Consortium for Improving Complementary Foods in Southeast Asia (COMMIT)

A comprehensive nutrient gap assessment in the Philippines:

Estimating micronutrient gaps during the complementary feeding period

COMMIT ACTIVITY 1

COMMIT 1 Comprehensive nutrient gap assessment
COMMIT 2 Consumer survey
COMMIT 3 Legal and policy review
COMMIT 4 Nutrient profile model
COMMIT Synthesis report

COMMIT

Consortium for Improving Complementary Foods in Southeast Asia

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THE COMMIT INITIATIVE
Overview

A nutrition transition is underway across Southeast Asia, with convenience, time and aspiration increasingly influencing food choices. This changing food environment is resulting in a shift from traditional diets towards processed foods that are usually higher in salt, sugar and unhealthy fats, and lower in essential nutrients – and children's diets are no exception.

The availability, affordability and variety of commercially produced, packaged foods marketed as suitable for older infants and young children – also known as commercially produced complementary foods (CPCF) – is increasing. Many CPCF exceed recommended levels of sugar, salt or fat and/or are labelled in ways that may mislead consumers; these products should not be promoted or provided to older infants and young children. For other CPCF, however, targeted improvements to their nutrient composition – such as through fortification – can help improve their nutritional impact. Governments and partners must work together to ensure that the CPCF promoted as suitable for older infants and young children are nutritionally adequate, safe and labelled in a responsible way.

The **Consortium for Improving Complementary Foods in Southeast Asia (COMMIT)**[i] was established to help ensure that the CPCF sold and consumed in the region contribute to healthy diets instead of unhealthy ones. COMMIT recognizes that one of the most effective ways to transform the food system and food environment is by supporting governments to set up regulatory environments that enable access to healthy food, adequately regulate unhealthy products and protect consumers from inappropriate marketing practices. To do this, COMMIT identified micronutrient gaps in the diets of older infants and young children, analysed current consumer CPCF preferences, reviewed national legislation regulating CPCF nutrient composition and labelling practices, and used a nutrient profile model to assess current CPCF nutrient composition, labelling practices and micronutrient content:

COMMIT Activity 1: Comprehensive nutrient gap assessment
A comprehensive nutrient gap assessment to identify limiting micronutrients in diets during the complementary feeding period.

COMMIT Activity 2: Consumer survey
Consumer perspective survey on the provision of CPCF to older infants and young children, motivations for CPCF provision and factors influencing CPCF purchases.

COMMIT Activity 3: Legal and policy review
Assessment of current national binding legal measures related to CPCF nutrient composition and labelling practices and their adherence to global CPCF guidance.

COMMIT Activity 4: CPCF nutrient profile model
Benchmarking of CPCF nutrient composition and labelling practices against an adapted version of the 2019 WHO Europe nutrient profile model designed specifically for CPCF.

This report details the methods and results for COMMIT Activity 1 in the Philippines.

[i] COMMIT partners include Access to Nutrition Initiative; Alive & Thrive; Helen Keller International's Assessment and Research on Child Feeding Project; JB Consultancy; School of Food Science and Nutrition, University of Leeds; UNICEF East Asia and the Pacific Regional Office; and World Food Programme Asia Pacific Regional Bureau.

1 Introduction

1.1 Micronutrient intake during the complementary feeding period

What, when, how and how much children are fed in early life lays the foundation for their health and survival.[1] Between 6 and 23 months of age – known as the complementary feeding period – children's diets must provide adequate quantities of energy, protein and micronutrients to fuel their rapid growth and development. In fact, between 6 months and 2 years of age, children have greater nutrient needs per kilogram of body weight than at any other time in life.[2] Sufficient quality, quantity, and diversity of foods during this period can reduce their risk of micronutrient deficiencies and other forms of malnutrition.

The most recent estimates of diet quality in the Philippines indicate that while 73 per cent of children aged 6–23 months are consuming fruits and vegetables, only 63 are consuming nutrient-rich eggs or other animal-source foods and only 57 per cent of children 12–23 months of age receive nutrient-rich breastmilk.[ii] Further, less than half (47 per cent) of children aged 6–23 months are consuming the minimum recommendation for a diverse diet (i.e., at least five food groups per day).[4] Approximately 12 per cent of children aged 6–23 months in the Philippines suffer from severe food poverty,[iii] meaning they only consume foods from one or two (or zero) food groups per day, and a further 34 per cent suffer from moderate food poverty, meaning they only consume foods from three or four food groups per day.[5] Limited dietary diversity and the absence of nutrient-rich foods during the complementary feeding period can increase the risk of micronutrient deficiencies, which take a devastating toll on children's physical and cognitive development.[6-8]

Improvements in diet quality in the first two years of life can help reduce the burden of micronutrient deficiencies and accelerate progress in ending other forms of malnutrition. However, robust evidence on specific nutrient gaps in the diets of older infants and young children is often unavailable, underused or misinterpreted.[9, 10] While standard global indicators on complementary feeding provide information on the number of food groups children are consuming and the frequency of meal consumption for children 6–23 months of age,[11-13] these indicators only provide limited insight into the magnitude and significance of specific nutrient gaps. As a result, governments may lack the evidence base needed to design effective policies to improve nutrient intake, such as legislation on mandatory fortification.[9, 10]

1.2 What is a comprehensive nutrient gap assessment?

The comprehensive nutrient gap assessment (CONGA) is a methodology designed to identify nutrient gaps in the diets of a defined population and estimate both the public health significance of these gaps and the certainty of evidence on which they are based. To do this, CONGA guides the collection and synthesis of evidence relevant to nutrient gaps, including data and indicators beyond those typically used to assess the diets of children aged 6–23 months.

A CONGA analysis was conducted in the Philippines to identify micronutrient gaps experienced during the complementary feeding period. This brief summarizes the results of the CONGA.

[ii] Between the ages of 12 and 23 months, it is estimated that children still receive 35–40 per cent of their energy needs from breastmilk, which is also a good source of essential fatty acids and micronutrients.[3]

[iii] UNICEF defines child food poverty as the percentage of children under 5 years of age consuming foods and beverages from four or fewer of the eight defined food groups. If children are fed 0–2 food groups per day, they live in severe food poverty. If children are fed 3–4 food groups per day, they live in moderate food poverty.

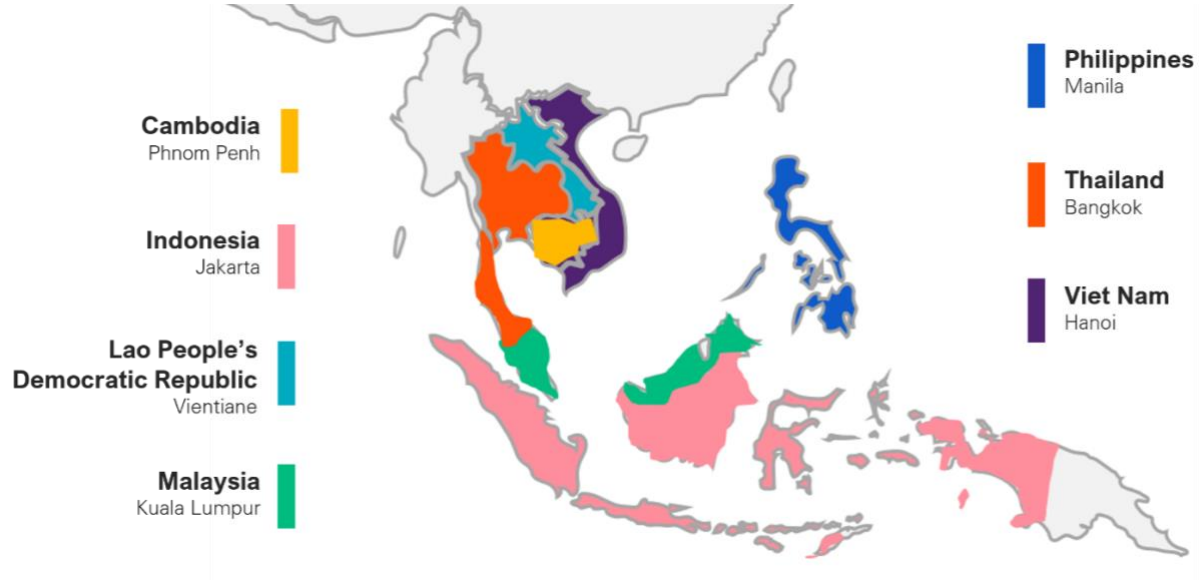
2 Objectives

To better understand micronutrient gaps during the complementary feeding period in Southeast Asia, the CONGA was implemented in seven countries in the region: Cambodia, Indonesia, the Lao People's Democratic Republic, Malaysia, Philippines, Thailand and Viet Nam (Figure 1).

The objective of this analysis was to (1) estimate micronutrient gaps in the diets of older infants and young children aged 6–23 months; and (2) establish the certainty of available evidence for each gap.

Micronutrients assessed in this analysis included those commonly lacking in the diets of older infants and young children aged 6–23 months: iron, vitamin A, zinc, calcium, iodine, vitamin B_1 [thiamine], niacin, vitamin B_{12}, vitamin B_6, folate, vitamin C and vitamin D.[3]

Figure 1: Map of the seven COMMIT Initiative countries



3 Summary of methods

The analysis in the Philippines followed the CONGA methodology,[14] with key steps summarized here.

Step 1 CONGA considers existing evidence only, with no primary data collection or analysis required. A literature search was conducted to gather five types of evidence identified by CONGA as relevant for assessing nutrient gaps: (1) biological, clinical and functional markers; (2) nutrient adequacy of individual diets; (3) nutrient adequacy of household diets; (4) nutrient adequacy of national food supplies; and (5) nutrient-informative food group intake of individuals or households. Evidence that did not fall into one of these five evidence categories but was still relevant to the diets of children 6–23 months of age (e.g., linear programming to identify problem nutrients) was compiled and classified as 'other' evidence. Data points from identified evidence sources were extracted and captured in a spreadsheet.

Step 2 Each data point was reviewed and assigned an implied nutrient burden gap rating (i.e., public health significance) of either negligible, low, moderate or high. Per CONGA methodology, ratings were based upon suggested prevalence and mean ranges for commonly available population-level indicators from each of the five priority evidence types (e.g., a data point for vitamin A deficiency prevalence >20 per cent was assigned a rating of 'high'). Each rating had an associated weight score: negligible (0); low (1); moderate (2); and high (3). If no implied nutrient burden was available (e.g., for 'other' evidence types), the implied burden was marked 'not applicable' and no weight score was assigned.

Step 3 To document and account for variations in evidence type, recency, relevance, and representativeness of each data point, five types of metadata were extracted, recorded, and assigned a weight in the country-specific spreadsheets: (1) evidence type; (2) geographic representation; (3) year of data collection; (4) age and sex group; and (5) sample size. Metadata information was standardized and assigned a weight score per CONGA methodology. Metadata weight scores were used to generate overall weight scores for each data point, where the most robust data points (e.g., the most recent, representative and relevant) were assigned greater weight and the less robust (e.g., older, subnational and small sample size) were assigned lower weight. Weight scores were calculated for each data point by multiplying the evidence-type metadata weight score by the combined weight scores of its other four metadata categories. Data points were *not* assigned a weight score if they were (1) categorized as 'other' evidence; (2) representative of <10 per cent of the national population; (3) collected before 2010; (4) representative of an age and sex group that excluded and was not near to children aged 6–23 months (i.e.., women of reproductive age); or (5) based on a sample size <50.

Step 4 To determine nutrient gap burden and evidence certainty ratings, CONGA requires at least two content experts to jointly review all evidence. Two researchers with expertise in infant and young child nutrition and knowledge of the Southeast Asian context reviewed the data points for the Philippines.

A quantitative nutrient gap burden score was calculated for each of the 12 micronutrients assessed using *only* data points from the five priority evidence types that received weight scores. The nutrient gap burden score was calculated by multiplying the implied nutrient burden weight score by the overall data point weight score (thus, data points without weight scores, such as for 'other' evidence, were omitted from this calculation). A rating of either negligible, low, moderate or high was assigned based on its value.

Step 5 The quantitatively derived nutrient gap burden ratings were then reviewed by the two researchers alongside the totality of evidence collated for each micronutrient, including the 'other' evidence data points and any additional information available (e.g., indicator trends). Researchers considered all evidence to determine whether the final nutrient gap burden rating should deviate from the quantitatively derived rating calculated in step 4. Final ratings of negligible, low, moderate, or high were assigned to each nutrient, and any deviation from the quantitatively derived ratings was documented and explained.

Step 6 A criteria-based rating of evidence certainty (low, moderate or high) was assigned to each final nutrient gap burden rating per the CONGA methodology. This criteria-based rating only considers the data points that received a weight score and is based both on the level of agreement between the implied nutrient burden ratings (e.g., variation in implied nutrient burden ratings for iron data points) and the evidence weight score for the data points. The two researchers again conducted a qualitative review, considering the totality of evidence available, to determine whether the final rating should deviate from the criteria-based rating. Any deviations were documented and explained.

Step 7 Finally, any disagreements with the final nutrient gap burden of evidence certainty ratings were discussed and critically re-evaluated by researchers. Ratings were only finalized once consensus was reached.

4 Results

4.1 Evidence sources and relevant data points

A total of 11 evidence sources were identified during the literature search for the Philippines, including two National Nutrition Surveys and several peer reviewed articles. A full list of evidence sources identified and used in this analysis is provided in the Annex.

A total of 51 data points relevant to micronutrient intake, availability and/or deficiency during the complementary feeding period were extracted from these evidence sources. Most data points (n=37) were nationally representative and nearly half (n=24) were representative of children aged 6–23 months. Many data points (n=22) were collected between 2017 and 2018, and 29 were collected between 2010 and 2014.

The availability of data points for the five priority evidence types varied (Table 1). A total of eight biological, clinical, or functional marker data points (e.g., deficiency prevalence data) were identified, including for iron, vitamin A, vitamin D, zinc and iodine, of which four were nationally representative. An estimate of nutrient adequacy of individual diets (i.e., prevalence of inadequate intake) representative of older infants aged 6–11 months and/or of young children aged 12–23 months (no aggregate estimate available for children 6–23 months) was available for all micronutrients except vitamin D. Estimates of nutrient adequacy of household diets was available for both iron and calcium. An estimate of nutrient adequacy of national food supplies was available for all micronutrients except vitamin D. Data on nutrient-informative food group intake was available for iron, vitamin A and iodine (e.g., household coverage of iodized salt). A total of 18 'other' data points were identified, including several from an Optifood analysis. More than half (n=29) of the identified data points qualified to receive a weight score.

Table 1: Number of datapoints identified that qualified* for a weight score, by evidence type

Qualification for quantitative calculations*	Evidence types						Total
	Biological, clinical and functional markers	Nutrient adequacy of individual diets	Nutrient adequacy of household diets	Nutrient adequacy of national food supplies	Nutrient-informative food group intake of individuals or households	Other	
Qualified	4	10	2	10	3	0	**29**
Did not qualify	4	0	0	0	0	18	**22**
Total	**8**	**10**	**2**	**10**	**3**	**18**	**51**

*Qualifying data points were: (1) one of the five priority evidence types; (2) collected in 2010 or later; (3) based on a sample size >50; (4) representative of >10 per cent of the population; and (5) representative of an age group at least similar to children aged 6–23 months.

4.2 Final ratings

Micronutrient gaps are identified when a micronutrient is assigned both a micronutrient gap burden and evidence certainty rating of at least moderate. Based on available evidence, micronutrient gaps during the complementary feeding period in the Philippines were identified for vitamin A, iron, calcium and zinc (Table 2).

Potential micronutrient gaps (micronutrients with a moderate to high burden but low certainty evidence) were identified for vitamin B_{12}, folate, niacin, thiamine and vitamin B_6. Iodine received a nutrient gap burden rating of low with moderate certainty, suggesting there may not be a significant dietary gap in iodine during the complementary feeding period.

More high-quality evidence is required to estimate the burden of micronutrient gaps, particularly for those with low certainty evidence (i.e., vitamins B_{12}, B_6, D and C and folate, niacin and thiamine).

Table 2: Final micronutrient gap burden and certainty of evidence ratings

Micronutrient	Micronutrient gap burden rating	Certainty of evidence rating
Vitamin A	High	High
Iron	High	Moderate
Calcium	High	Moderate
Zinc	Moderate	Moderate
Vitamin B_{12}	High	Low
Folate	High	Low
Niacin	High	Low
Thiamine	High	Low
Vitamin B_6	High	Low
Iodine	Low	Moderate
Vitamin D	Low	Low
Vitamin C	Low	Low

5 Conclusion

Preventing micronutrient deficiencies through relevant, context-specific national nutrition policies and programmes requires a comprehensive understanding of dietary gaps; however, relevant evidence and analyses to identify nutrient gaps are often lacking.[10, 14] The CONGA methodology applied to the Philippines enabled the synthesis of multiple evidence types from disparate sources. It provided a comprehensive picture of the magnitude and significance of micronutrient gaps in the diets of children aged 6–23 months, and highlighted the depth, breadth and quality of the relevant evidence base in the country.[iv] In addition, using CONGA in the Philippines allowed for the consideration of evidence types not typically synthesized to assess the quality of young children's diets.

Available evidence indicates that children aged 6–23 months face micronutrient gaps in vitamin A, iron, calcium and zinc. Vitamin A deficiency has severe consequences, including increased susceptibility to infections and death.[15] Early iron deficiency can result in poorer cognitive, motor and social-emotional development.[16, 17] Zinc deficiency in early life is associated with impaired immune function, diminished cognitive and motor development and increased risk of diarrhoea.[18, 19] Calcium deficiency can increase the risk of rickets. However, wider, long-term health implications of calcium deficiency in young children are not well established.[10, 20] Vitamin B_{12}, folate, thiamine, niacin and vitamin B_6 were also identified as potential micronutrient gaps. Deficiencies in these nutrients can also negatively impact health and development in early age. For example, early folate and thiamine deficiency can have immediate and long-term consequences, including hindered brain development and other adverse health outcomes.[21, 22]

Biological, clinical and functional markers (i.e., deficiency prevalence data) for young children were available for iron, vitamin A, zinc, iodine and vitamin D from a 2013 National Nutrition Survey and a 2018 Expanded National Nutrition Survey. However, the national prevalence estimate for iron deficiency was representative only for children aged 6–12 years and the estimate for zinc deficiency was representative only for children aged 6–59 months. An estimate of vitamin D deficiency was available for children aged 6–12 years and was only representative at a subnational level. Estimates of prevalence of inadequate intake among young children were available for 11 micronutrients from the 2013 National Nutrition Survey, and estimates of nutrient adequacy of household diets were available for iron and calcium from the same survey. However, these data points are now a decade old. Identifying micronutrient and dietary gaps requires relevant, reliable and representative data. Evidence generation on micronutrient availability, intake and deficiency should therefore be prioritized in the Philippines, particularly for the micronutrients with moderate or high nutrient burden ratings but low evidence certainty (i.e., vitamin B_{12}, folate, thiamine, niacin and vitamin B_6).

Evidence-based strategies are required to address the clear micronutrient gaps identified during the complementary feeding period. Relevant strategies include increasing the availability and consumption of nutrient-dense foods, micronutrient supplementation, large-scale fortification of staple foods and condiments, and point-of-use fortification with multiple micronutrient powders and fortified specialty foods (e.g., fortified infant cereals). Nutrition programmes and policies should consider a multitude of approaches to equitably improve nutrition for older infants and young children. The strategies noted here can be implemented concurrently, and in a complementary fashion. Efforts to protect, promote and support breastfeeding should also be considered essential. Social and behaviour change strategies and interventions are also critical to support efforts to reduce micronutrient gaps, including by encouraging the consumption of micronutrient-dense foods and improving caregiver awareness of the suitability of fortified speciality foods for their older infants and young children.

[iv] Other methods exist for collating and assessing data to guide policy and programming decisions on nutrient gaps and/or diets. For example, the Fill the Nutrient Gap exercise designed and implemented by the World Food Programme provides a comprehensive look at the environment within which observed diets are shaped. However, in contrast to the CONGA, the Fill the Nutrient Gap exercise does not provide estimates of nutrient gaps, their public health significance or the certainty of the relevant evidence base. The CONGA can be a complementary exercise to Fill the Nutrient Gap efforts and other similar exercises.

Annex

List of references utilized in the CONGA in the Philippines

Angeles-Agdeppa, I., & Tanda, K. V. (2021). Vitamin D Status and Usual Nutrient Intake of Filipino Children Aged 6–12 Years in Selected Areas in the Philippines: A 2018 National Nutrition Survey. *Journal of Nutrition and Metabolism, 2021*, 8515607. doi:10.1155/2021/8515607

Beal, T., Massiot, E., Arsenault, J. E., Smith, M. R., & Hijmans, R. J. (2017). Global trends in dietary micronutrient supplies and estimated prevalence of inadequate intakes. *PLoS One, 12*(4), e0175554. doi:10.1371/journal.pone.0175554

Denney, L., Angeles-Agdeppa, I., Capanzana, M. V., Toledo, M. B., Donohue, J., & Carriquiry, A. (2018). Nutrient Intakes and Food Sources of Filipino Infants, Toddlers and Young Children are Inadequate: Findings from the National Nutrition Survey 2013. *Nutrients, 10*(11). doi:10.3390/nu10111730

Department of Science and Technology - Food and Nutrition Research Institute. (2020). *Philippine Nutrition Facts and Figures: 2018 Expanded National Nutrition Survey (ENNS)*. Manila, Philippines.

Food and Nutrition Research Institute-Department of Science and Technology. (2015a). *2nd NATIONAL NUTRITION SUMMIT: 8th NATIONAL NUTRITION SURVEY*. Manila, Philippines.

Food and Nutrition Research Institute-Department of Science and Technology. (2015b). *Philippine Nutrition Facts and Figures 2013: Biochemical Survey, 2nd Edition*. Manila, Philippines.

Kumssa, D. B., Joy, E. J., Ander, E. L., Watts, M. J., Young, S. D., Walker, S., & Broadley, M. R. (2015). Dietary calcium and zinc deficiency risks are decreasing but remain prevalent. *Sci Rep, 5*, 10974. doi:10.1038/srep10974

Mejos, K. K., Ignacio, M. S., Jayasuriya, R., & Arcot, J. (2021). Use of Linear Programming to Develop Complementary Feeding Recommendations to Improve Nutrient Adequacy and Dietary Diversity Among Breastfed Children in the Rural Philippines. *Food Nutr Bull, 42*(2), 274-288. doi:10.1177/0379572121998125

Ramirez, M. A. R., & Ducay, A. J. (2021). Determinants of normal nutrition among 0-59-month-old Filipino children living in low-income households. *Nutr Health, 27*(4), 423-434. doi:10.1177/0260106021992669

Rohner, F., Woodruff, B. A., Aaron, G. J., Yakes, E. A., Lebanan, M. A., Rayco-Solon, P., & Saniel, O. P. (2013). Infant and young child feeding practices in urban Philippines and their associations with stunting, anemia, and deficiencies of iron and vitamin A. *Food Nutr Bull, 34*(2 Suppl), S17-34. doi:10.1177/15648265130342S104

Wessells, K. R., & Brown, K. H. (2012). Estimating the global prevalence of zinc deficiency: results based on zinc availability innational food supplies and the prevalence of stunting. *PLoS One, 7*(11), e50568. doi:10.1371/journal.pone.0050568

References

1. UNICEF. (2021). Fed to Fail? The Crisis of Children's Diets in Early Life. 2021 Child Nutrition Report. New York: United Nations Children's Fund.
2. Dewey, K.G. (2013). The Challenge of Meeting Nutrient Needs of Infants and Young Children during the Period of Complementary Feeding: An Evolutionary Perspective. The Journal of Nutrition, 143(12), 2050-2054. doi:10.3945/jn.113.182527
3. PAHO. (2003) Guiding principles for complementary feeding of the breastfed child. Washington, DC: Pan American Health Organization.
4. Philippine Statistics Authority (PSA) and ICF. (2023). 2022 Philippine National Demographic and Health Survey (NDHS): Final Report. Quezon City, Philippines and Rockville, Maryland, USA.
5. UNICEF Division of Data, Analysis, Planning and Monitoring. (October 2022). Global UNICEF Global Databases: Infant and Young Child Feeding: Child food poverty. New York: United Nations Children's Fund.
6. Prado, E.L. and Dewey, K.G. (2014). Nutrition and brain development in early life. Nutr Rev, 72(4), 267-84. doi:10.1111/nure.12102
7. Aguayo, V.M., et al. (2016). Determinants of stunting and poor linear growth in children under 2 years of age in India: an in-depth analysis of Maharashtra's comprehensive nutrition survey. Matern Child Nutr, 12 Suppl 1(Suppl 1), 121-40. doi:10.1111/mcn.12259
8. UNICEF. (2016). From the First Hour of Life: Making the case for improved infant and young child feeding everywhere. New York: United Nations Children's Fund.
9. Beal, T., et al. (2021). Micronutrient gaps during the complementary feeding period in South Asia: A Comprehensive Nutrient Gap Assessment. Nutr Rev, 79(Suppl 1), 26-34. doi:10.1093/nutrit/nuaa144
10. White, J.M., et al. (2021). Micronutrient gaps during the complementary feeding period in 6 countries in Eastern and Southern Africa: a Comprehensive Nutrient Gap Assessment. Nutr Rev, 79(Suppl 1), 16-25. doi:10.1093/nutrit/nuaa142
11. UNICEF. (2020). Improving Young Children's Diets During the Complementary Feeding Period. UNICEF Programming Guidance. New York: United Nations Children's Fund.
12. UNICEF, et al. (2017). Meeting report on considering, refining, and extending the World Health Organization infant and young child feeding indicators.
13. WHO and UNICEF. (2018). Meeting Report: Inter-agency technical consultation on infant and young child feeding indicators. World Health Organization, United Nations Childrens Fund.
14. Beal, T., et al. (2021). Comprehensive Nutrient Gap Assessment (CONGA): A method for identifying the public health significance of nutrient gaps. Nutr Rev, 79(Suppl 1), 4-15. doi:10.1093/nutrit/nuaa140
15. Sommer, A. and WHO. (1995). Vitamin A deficiency and its consequences: a field guide to detection and control.
16. Stoltzfus, R.J. (2003). Iron deficiency: global prevalence and consequences. Food Nutr Bull, 24(4 Suppl), S99-103. doi:10.1177/15648265030244S206
17. Lozoff, B. (2007). Iron deficiency and child development. Food Nutr Bull, 28(4 Suppl), S560-71. doi:10.1177/15648265070284S409
18. Black, M.M. (1998). Zinc deficiency and child development. Am J Clin Nutr, 68(2 Suppl), 464S-469S. doi:10.1093/ajcn/68.2.464S
19. Semrad, C.E. (1999). Zinc and intestinal function. Curr Gastroenterol Rep, 1(5), 398-403.
20. Pettifor, J.M. (2014). Calcium and vitamin D metabolism in children in developing countries. Ann Nutr Metab, 64 Suppl 2, 15-22. doi:10.1159/000365124
21. Black, M.M. (2008). Effects of vitamin B12 and folate deficiency on brain development in children. Food Nutr Bull, 29(2 Suppl), S126-31. doi:10.1177/15648265080292S117
22. Dhir, S., et al. (2019). Neurological, Psychiatric, and Biochemical Aspects of Thiamine Deficiency in Children and Adults. Front Psychiatry, 10, 207. doi:10.3389/fpsyt.2019.00207

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