

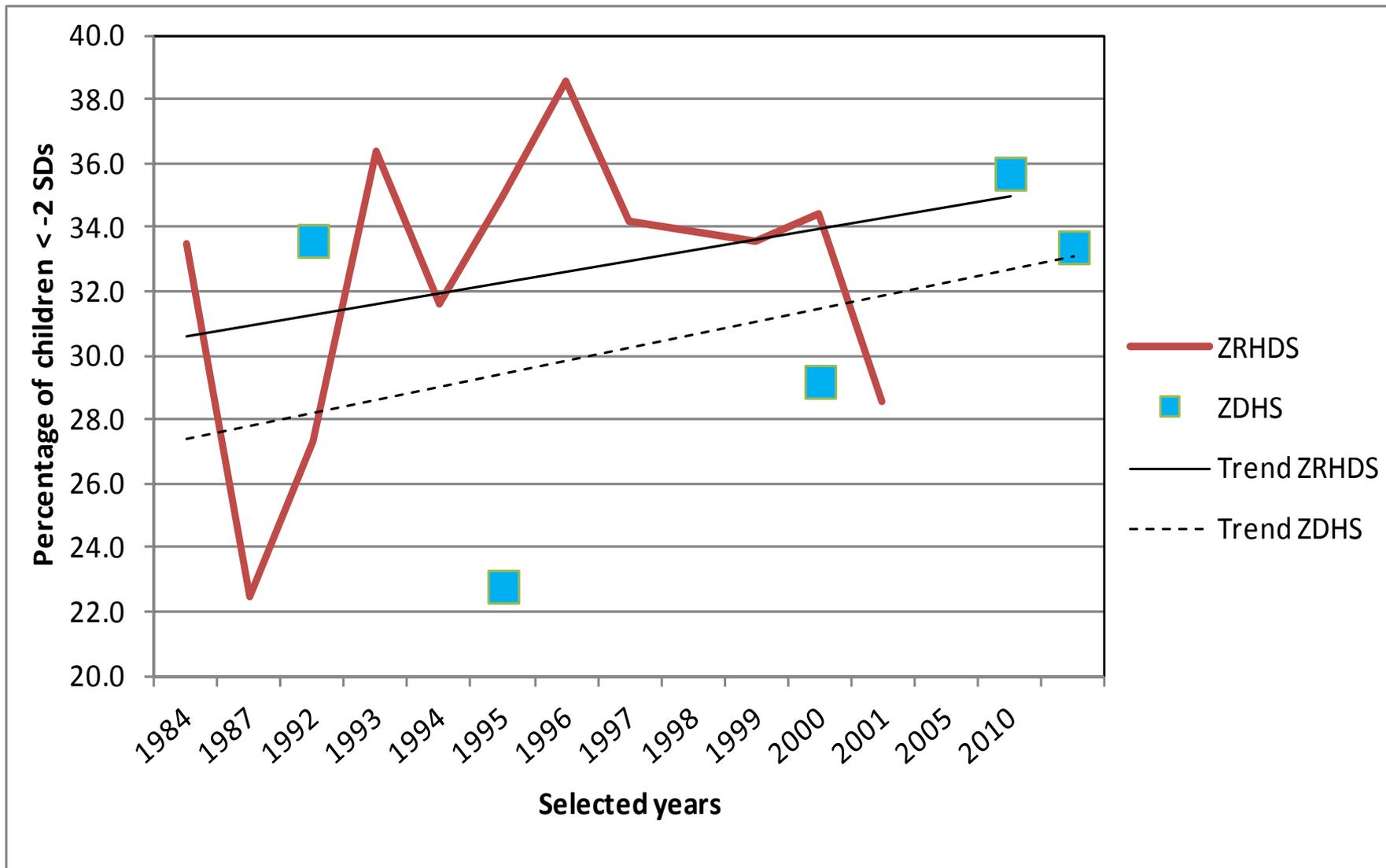
The Excluded Generations: Questioning a Leading Poverty Indicator

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Background

- Study to assess the welfare effects of transferring land to the land-poor
- Long-term (30 year) panel of land reform beneficiaries & non-beneficiaries (400-600 HHs/yr)
- Three agroecological zones
- Broad mix of conventional & non-money metric indicators—esp. health & nutrition variables

The Evolution of Nutritional Outcomes: HAZ for 1984-2011 (ZRHDS & ZDHS)



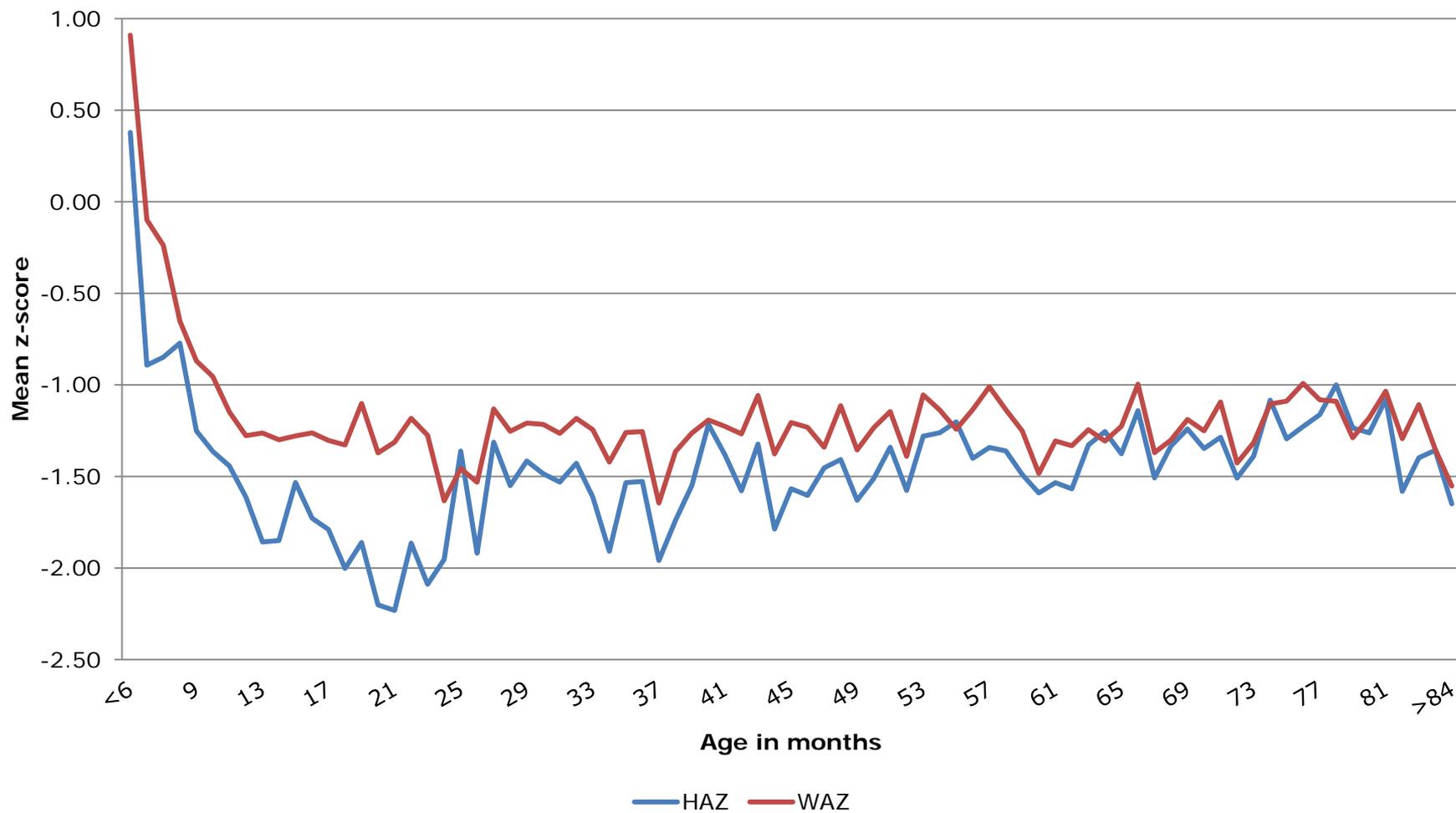
Nutritional categorization of households, 1997-2001

	Children's z-scores		
	Symptomatic	Asymptomatic	Totals
Adults' BMIs	<i>(per cent)</i>		
Symptomatic	16.1	4.9	21.0
Asymptomatic	46.6	32.5	79.0
Totals	62.6	37.4	100.0

But, do nutritional assessments work as consistent poverty indicators?

- No...but why not?
- If undernutrition is the norm, then welfare indicators lack discriminatory power
- Large numbers of counterintuitive outcomes (income, food purchases, etc)
- Use of dummy variables & threshold points masks the depth of deprivation
- A household approach does not work because cause & effect variables operate in opposite directions for children & adults

Timing of Growth Faltering among Rural Zimbabwean Children



The culprit?

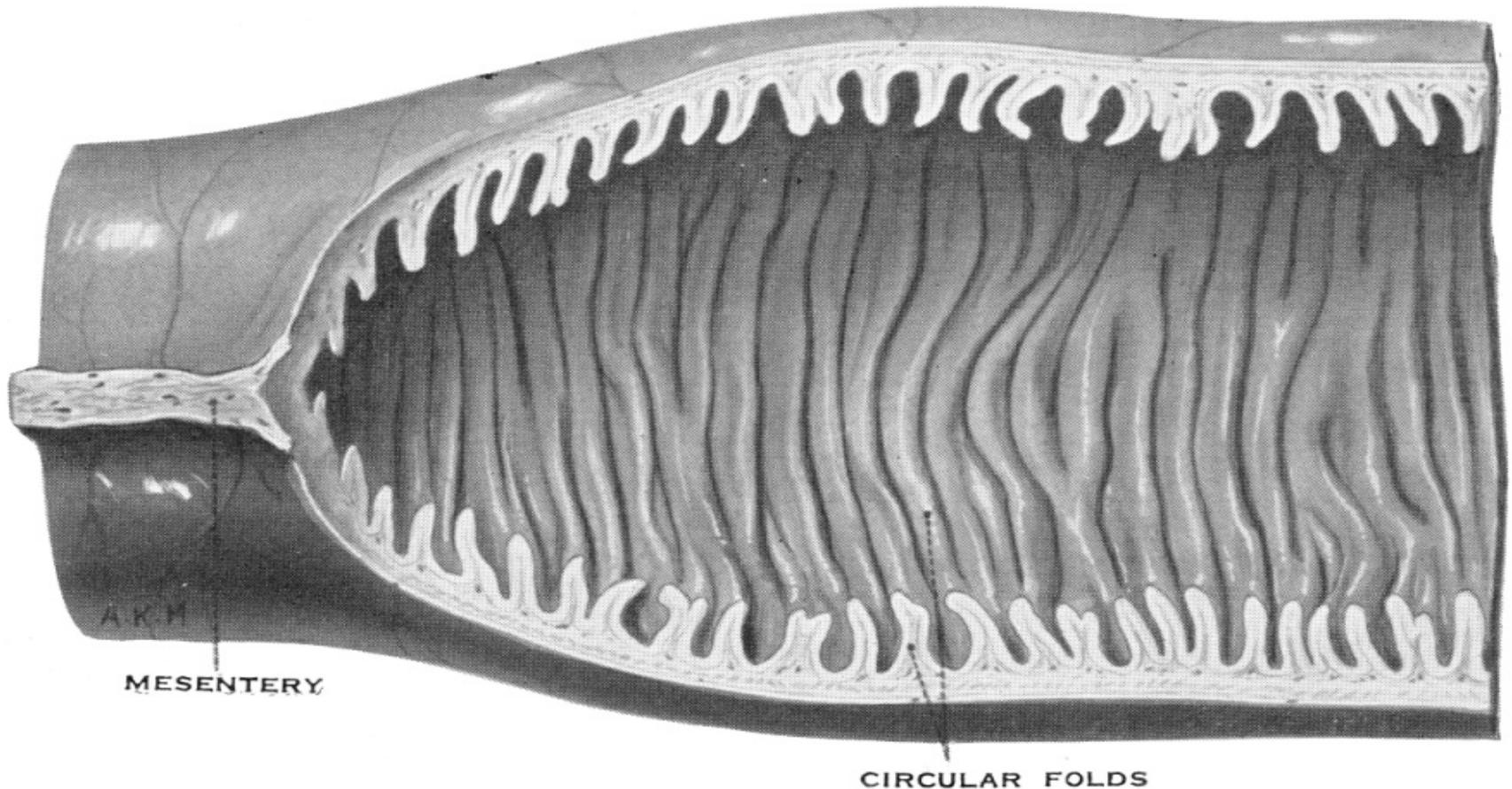
A *subclinical* and chronic condition known as environmental enteropathy (EE—previously ‘tropical enteropathy’), ubiquitous among people living in unhygienic conditions. With an unclear etiology, EE mediates two interlinked public health problems of childhood—stunting and anemia—and underlies poor oral vaccine efficacy.

The interacting effects of infection and enteropathy drive a vicious cycle that can propagate severe acute undernutrition, which underlies almost half of under-5 deaths.

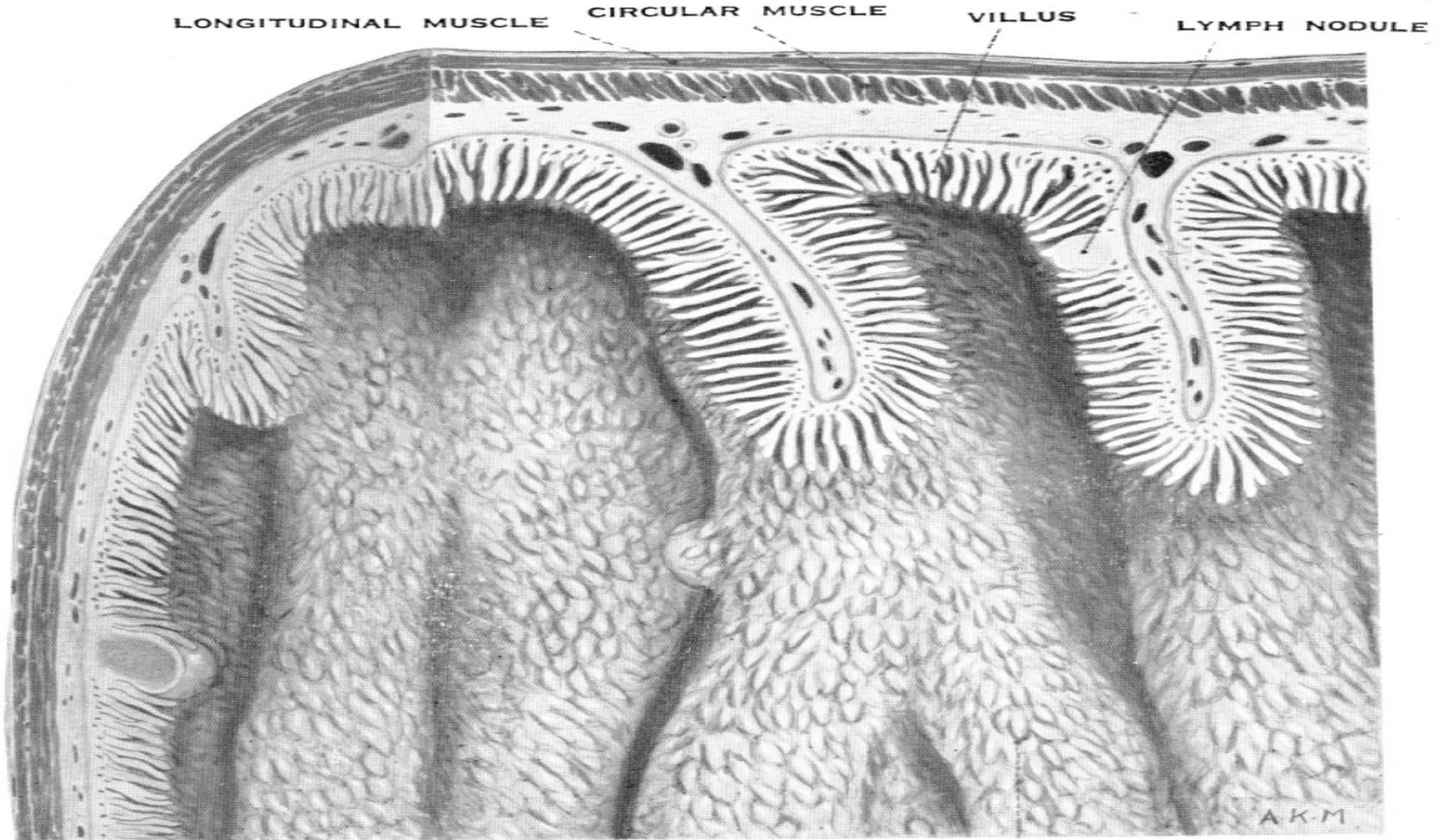
Enteropathies are highly prevalent, interacting causes of morbidity and mortality in developing countries, especially in rural areas.

The physiology of deprivation: An overview

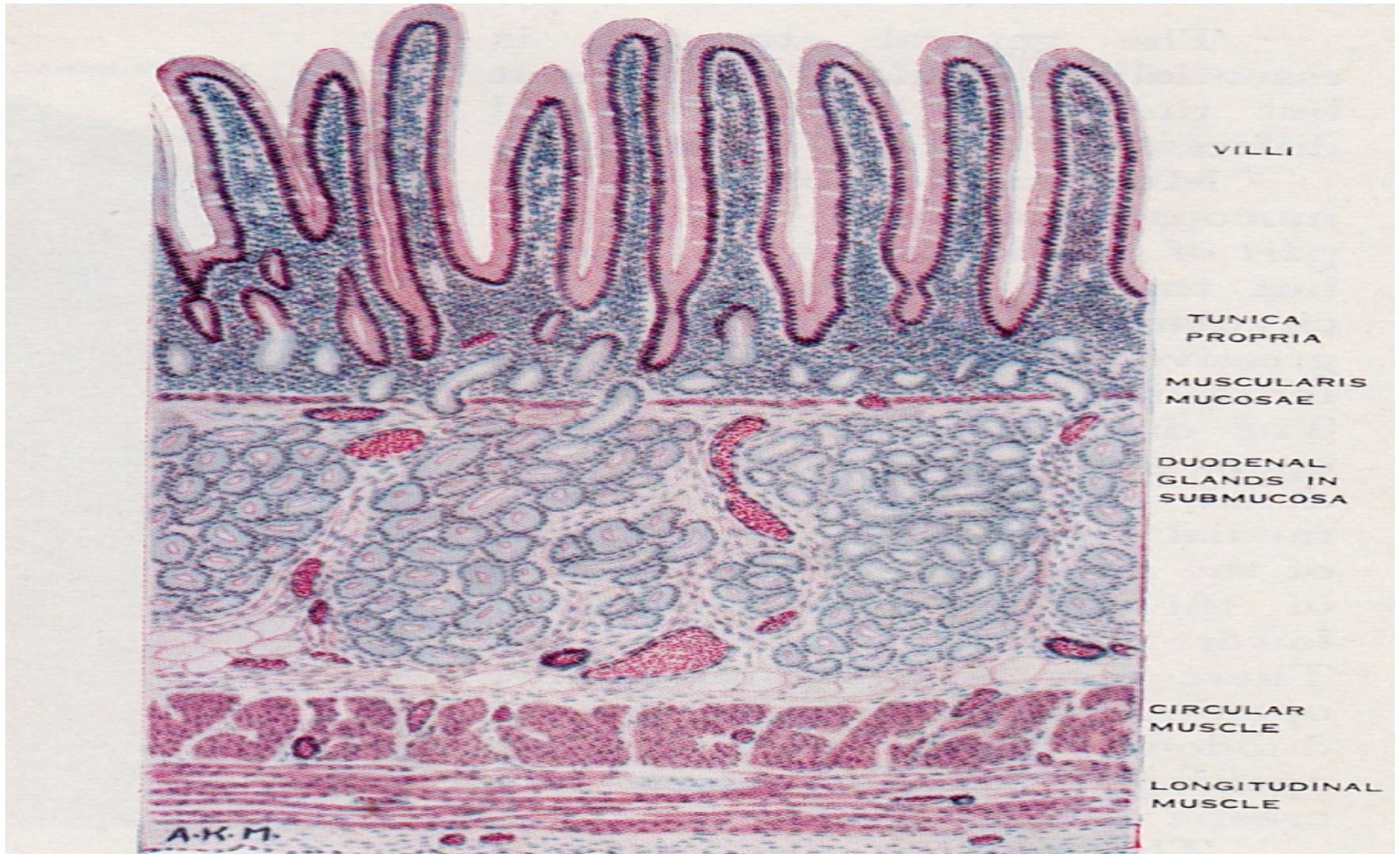
The appearance of the interior of the jejunum



The arrangement of the villi on the circular folds of the jejunum

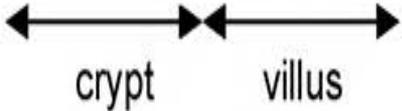
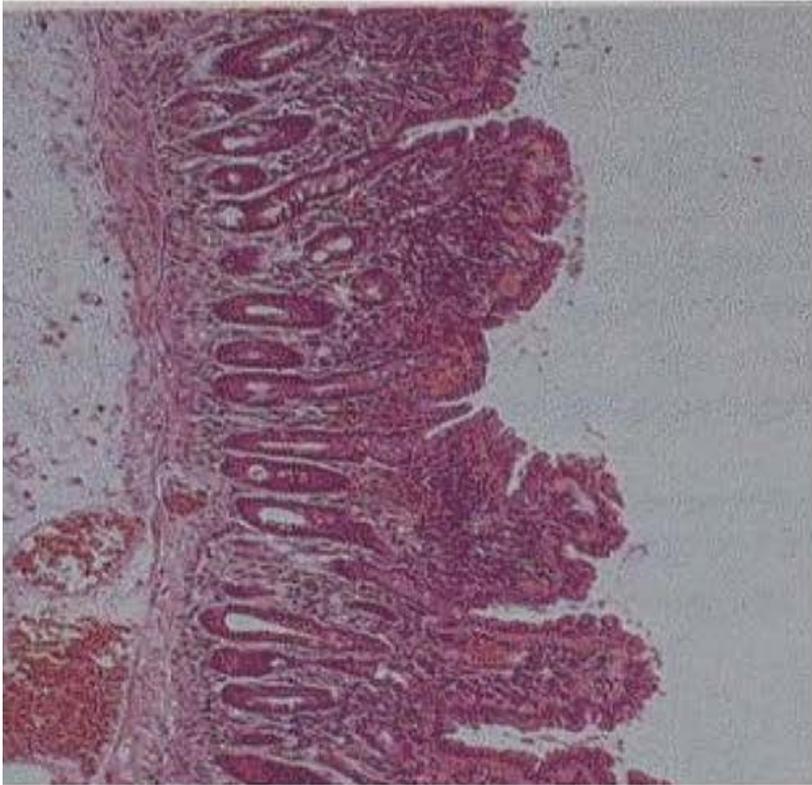


The microscopic appearance of healthy villi and glands in the duodenum

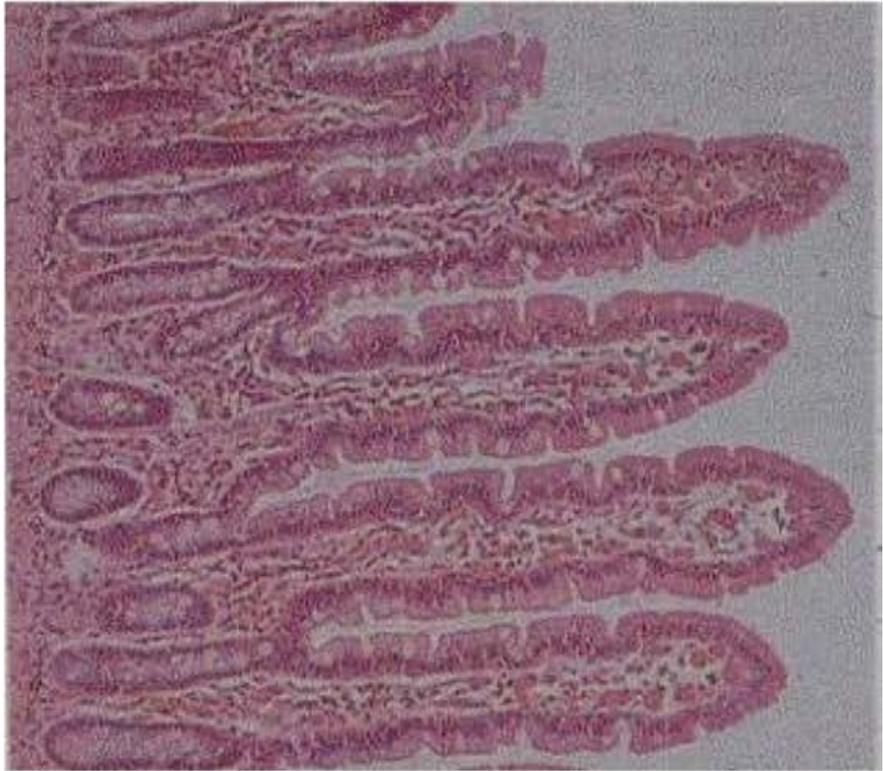


Histological features of the small intestinal mucosa of children with & without environmental enteropathy (McKay 2010)

(A)



(B)



EE is an 'invisible disease'

- Sufferers don't know they have it
- Carers don't know their charges have it—since undernutrition is the norm, mothers see their stunted children as comparable to other children
- The medical profession cannot diagnose the condition and thus doesn't know who is suffering
- And the effects of EE are largely irreversible

But...if EE is *subclinical*....

So...how is it detected?

Not easily...requires clinical/lab facilities.

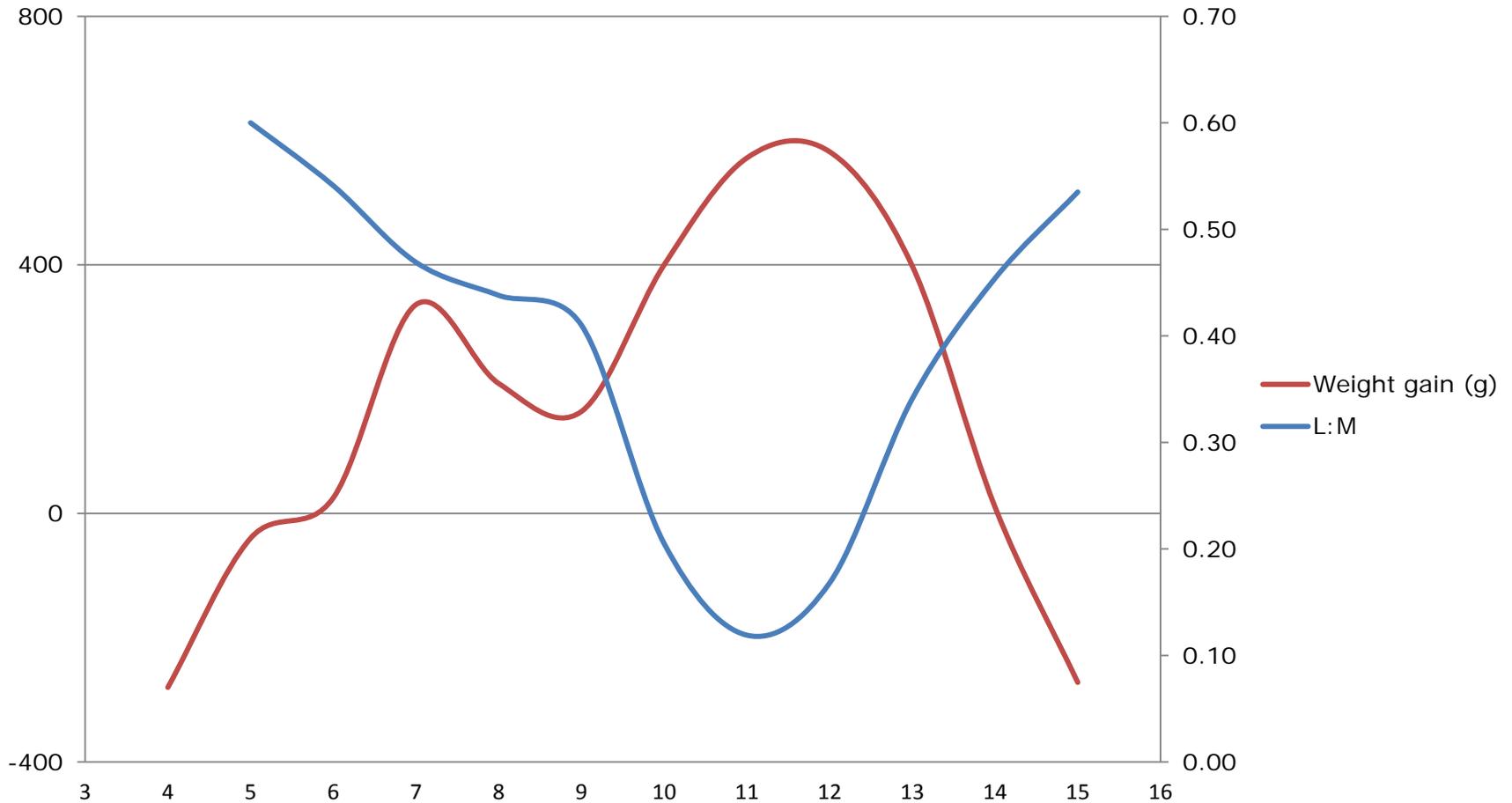
The lactulose-mannitol test—two sugars to pinpoint 'leaky gut syndrome'—as EE is also known

Unhygienic conditions during early childhood initiate a chronic intestinal pathology that only resolves once living levels improve

Consequences

- Malabsorption of nutrients → reduced resources during critical periods of growth
- Leakiness causes an immune system response...further wasting physical resources
- The obvious physical stunting and less-obvious mental stunting

'Mirror image' relationship between growth (g/month) and intestinal permeability assessed by the dual-sugar (lactulose:mannitol; L:M) test in typical Gambian children (after Lunn 2000)



Interventions & Challenges

- Feeding programs—A review of 42 programs shows statistically significant growth effects → the very best = 0.7 z-score improvement. But the average growth deficit of African & Asian children is -2.0 z-score, so diet solved only 1/3 of the problem
- Disease control—Diarrhea accounted for 5-20% of the linear growth deficit in some studies, but interventions resulting in less diarrhea produced no change in linear growth

Interventions & Challenges

- Sanitation and hygiene interventions with 99% coverage reduced diarrhea by 30% but reduced undernutrition by only 2.4%
- Improved WASH (water, sanitation and hygiene) was associated with $\sim 0.1 - 0.6$ increase in HAZ—similar to the partial effects of dietary interventions
- Using clinical diarrhea incidence to model impacts underestimates the contribution of WASH to child growth

Interventions & Challenges

- Growth studies in the Gambia show that growth faltering between 3 & 14 months of age is not explained by diet—nor corrected by dietary supplements. Nor was there an association with diarrhea, but there was an association with indicators of EE. Children had diarrhea 7.3% of the time but had L-M values associated with growth suppression 76% of the time. Diarrhea represented only 10% of the growth suppressive infant disease these children endured most of their lives

Interventions & Challenges

There is no development silver bullet. Multiple, interrelated behavioral changes seem to be required:

- Basic household-level hygiene practices
- Child-rearing behavior
- Maternal time management
- High-density weaning foods
- Safe water supplies
- Domestic toilets
- Livestock management practices

Findings:

- Panel data and national surveys confirm a long-term secular decline in nutritional status
- The 'norm' in rural Zimbabwe is a household with well-nourished adults and at least one undernourished child
- There are multiple strong (and often counterintuitive) correlates between socioeconomic variables and child, adult and household nutritional status

Findings:

- There are strong indications that worsening nutritional outcomes are not generally distributed but rather reflect wider underlying welfare—and perhaps geographical and social—disparities
- There is—not yet—unambiguous evidence for a link between nutritional outcomes and factors that may predispose to environmental enteropathy. There is huge scope for collaboration between medical and social scientists.
- Children who have suffered from EE face a lifetime of reduced opportunities—and thus can only partially at best benefit from inclusive growth

Questions

- Why has there been so little interaction among medical and social scientists in the c. 50 years that EE has been an identified risk?
- Are disciplinary boundaries any more porous now than they were over the past several decades?
- The “rediscovery” of nutrition as a development focus (and an MDG goal?) raises major concerns and challenges past responses. Many basic and commonly used concepts—food deficits, ‘nutritionally adequate’ diets, food security, undernutrition, even hunger—need critical reappraisal.