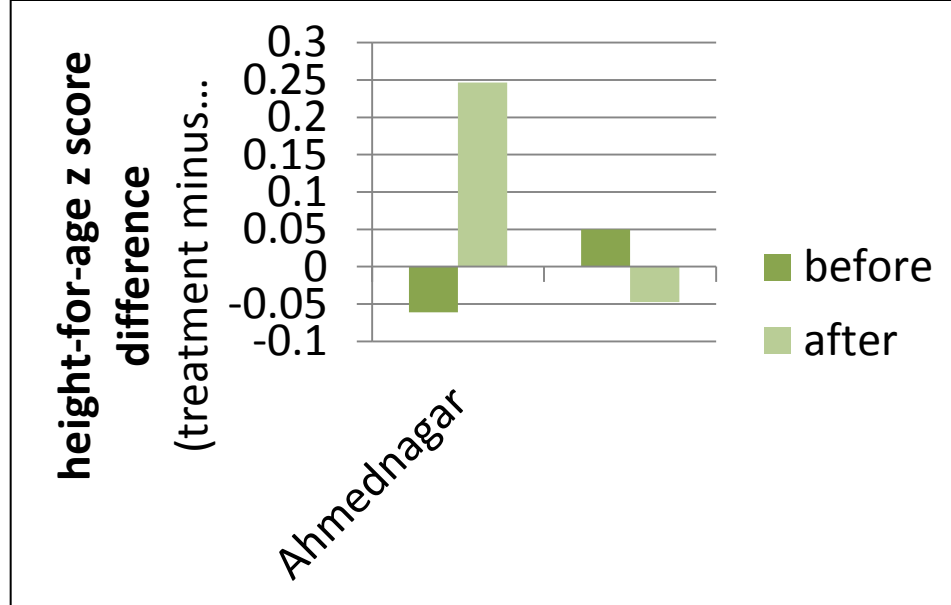


Individual Participant Data

- 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)



What about new studies, published after the Cochrane review?



Cochrane review (Dangour et al 2013) found no eligible sanitation studies; in line with earlier Cochrane review on diarrhoeal diseases (Clasen et al 2009).

However, four new studies have subsequently been published:

1. Alzua et al 2014 (UNICEF working paper report)

Effect on 0.16 MD HAZ (95% CI: 0.00-0.32;p: 0.049)

2. Spears & Hammer 2013 (World Bank Working Paper)

Large effect on stunting (0.3-.0.4 MD HAZ)

3. Cameron et al 2013 (World Bank Working Paper)

No effect overall but “improvements in height were found for the non-poor sample with no sanitation at *baseline*”

4. Sumeet et al 2014 (PLOS Medicine)

“The intervention did not improve child health measured in terms of multiple health outcomes (...growth)” But uptake was low.

*1-3 have not as yet been published in a peer reviewed journal

Interpretation

- First systematic review estimating effect of WASH on nutrition outcomes
- Identified reasonable number of studies including a good number of children
- Suggestive evidence that WASH interventions slightly improve linear growth in children
- No studies show mixed results for sanitation although many found weak uptake/intervention compliance
- Evidence from large trials in Bangladesh, India and Zimbabwe may provide more definitive answer

Thank you



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