WASH and nutrition

WASH Nutrition Form 2015, Bonn

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“WASH is about more than nutrition”

Health benefits:

Diarrhoeal disease

Helminth infections

Trachoma

Maternal and newborn health

Non-health benefits:

Time savings

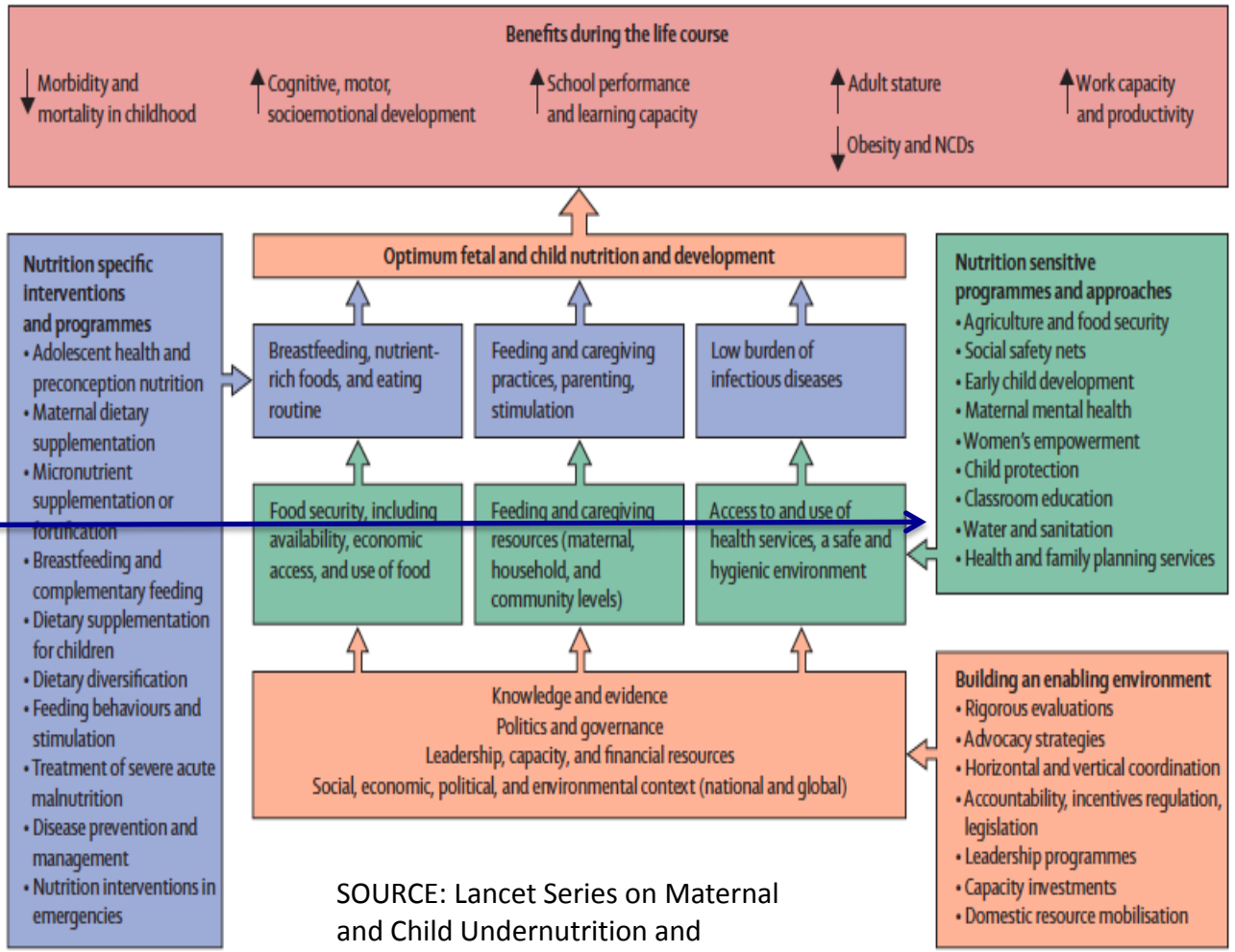
Convenience

Dignity

Safety

“Nutrition is about more than WASH”

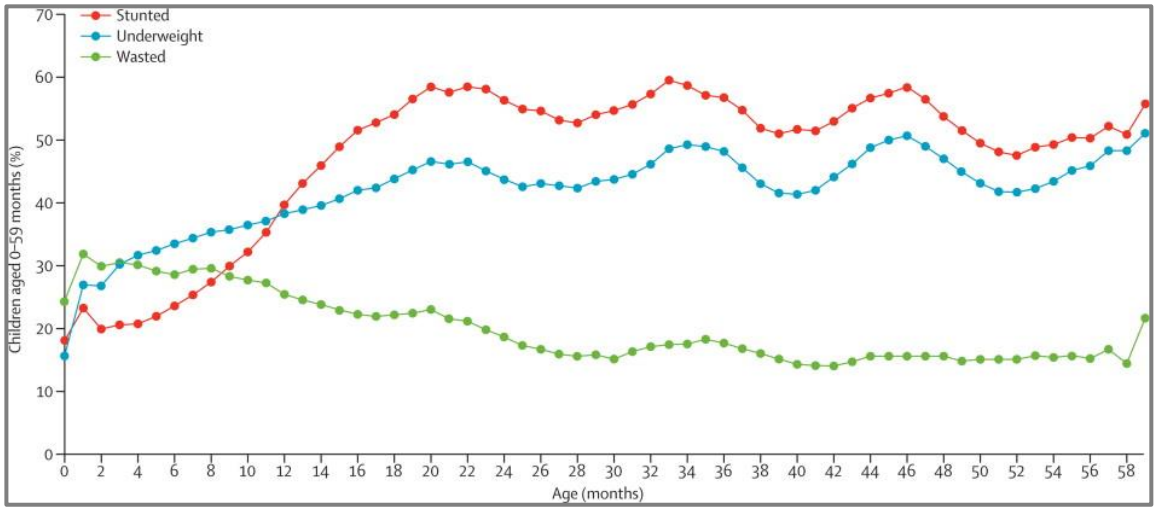
A potentially important part of the jigsaw



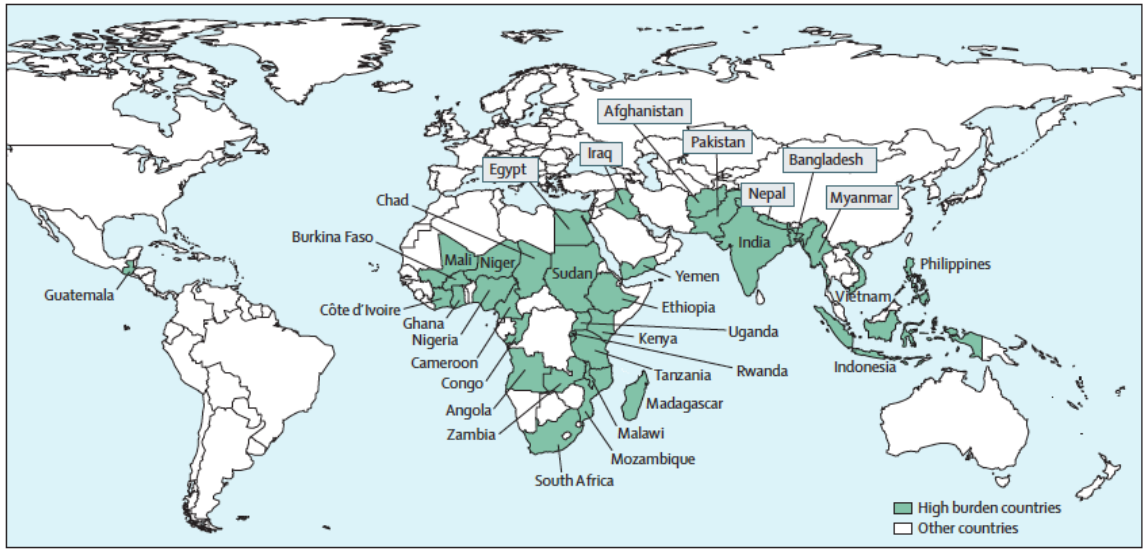
SOURCE: Lancet Series on Maternal and Child Undernutrition and Overweight (Black et al, 2013)

Why is nutrition so important?

SOURCE: Paul et al 2011



SOURCE: Bhutta et al 2013



Short-term

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

Long-term

- Educational achievement
- Work capacity
- Economic productivity

WASH and Food & Nutrition security

1. Food availability

2. Food access

3. Food stability or resilience

4. Food utilisation

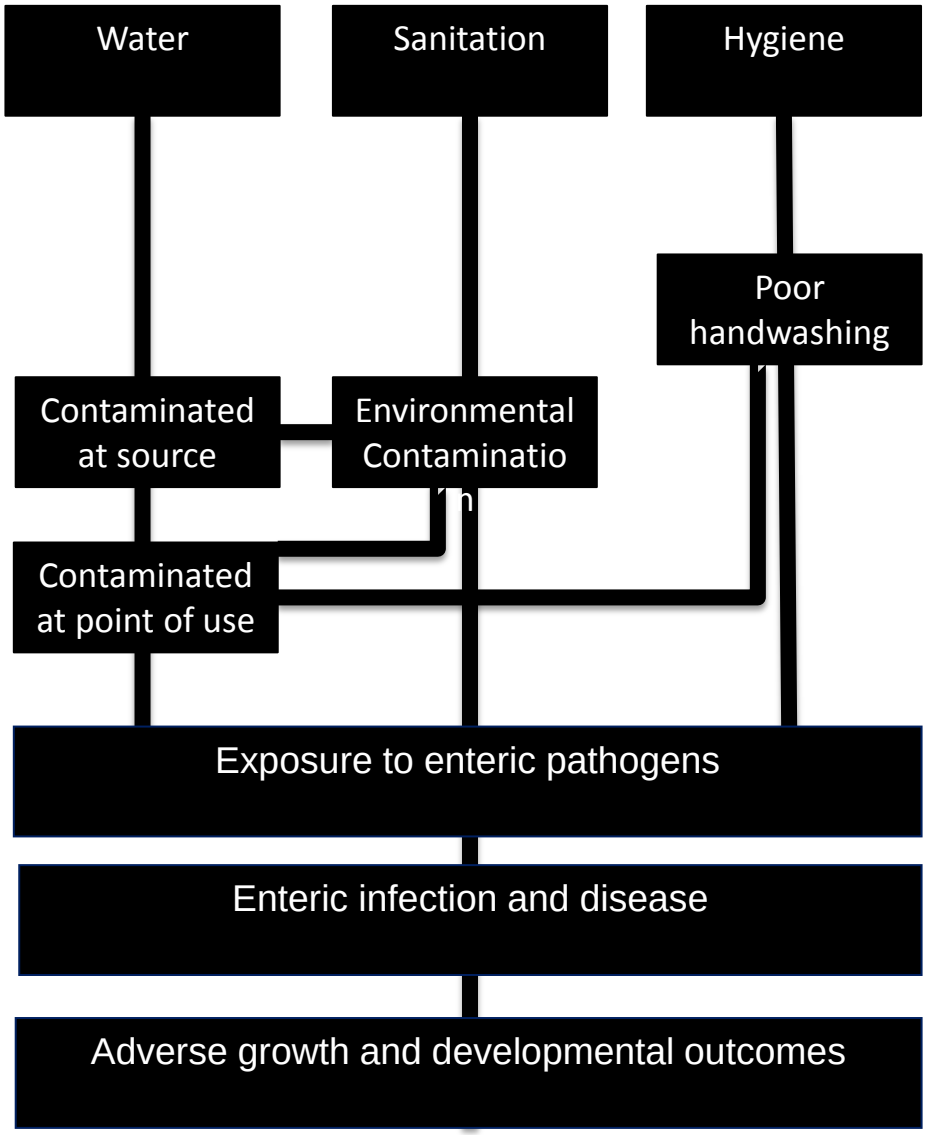
1. Water (and excreta) are a resource for agriculture

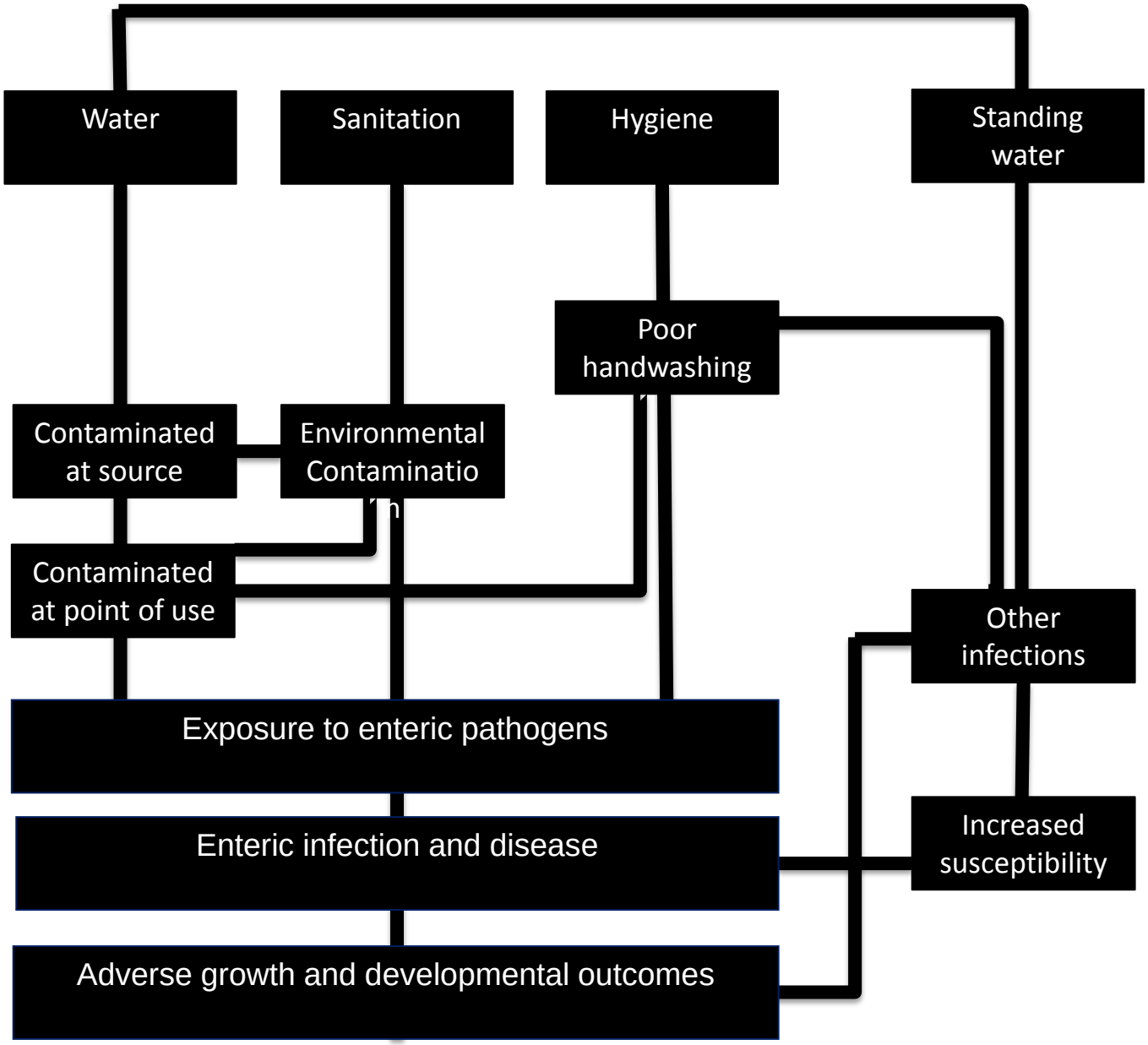
1. Cost of services may divert scarce household income from food

1. Economic shock presented by ill health or death of household members

1. Enteric infection affecting how food is absorbed and utilised

SOURCE: Cumming O, Watson L, Dangour AD (In Press)


Water
Sanitation
Hygiene
Poor handwashing
Contaminated at source
Environmental Contaminatio
Contaminated at point of use
Exposure to enteric pathogens
Enteric infection and disease
Adverse growth and developmental outcomes


Water
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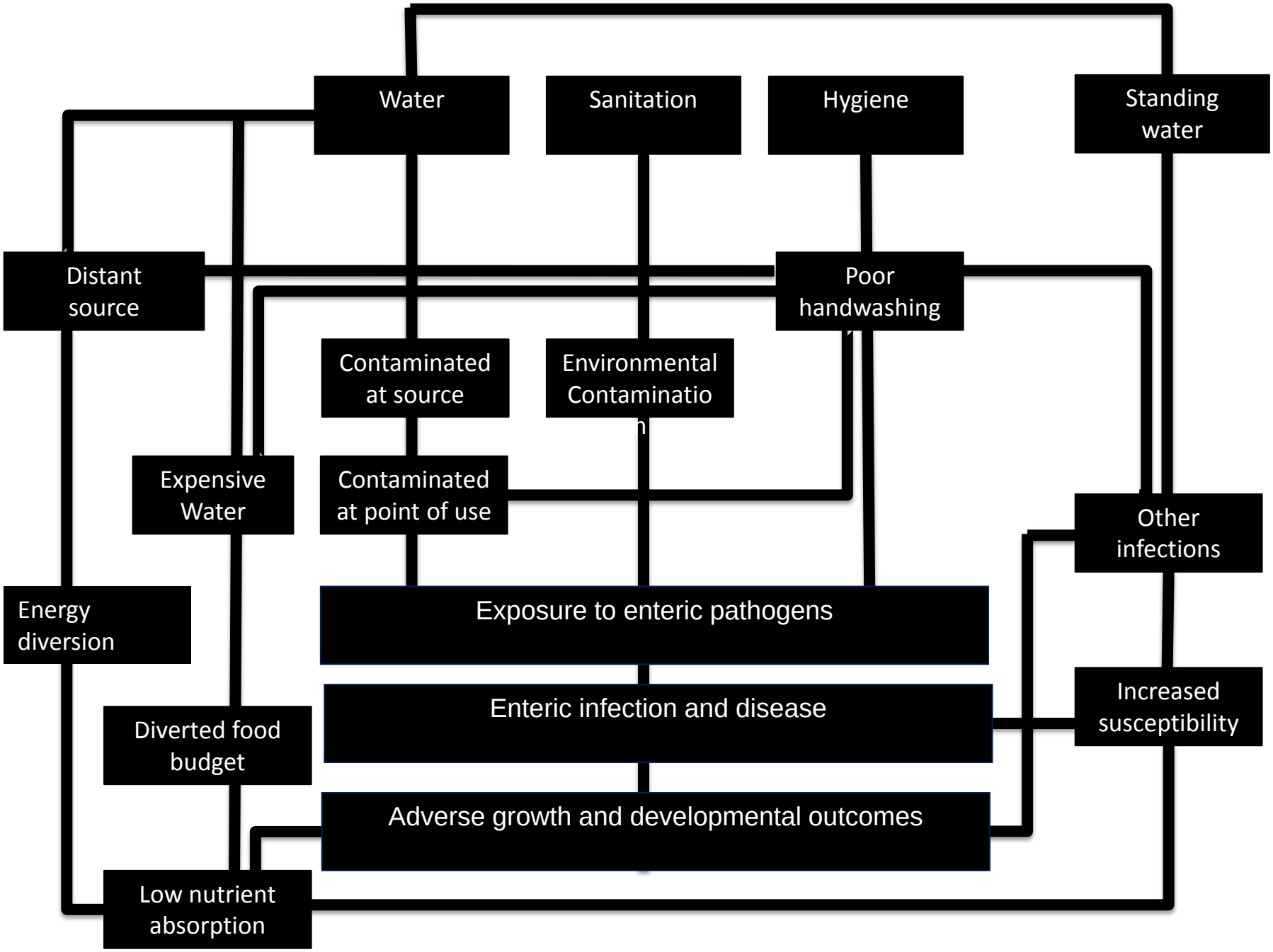
Hygiene
Standing water
Poor handwashing
Contaminated at source
Environmental Contaminatio
Contaminated at point of use
Other infections
Exposure to enteric pathogens
Enteric infection and disease
Increased susceptibility
Adverse growth and developmental outcomes


Water
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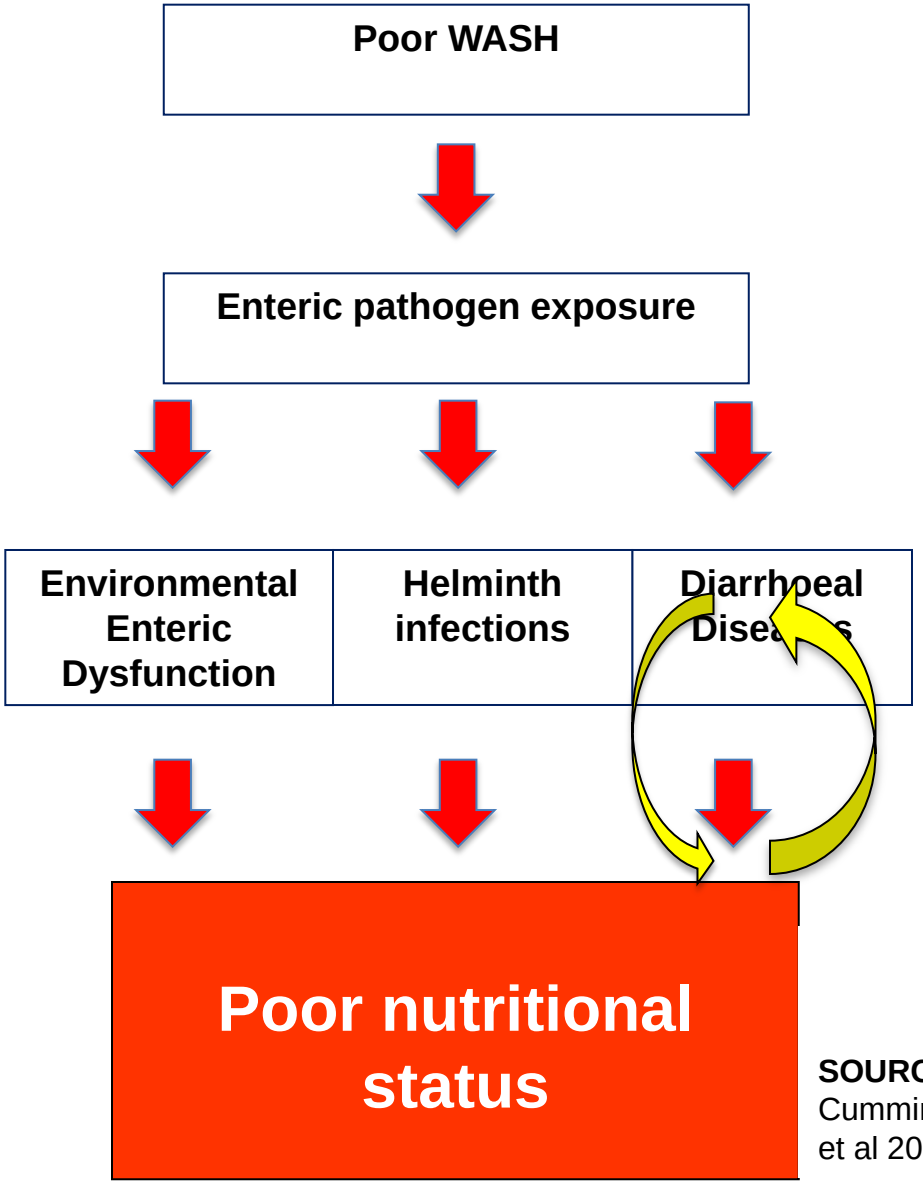
Hygiene
Standing water
Distant source
Poor handwashing
Contaminated at source
Environmental Contaminatio
Expensive Water
Contaminated at point of use
Other infections
Energy diversion
Exposure to enteric pathogens
Enteric infection and disease
Increased susceptibility
Diverted food budget
Adverse growth and developmental outcomes
Low nutrient absorption

Biological links

Repeated bouts of diarrhoea associated with stunting – "Proportion of stunting attributable to five or more episodes of diarrhoea before 2 years of age was 25% (C.I. 8–38%)"
(Walker et al 2013)

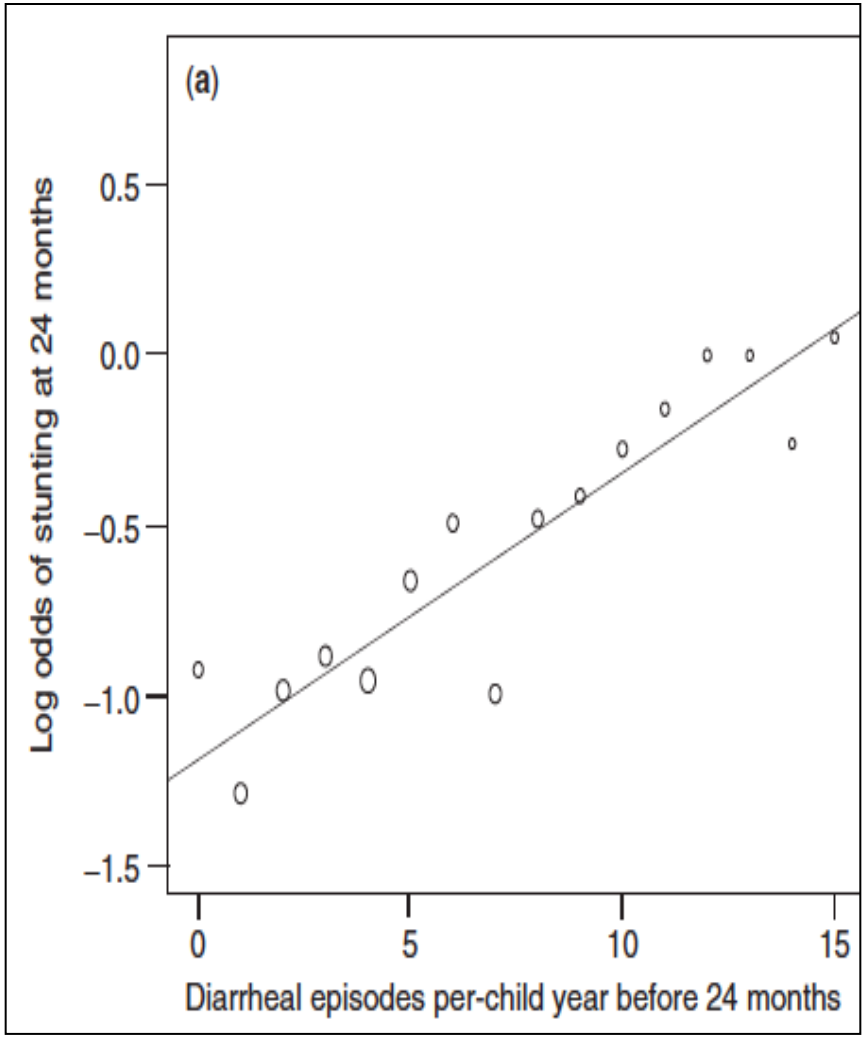
Parasitic worm infections associated with poor sanitation that limit growth and cognitive development
(Bethony et al 2006)

EED – an asymptomatic syndrome causing chronic inflammation, reduced nutrient absorption of the intestine, and a weakened barrier function of the small intestine, associated with poor WASH and undernutrition.
(Keusch et al 2015)



SOURCE: Cumming et al 2015

Diarrhoea and stunting



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

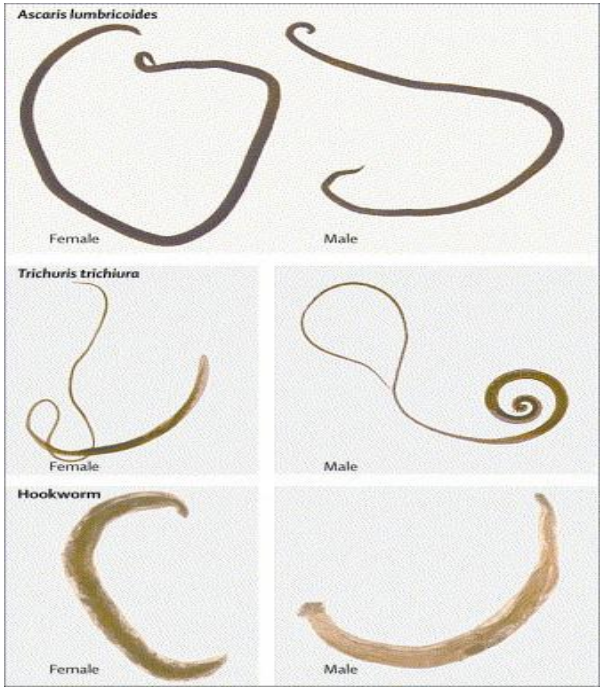
Nematode infections

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

•*Ascaris lumbricoides* (Roundworm)
Intestinal obstruction & Vit A malabsorption

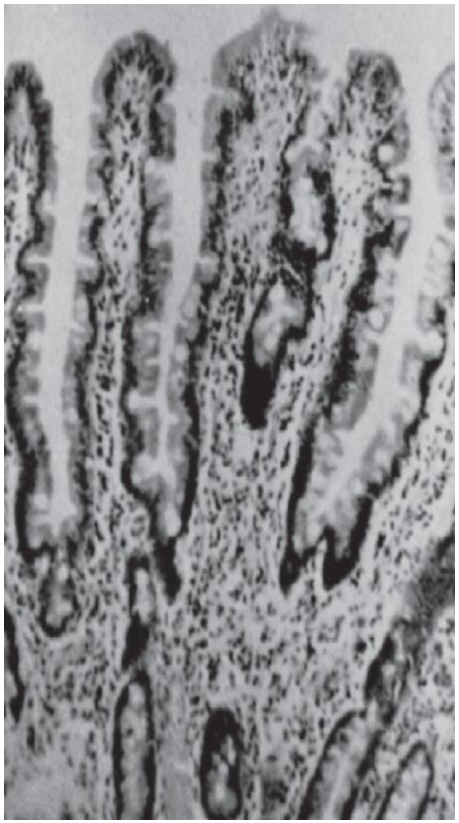
•*Trichuris trichiura* (Whipworm)
Dysentery syndrome, colitis, rectal prolapse

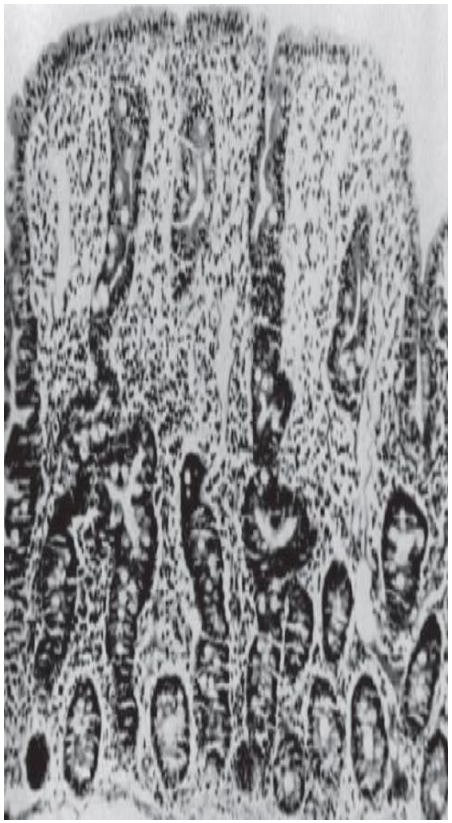
• *N. americanus* & *A. duodenale (Hookworms)*
Intestinal blood loss, iron deficiency, PEM



SOURCE: Bethony et al, 2006

Environmental Enteric Dysfunction





Asymptomatic condition:
(Keusch et al 2015)

- Chronic inflammation
- Chronic villus atrophy
- weakened barrier function

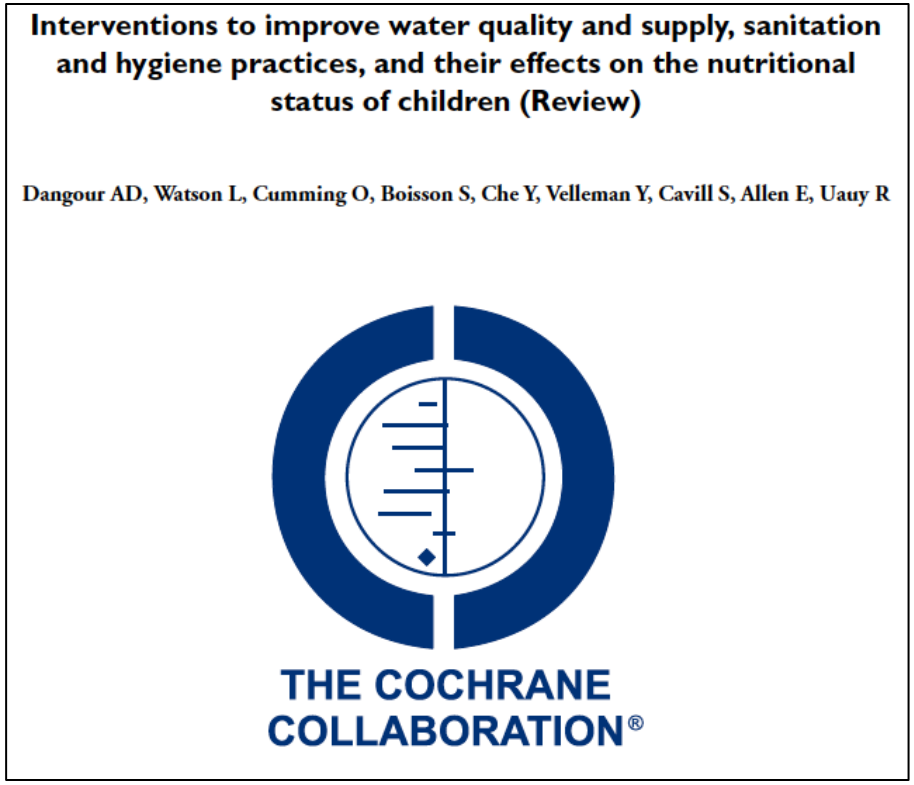
Associated with enteric pathogen exposure and poor WASH conditions
(Humphrey 2009; Lin et al 2013)

Resulting in:

- Growth faltering
- Adverse ECD
- Immunological deficiencies

SOURCES:
Images - Garcia, 1968;

What effect do WASH interventions have on undernutrition when rigorously evaluated?

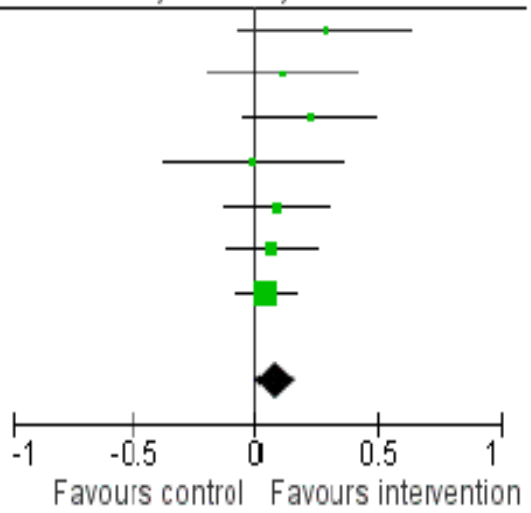


Effect of WASH interventions on height-for-age

Study or Subgroup	WASH Intervention Mean	SD	Total	Control Mean	SD	Total	Weight	Mean Difference IV, Random, 95% CI
Du Preez 2010	-1.12	1.74	171	-1.4	1.46	161	5.1%	0.28 [-0.06, 0.62]
Du Preez 2011	-0.74	1.65	275	-0.85	1.89	250	6.5%	0.11 [-0.19, 0.41]
McGuigan 2011	-1.56	1.86	418	-1.78	1.84	342	8.6%	0.22 [-0.04, 0.48]
Luby 2004	-2.67	2.58	603	-2.66	2.52	270	4.5%	-0.01 [-0.37, 0.35]
Luby 2006 (Soap)	-0.97	2.11	425	-1.05	0.41	109	13.1%	0.08 [-0.13, 0.29]
Luby 2006 (Soap & Floc)	-0.99	1.79	441	-1.05	0.41	108	17.8%	0.06 [-0.12, 0.24]
Luby 2006 (Floc & Bleach)	-1.01	1.29	838	-1.05	0.58	216	44.3%	0.04 [-0.08, 0.16]
Total (95% CI)			**3171**			**1456**	**100.0%**	**0.08 [0.00, 0.16]**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 3.14$, df = 6 (P = 0.79); $I^2 = 0\%$

Test for overall effect: Z = 1.99 (P = 0.05)



- Cochrane meta-analysis suggests that WASH improves HAZ by ~0.08 SD among children (u-5)
- IPD analysis found larger effect for <24months (0.25 HAZ)
- Approximately equivalent to 0.5 cm at 24 months; relative reduction in stunting prevalence of 15%
- "Suggestive evidence of a small benefit"

<u>But:</u>

- All studies medium to high risk of bias
- Mostly PoU water treatment (1* HWWS)
- No sanitation or water supply interventions

SOURCE: Dangour et al 2013

New studies (post-2013)

5 new RCTs for the effect of sanitation on undernutrition

Mixed results: 3 studies* found no effect on childhood stunting; 2 studies** found large effects

Studies with no effect had very low uptake and compliance

Persistent challenges around uptake

Not clear whether traditional WASH interventions are sufficient to optimise nutrition impacts

* Cameron et al 2013, Patil et al 2014, Clasen et al 2014
** Hammer & Spears 2013; Pickering et al 2015

Implications

What do we need to do?

Where do we need to focus efforts?

Who do we need to target?

When do we need to target them?

Window of opportunity

Process of stunting and burden of diarrhoeal disease is concentrated in the first two years of life (first 1000 days)

Infant WASH*: design and deliver WASH interventions to prevent exposure among young children:

- Safe disposal of child faeces
- Infant food hygiene
- Management of animal waste
- Hygienic play areas

Target WASH services at high burden populations

Listen and learn from the nutrition sector

*References: Ngure et al 2014; Humphrey 2015

Conclusions

Sufficient evidence to act (but learn)

WASH plausibly affects growth in multiple ways although magnitude of effect is less clear

Persistent challenges in delivering successful WASH interventions

Efforts needed in both sectors to forge effective policy and practice response

Lessons from Germany

Dr Reincke (1897) reported that the declines in overall and infant mortality which followed improvements in water supply in Hamburg, Germany, were greater than the burden attributable to enteric infections

Mr Mills (1897) reported the same findings following improvements in water supply in Lawrence, Massachusetts. USA

An answer to the Mills-Reincke Phenomenon?

SOURCE: Sedgwick & Nutt 1910

Thank you

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