WASH and nutrition

WASH Nutrition Form 2015, Bonn

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“WASH is about more than nutrition”

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“Nutrition is about more than WASH”

A potentially important part of the jigsaw

Why is nutrition so important?

Short-term
• ↑ risk of mortality
• ↑ susceptibility to infections/morbidity

Long-term
• Educational achievement
• Work capacity
• Economic productivity

SOURCE: Paul et al 2011

SOURCE: Bhutta et al 2013
WASH and Food & Nutrition security

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

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

3. Food stability or resilience
   1. Economic shock presented by ill health or death of household members

4. Food utilisation
   1. Enteric infection affecting how food is absorbed and utilised

Contaminated at source

Contaminated at point of use

Environmental Contamination

Exposure to enteric pathogens

Enteric infection and disease

Adverse growth and developmental outcomes

Water

Sanitation

Hygiene

Poor handwashing
Water leading to Sanitation and Hygiene, with Environmental Contamination at point of use.

Contaminated at source and other infections leading to Increased susceptibility.

Hygiene and Poor handwashing leading to Exposure to enteric pathogens.

Exposure to enteric pathogens leading to Enteric infection and disease.

Enteric infection and disease leading to Adverse growth and developmental outcomes.
Sanitation

Contaminated

at source

Environmental

Contamination

Contaminated

at point of use

Hygiene

Poor

handwashing

Standing water

Distant

source

Expensive

Water

Energy

diversion

Diverted food

budget

Low nutrient

absorption

Water

Distant

source

Expensive

Water

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Diverted food

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Low nutrient

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Standing water

Poor handwashing

Enteric infection and disease

Adverse growth and developmental outcomes

Exposure to enteric pathogens

Other infections

Increased susceptibility
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)
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**

**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”**

**But:**

- 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

** 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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