ence among groups. Those in the Consistently Positive WHZ group and the Stable Normal WHZ group had more favourable SES profiles with lower proportions of children in the 'lowest' and 'low' strata. If the At Risk of Severe Acute Malnutrition group were to be excluded as being outliers, then there is a trend whereby the more favourable WHZ class groups included children who had a lower prevalence of carious teeth with pulpal involvement; Consistently Positive WHZ group = 3.6%; Stable Normal WHZ group = 4.2%. Less favourable WHZ groups were as follows; Increasing Risk of Wasting group = 6.5%; and Consistently Skinny group = 7.1%. Spearman's Rho values affirmed that membership in less favourable groupings was correlated with the presence of pulpally involved teeth.

Table S2 in the **Online Supplementary Document** presents data on the baseline characteristics of participants by HAZ class membership. While the differences in sociodemographic and clinical characteristics by group membership were not present, there was a trend by which those children who were in the Consistently Tall group or who were in the Stable Normal HAZ group had a more favourable SES profile with higher proportions of children in the favourable SES strata. Children who were in the 'Stable Normal HAZ' group had the most severe caries experience. Exposure to caries and pulpally involved teeth were negatively correlated with membership in less favourable HAZ class groupings (Spearman's Rho).

Table 2 presents regression models for the likelihood of WHZ class membership by ECC status (presence of any cavities or presence of any carious teeth with pulpal involvement at FUP4). Having dental cavities or having pulpally involved teeth were associated with lower odds of being in a class group where the WHZ trajectory was favourable. Those with one or more carious teeth with pulpal involvement had higher odds of belonging to the less favourable WHZ class than those with cavities only. Those with one or more cavities or with one or more carious teeth with pulpal involvement had lower odds of belonging to the Consistently Positive WHZ group than the reference group. The E-values for the effect estimates were large making it unlikely that unmeasured confounding could negate the effects observed in the model (Table S3 in the **Online Supplementary Document**).

Table 2. Adjusted associations between WHZ trajectories and ECC Exposure compared with the reference class*

	Persistently at Risk of Severe Acute Malnutrition OR (95% CI)	Increasing Risk of Wasting OR (95% CI)	Consistently skinny OR (95% CI)	Stable Normal WHZ† OR (95% CI)	Consistently Positive WHZ OR (95% CI)
Cavities‡	1.31 (0.54-3.16)	1.16 (0.8-1.7)	1.23 (0.88-1.73)	1.0 (n/a)	0.27 (0.08-9.8)
Pulpal involvement§	3.11 (0.66-14.68)	2.06 (0.92-4.60)	2.01 (0.97-4.15)	1.0 (n/a)	0.06 (0.02-0.39)

WHZ – weight for height Z-score, OR – odds ratio, CI o confidence interval
*Adjusted multinomial odds ratio: gender, mother's age, mother's education, and socioeconomic status.
†Reference category.
‡Child is exposed to one or more cavities extending to the dentine during the first 1000 dBZT of life.
§Child is exposed to a caries lesion extending to the pulp during the first 1000 dBZT of life.

Table 3 presents regression models for likelihood of HAZ class membership by disease exposure. There are consistently lower odds of participants with caries exposure (cavities, with or without pulpal involvement) being in a less favourable HAZ class grouping. The confidence intervals around each of the odds ratios are broad and suggest a large degree of uncertainty. This was also observed in the E-values (Table S4).

Table 3. Adjusted associations between HAZ trajectories and ECC exposure compared with the reference class*

	Persistent severe stunting OR (95% CI)	Consistently stunted OR (95% CI)	Consistently Borderline OR (95% CI)	Persistently short OR (95% CI)	Stable Normal HAZ† OR (95% CI)	Consistently tall OR (95% CI)
Cavities ‡	0.80 (0.34-1.92)	0.68 (0.40-1.17)	0.82 (0.53-1.29)	0.88 (0.56-1.38)	1.0 (n/a)	0.62 (0.24-1.61)
Pulpal involvement §	0.68 (0.08-5.84)	0.61 (0.19-1.93)	1.10 (0.47-2.56)	0.86 (0.36-2.07)	1.0 (n/a)	0.36 (0.05-2.85)

ECC – early childhood caries, HAZ – height for age Z-score, OR – odds ratio, CI – confidence interval
*Adjusted multinomial odds ratio: gender, mother's age, mother's education, and socioeconomic status.
†Reference category.
‡Child is exposed to one or more cavities extending to the dentine during the first 1000 dBZT of life.
§Child is exposed to a caries lesion extending to the pulp during the first 1000 dBZT of life.

of stunting in children. Given the biological plausibility for a negative relationship between untreated caries lesions and stunting malnutrition, mediated through pain, inflammation, and difficulty eating or sleeping, it seems less plausible that caries might have a positive effect on linear growth. Such a relationship is more likely to be explained by confounding factors. In addition, larger studies with long-term follow up period (into late childhood) are needed to be able to draw conclusions on the relationship between exposure to caries lesions and HAZ scores.

Dental caries is a preventable and treatable disease and interventions to prevent ECC have been demonstrated to be effective, and are justifiable on their own as a means of reducing pain and suffering among children in high caries populations [21]. The results of this analysis suggest that reducing the prevalence and severity of ECC could also have a positive effect on child growth and development. Therefore, interventions aiming to address the UN Sustainable Development Goals 2030 (SDG), specifically SDG 3 'Good Health and Well-being', should include oral health components. Given the general lack of funding for oral health interventions, integrating oral health programing with those supporting normal child growth and development in the early years would be an appropriate way to reduce the impacts of oral disease. Such an approach is supported by WHO [22,23].

In the present study only a minimally and guaranteed set of confounding factors were included. Baseline nutrition status was not included as covariates in order to avoid over adjustment particularly given that the outcomes were measured at multiple time points [24]. Also, variables such as water and sanitation as well as dietary adequacy, previously published as being associated with wasting malnutrition were not included in the present model [8,9,25,26]. This is not thought to influence the directionality and size of the effect, as the E-values suggest that unmeasured confounding would have to be large relative to the observed effects. Further, unmeasured confounding would need to be greater than that reported in previous investigations from the same cohort [8,27]. The implications are that this initial descriptive exercise should be followed up by a more intensive research study using long-term cohorts specifically designed to explore the relationship between ECC and growth and development.

CONCLUSIONS

Children with ECC in their first 1000 days of life were more likely to belong to unfavourable WHZ trajectory class groupings. The present analysis added evidence to the hypothesis that ECC may be a modifiable risk factor for unfavourable linear and ponderal growth.

Acknowledgements: The present analysis and collection of dental data was funded by grants from The Borrow Foundation. The Cambodia Longitudinal Health and Nutrition Study was conceived, developed and funded through UNICEF Cambodia along with and the French National Institute for Sustainable Development (IRD). The authors would like to acknowledge the work of the examiners and field staff who undertook the data collection in challenging conditions: Chengkim Lean, Chanveata Pot, Chandaroth heng, Pheanyvita, Sokmean Peng, Rang Sey Hay, Sopheap Orn, Hongthein Hy, Lengeave Hong, Sam At Sang, Koinghuy Leang, Kimser Ngan, Phallin Uy, Heng lay Veng, Khemey Ea, Nary Sun, Serey Hing under the supervision of Dr Sokuntheary Hou.. Ms Somphos Som coordinated the field data collection. The collaborating partners on this project are RACHA (Reproductive and child health association), UNICEF-Cambodia, and The French National Institute for Sustainable Development Institute (IRD), and the Oral Health Bureau, Preventive Medicine Department, Ministry of Health Cambodia

Funding: This research was funded by a grant from 'The Borrow Foundation'

Authorship contributions: BT helped conceptualize the secondary data analysis, coordinated and supervised data collection, drafted initial manuscript and reviewed and revised the manuscript. TC and HS coordinated and supervised data collection, critically reviewed the manuscript for important intellectual content. KS critically reviewed the manuscript for important intellectual content, and reviewed and revised the manuscript. DL performed data analysis and reviewed and revised the manuscript. AL helped conceptualized the broader Cambodia Health and Nutrition Monitoring Study along with colleagues from IRD and UNICEF. He critically reviewed the manuscript for important intellectual content. AS helped conceptualize this secondary data analysis, performed data analysis, critically reviewed the manuscript for important intellectual content, reviewed and revised the manuscript. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

Competing interests: The authors completed the ICMJE Unified Competing Interest form (available upon request from the corresponding author), and declare no conflicts of interest.

Additional material
Online Supplementary Document

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