

Gut health/EED and impact on children's health: The Zimbabwean Experience

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Global Alliance for
Improved Nutrition (GAIN)

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**Nuclear Techniques
in Human Health**

Prevention, Diagnosis, Treatment

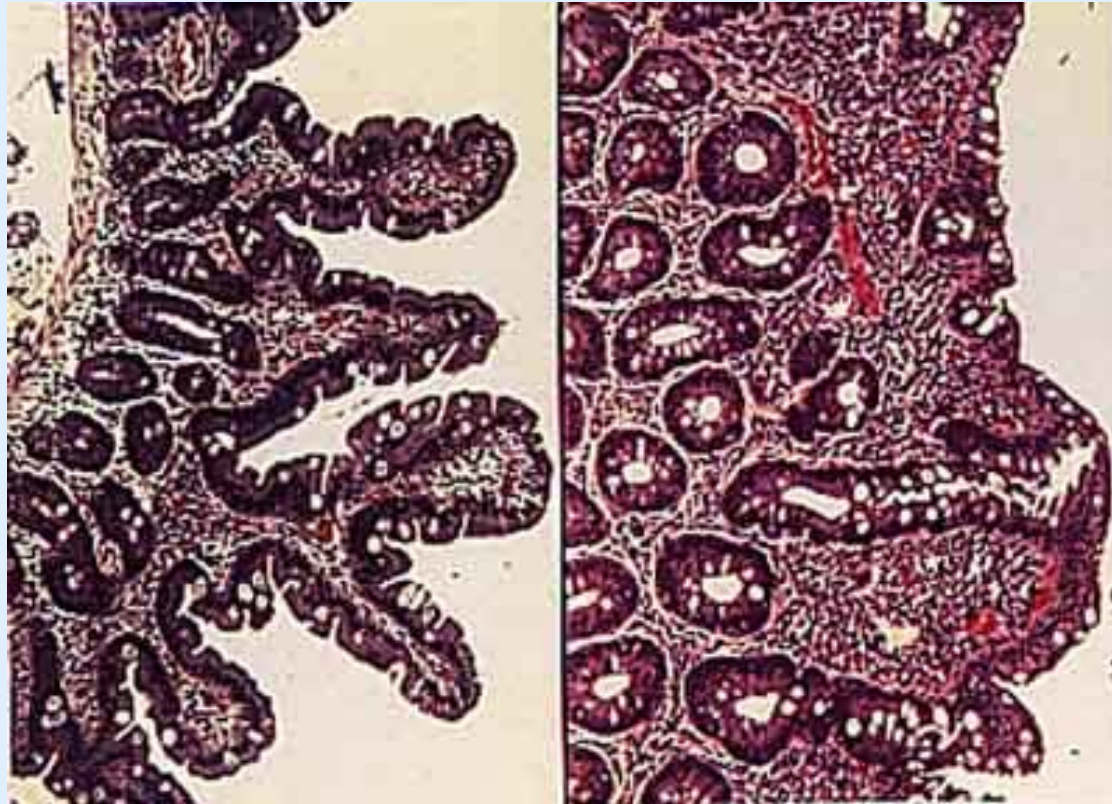
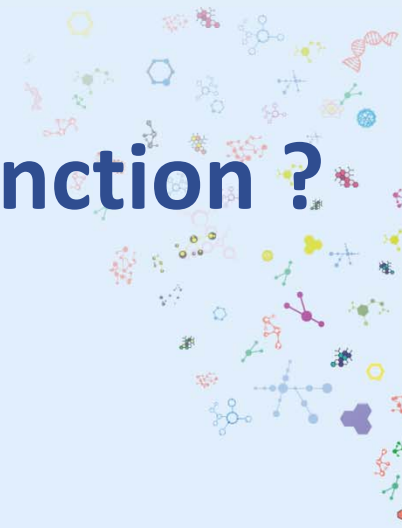


Observations About Linear Growth



1. About 25% of the stunting seen at 2 years is already apparent at birth
2. Adequate infant diet is necessary, but not sufficient
 - Largest effect size ~ 0.7 Z score improvement (1/3 of linear growth deficit of -2.0 LAZ) [*Dewey & Adu-Afarwuah, 2008*]
3. Illness contributes, but reductions in child morbidity and mortality have not led to reductions in stunting
 - At 2 years a child who had had average diarrhea was 0.38 cm shorter compared to a child who had had no diarrhea [*Richard SA, Am J Epi, 2013*]
 - 0.38 cm at 2 years = 0.13 LAZ score which is 7% of the average deficit of -2.0 LAZ)

What is Environmental Enteric Dysfunction ?

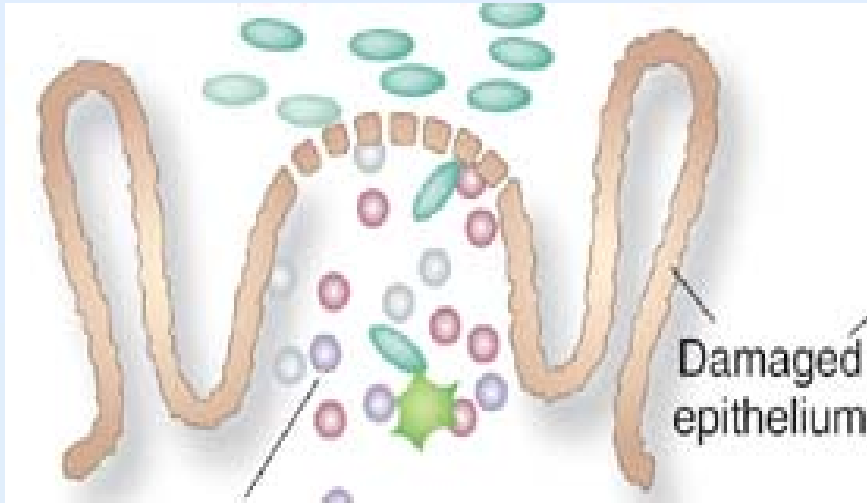


Normal

Environmental
Enteric
Dysfunction

1. Subclinical
2. Flat
(shortened villi)
less nutrient
absorption
3. Permeable

Microbial translocation



The lining of the gut is only one cell thick

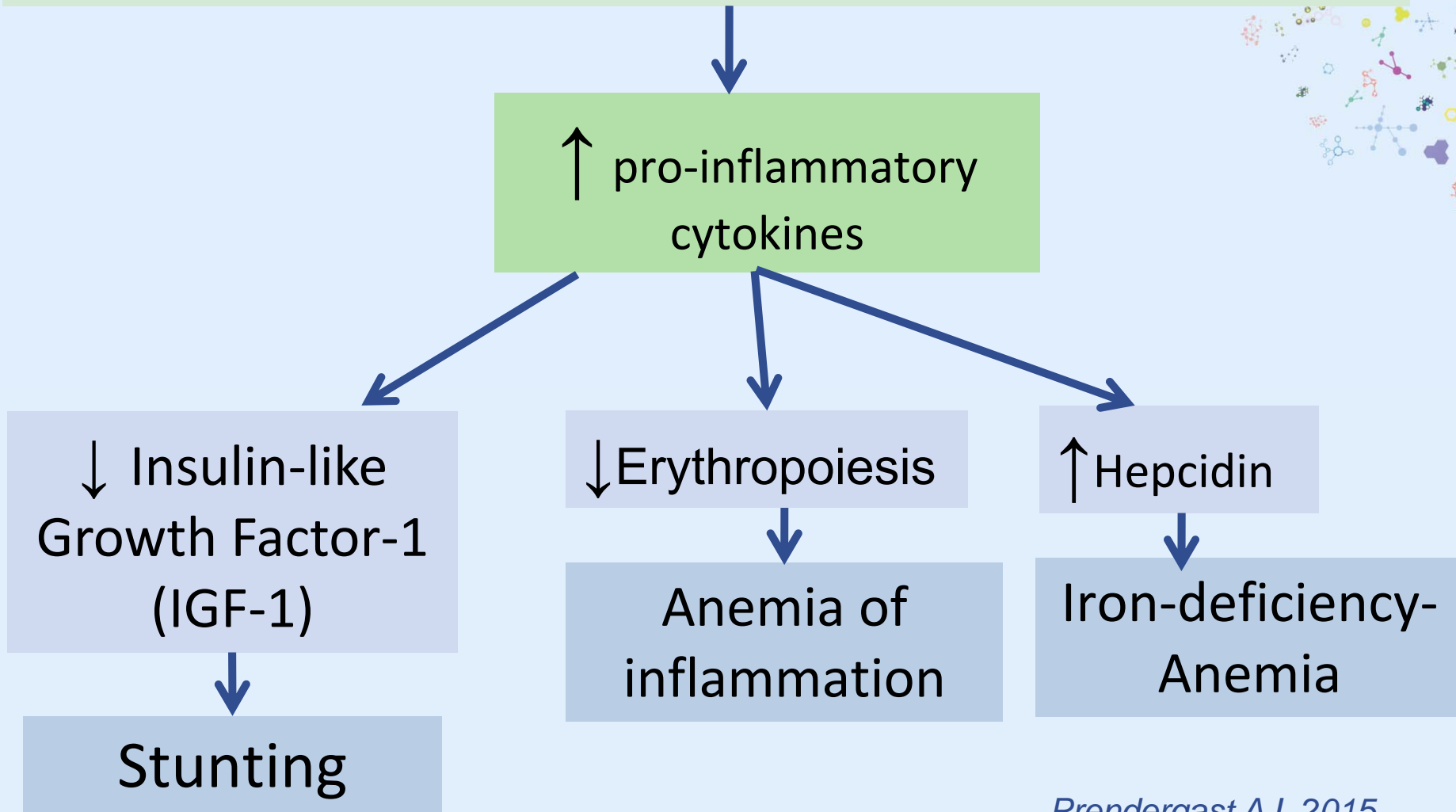
If the gut is injured and becomes permeable, gaps open up between cells

**Microbial products
cross into blood stream**



**Chronic immune
activation**

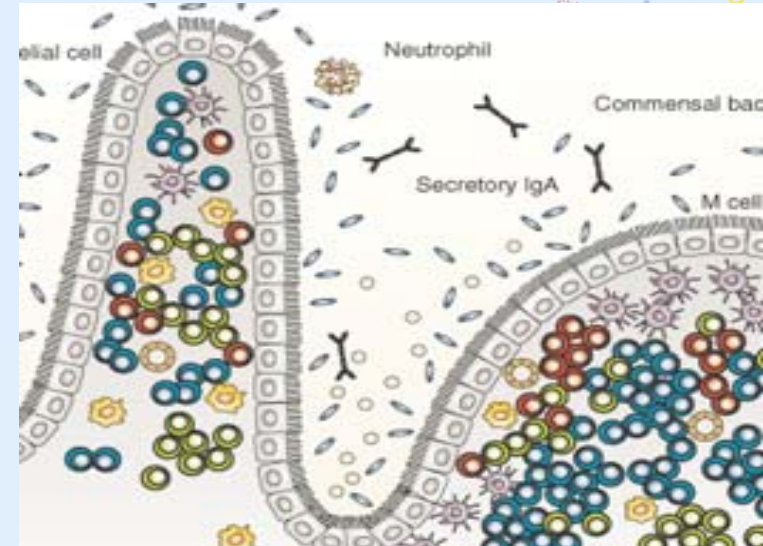
Chronic immune activation



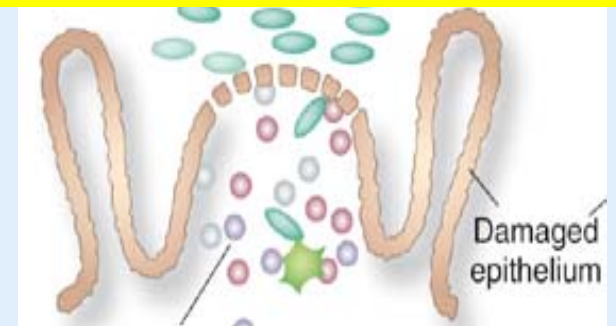
*Prendergast AJ, 2015
Mbuya & Humphrey, 2015*

EED and Stunting Hypothesis

- EED is a major cause of post-natal stunting, anemia and impaired immune competence
- EED can be prevented or reduced by preventing infants and young children from ingesting environmental microbes.



Microbial translocation



Chronic immune activation

Sanitation/Hygiene & Infant Nutrition Efficacy (SHINE) Study in Zimbabwe

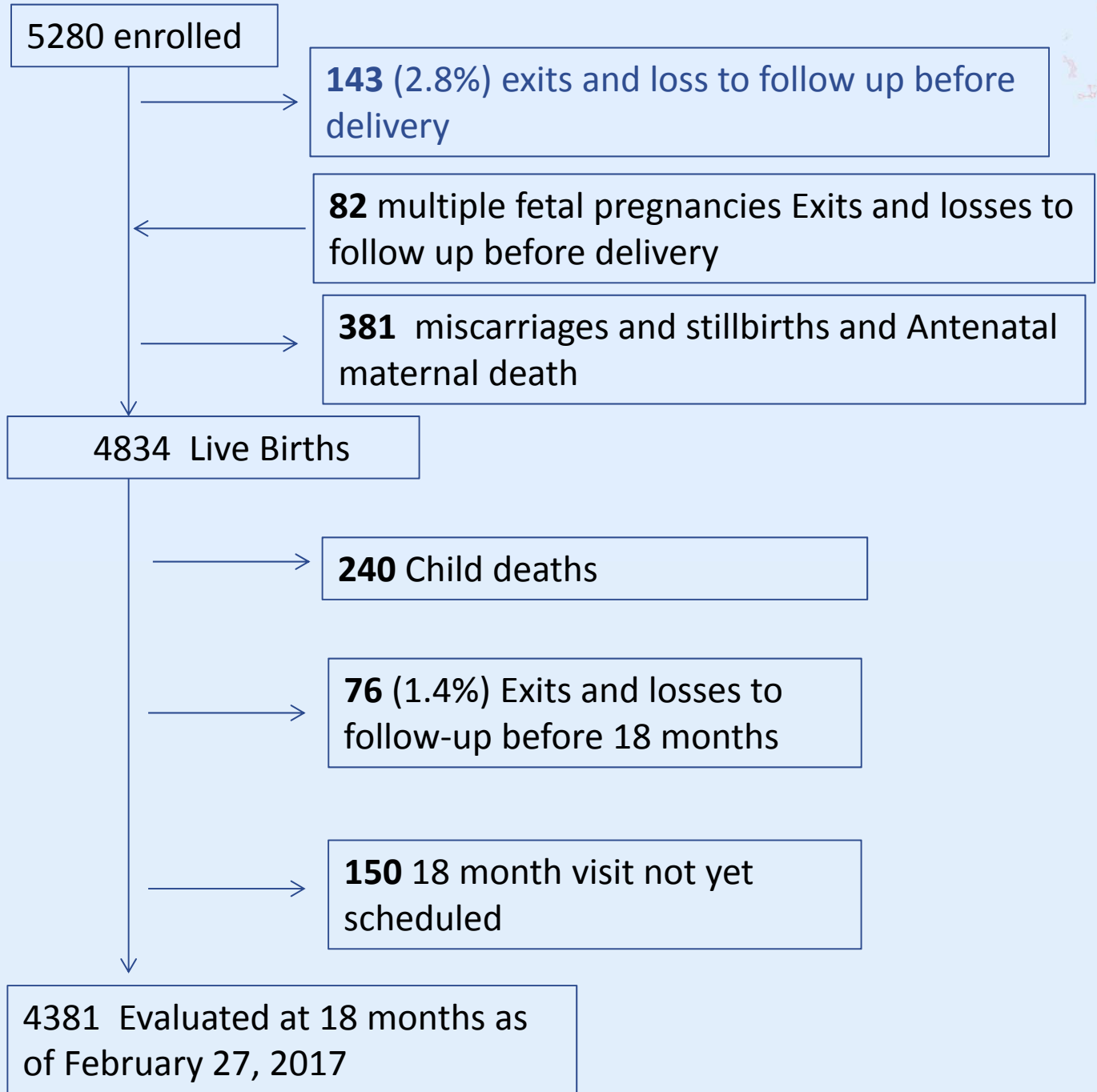




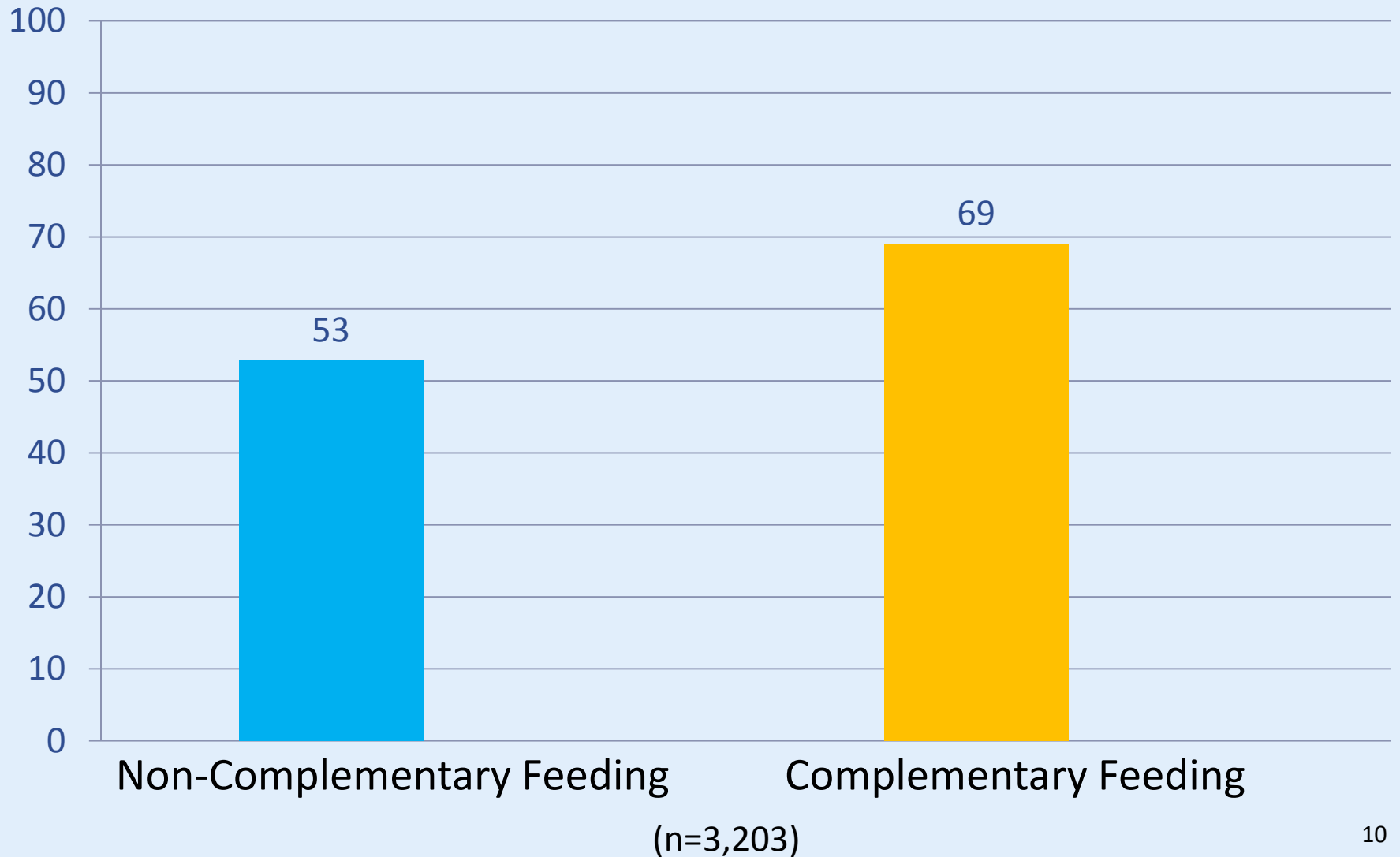
SHINE Study, Zimbabwe

- SHINE Objective: To measure the independent and combined effects of WASH and infant feeding 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**

Standard of Care	WASH: Integrated Water, Hygiene & Sanitation
Complementary Feeding: Education + Nutributter	WASH + Infant Feeding



Minimum dietary diversity at 12 months



Child ever seen eating soil



What next?



1. Data collection completed June 2017
2. Code breaking in September 2017
3. First presentation of primary findings planned for November/December 2017
 - Independent and combined benefits of integrated WASH and child feeding
 - Mediating role of gut health (EED)
4. Remaining questions
 - Measurement, case definition of EED
 - Specific causes (etiology) of EED
 - How clean is clean enough? (to improve gut health and improve health outcomes)



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UKaid
from the Department for
International Development

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GATES *foundation*

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