Baby WASH: Sanitation and Hygiene Interventions to Prevent Environmental Enteropathy, Stunting, and Anemia in Infants
Observations About Linear Growth

1. About 25% of the stunting seen at 2 years is already apparent at birth
2. Adequate infant diet is necessary, but not sufficient
3. Illness contributes, but reductions in child morbidity and mortality have not led to reductions in stunting
Environmental Enteropathy and Stunting Hypothesis

- EE is a major cause of post-natal stunting, anemia and impaired immune competence
- EE can be prevented or reduced by preventing infants and young children from ingesting human and animal feces.
SHINE Study, Zimbabwe

- **SHINE Objective:** To measure the independent and combined effects of WASH and infant nutrition on stunting and anemia among children from birth to 18 mo.

- **WASH intervention objective:** To ensure that infants do not ingest any environmental microbes from birth through 18 months.
Iterative Intervention Design Research (IIDR) Spiral

Critical Reflection

Conceptual Shifts

Received Knowledge

Domain of Efficacious Interventions

Consecutive Iterations

Overall vision of the process

Adapted from Zeisel (2006)
First Iteration:
Conventional WASH Interventions

• Behavior trials (21 rural households)
  – Interventions: latrine use, hand washing with soap/ash, safe drinking water, food safety
  – Studied current practices, barriers and motivators, socio-normative factors, implementation feasibility

• Critical Reflection:
  – What about the <18 mo child?
  – Do the fecal-oral transmission pathways differ?
Second Iteration: Baby Observation Study (Ngure, 2013)

- 6-hour observation of 20 babies,
  - What went in the mouth?
    - How often
    - If visibly dirty

- Return visit
  - Collected samples of most frequently and dirtiest things mouthed

- Microbiological analysis of key potential vectors
<table>
<thead>
<tr>
<th></th>
<th>% HH with E coli + sample</th>
<th>E coil/Per gram</th>
<th>Average E Coli Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Food</td>
<td>0%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Drinking Water</td>
<td>54%</td>
<td>2</td>
<td>800</td>
</tr>
<tr>
<td>Soil in laundry area</td>
<td>60-80%</td>
<td>70</td>
<td>1,400</td>
</tr>
<tr>
<td>Chicken feces</td>
<td>100%</td>
<td>10,000,000</td>
<td>10,000,000</td>
</tr>
</tbody>
</table>

Clearly, kids must stop eating dirt and chicken poop!
Babies are fed on
*Ground in the yard
  (60-80% E coli+)
*Kitchen floor
  (81% E coli+)
Routes of fecal disease transmission and protective barriers *for babies!*

- **Sanitation**
- **Clean water supply**
- **Hygiene**
  - Protective Play Space

**Feces**
- Fluids
- Fingers
- Flies
- Fields/floors
- Laundry Water

- Geophagia, dirty hands
- Nappy Handling

*Image of a child playing with a stick.*
A new paradigm of WASH in the first 1000 days

1. Dispose all feces in latrine; including children’s feces
2. Wash hands with soap after fecal contact and before preparing, eating or feeding food. Also wash baby’s hands
3. Put baby in clean protected area where he cannot access dirt/ feces when playing or eating
4. Treat drinking water with Water Guard and give treated water to children over 6 mo
5. Feed baby freshly prepared or reheated food
Programmatic approaches for nutrition, stimulation and social protection are well developed.

UNICEF 2006 *Programming Experiences in Early Childhood Development*

*Lancet 2011 Child Development Series*

Hygiene for babies (Baby WASH) needs to be further developed and tested

*Environmental Protection?*
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