Malnutrition in HIV exposed uninfected children in long-term observational follow-up

0800

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BACKGROUND

- For unclear reasons, children exposed to HIV *in utero* and in breastmilk but not living with HIV (HEUs) are at risk of malnutrition, which increases childhood infections and mortality.
- Stunting, particularly in the first 2 years of life, potentially affects cognitive functioning, educational achievement, adult height and future risk of metabolic disease (e.g. hypertension, obesity, diabetes).
- Stunting in girls may increase the risk that their own offspring are born with low birth weight, creating an intergenerational effect.
- The PEPFAR PROMise Ongoing Treatment Evaluation (PROMOTE) study follows an already well-characterized cohort of women with HIV infection and their children who previously enrolled in the multi-site PROMISE* study in four African countries to evaluate long-term ART adherence and health outcomes in mothers and children exposed to HIV *in utero* and in breastmilk

OBJECTIVE

- We set out to establish the rate of severe growth faltering and correlates of stunting in HEUs aged 2-5 years under observational follow-up since birth.

METHODS

- Study enrolment was December 2016 – September 2017
- Child anthropometric parameters were measured six-monthly using standardized procedures
- WHO child-growth standards (2006) were used to calculate age-and-sex appropriate Z-scores for weight (WAZ), height (HAZ), and weight-for-height (WHZ)
- Severe growth-faltering (stunting, underweight and wasting) was defined as >2 standard deviations below the WHO population median
- Generalised estimating equations (GEE) were used to assess correlates of stunting including maternal factors (age, education), country, infant sex, and surrogate measures of household level sanitation and socioeconomic status (tap water use, size of the house).

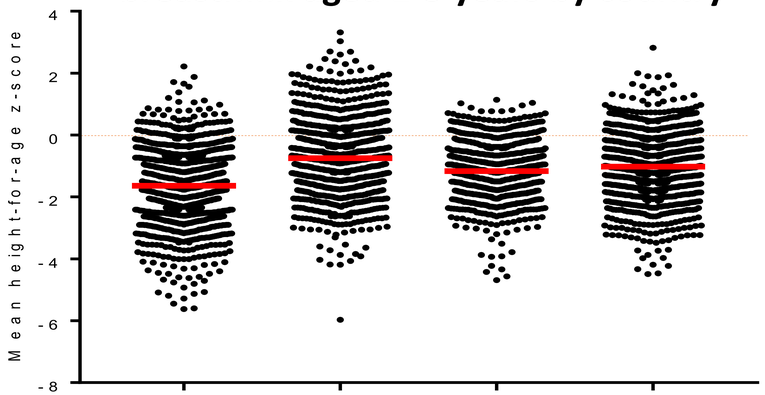
* Taha TE, Yende-Zuma N, Aizire J, Chipato T, Wambuzi Ogwang L, Makanani B, et al. (2018). The multi-country PROMOTE HIV antiretroviralvtreatment observational cohort in Sub-Saharan Africa: Objectives, design, and baseline findings. *PLoS ONE* 13(12): e0208805. https://doi.org/10.1371/journal.pone.0208805

Table 1 – Nutrition status by country for observations from children aged 2-5 years during the study period

Variable	Malawi (N=1421)	South Africa (N=931)	Uganda (N=751)	Zimbabwe (N=991)	TOTAL (N=4094)
Number of children (% female)	514 (48.4%)	375 (49.6%)	240 (47.9%)	330 (47.6%)	1459 (48.5%)
Mean weight-for-age z-score (sd)	-0.7 (±0.9)	-0.2 (±1.0)	-0.5 (±0.9)	-0.6 (±0.9)	-0.5 (±1.0)
Mean height-for-age z-score (sd)	-1.6 (±1.1)	-0.7 (±1.2)	-1.2 (±1.0)	-1.0 (±1.1)	-1.2 (±1.2)
Mean weight-for-height z-score (sd)	0.5 (±1.1)	0.4 (±1.3)	0.3 (±0.9)	0.0 (±1.0)	0.3 (±1.1)
Number (%) underweight	101 (7.1%)	34 (3.7%)	24 (3.2%)	49 (4.9%)	208 (5.1%)
Number (%) wasted	16 (1.1%)	28 (3.0%)	3 (0.4%)	25 (2.5%)	72 (1.8%)

Stunted, underweight, wasted = z-score more than 2 standard deviations below the WHO population median

Risk of stunting among children exposed to HIV *in utero* and in breastmilk aged 2-5 years by country



	Malawi	South Africa	Uganda	Zimbabwe	Total
Number stunted*	501	137	134	162	934
(%)	(35.4%)	(14.8%)	(17.9%)	(16.4%)	(22.9%)

* height-for-age z-score more than 2 standard deviations below the WHO population median

Table 2 – Factors associated with stunting

Parameter	Level	Adjusted Odds Ratio (95% CI)	p-value
Age of child (months)		0.96 (0.95-0.96)	<0.001
Sex	Male	1.08 (0.86-1.36)	0.504
	Female	Ref.	
Country	Malawi	2.50 (1.74-3.60)	<0.001
	Uganda	0.87 (0.54-1.39)	0.564
	Zimbabwe	0.99 (0.66-1.47)	0.942
	South Africa	Ref.	
Age of mother at child birth		1.00 (0.98-1.02)	0.972
Tap water	No	1.24 (0.96-1.60)	0.106
	Yes	Ref.	
Number of rooms at home		0.99 (0.93-1.06)	0.816
Schooling	Did not complete secondary school	1.47 (1.11-1.95)	0.007
	Secondary school completed	Ref.	

RESULTS

- 1459 HEUs aged 2-5 years during the study period were included in this analysis
- 48.5% were female
- Mean (sd) z-scores were below population norms for height (-1.2 +1.2) and weight (-0.5 +1.0) across all 4094 repeated measurements (Table 1)
  - **Stunted – 22.9%** (Figure)
  - **Underweight – 5.1%**
  - **Wasted – 1.8%**
- Associations with higher odds of stunting (Table 2) –
  - Malawi location when compared to South Africa (shown in the Figure) [adjusted Odds Ratio 2.50 (95% CI 1.74-3.60)]
  - Being born to a mother who did not complete secondary school [aOR 1.47 (95% CI 1.11-1.95)]
  - Older children had lower odds of stunting [aOR 0.96 (95% CI 0.95-0.96)]

CONCLUSIONS

- High rates of growth faltering were observed in this large multi-country cohort of predominantly breastfed African children.
- Malnutrition remains a challenge for breastfed HEUs who survive to at least 2 years and escape HIV infection.
- Early interventions are necessary to address malnutrition in the growing population of HEUs in order to optimize their health and future human capital.
- Maternal factors, specifically education, may be a key area of focus for intervention.

ADDITIONAL INFORMATION

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Acknowledgements

The Authors would like to thank the women and children participating in the PEPFAR PROMOTE study and the study staff at the different sites.

Funding for this study is provided by PEPFAR

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