COMPREHENSIVE NUTRIENT GAP ASSESSMENT (CONGA)

FINDINGS FOR CHILDREN 6–23 MONTHS IN **TANZANIA**

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WHY IS CONGA NEEDED?

After a child's first six months, nutrient requirements exceed what breastmilk alone can provide. To meet growing nutrient needs and ensure proper growth and development, along with breastfeeding, infants should be introduced to nutrient-dense solid, semi-solid, or soft foods at six months of age (1,2). Despite this, only 26% of infants and young children aged 6–23 months in Tanzania consume a diet meeting the minimum recommended number of food groups (3), increasing their risk of micronutrient deficiencies and growth faltering.

Identification of nutrient and dietary gaps during the complementary feeding period is essential to inform policies and programs designed to improve child health and nutrition. However, nationally-representative data specific to young children are usually only available for select nutrients and infrequently collected. Lower quality evidence can help fill data gaps, particularly when multiple sources point to the same nutrients of concern or dietary issues. Yet decision makers have little guidance on how to locate and interpret the evidence to identify the magnitude and significance of nutrient gaps in child diets given the wide range of indicators used, diversity of data sources and population characteristics, and differences in severity of associated health outcomes. A Comprehensive Nutrient Gap Assessment (CONGA) meets this need by collating the evidence and rating the burden of nutrient gaps[1] and certainty of evidence. This brief summarizes the main food and micronutrient gaps identified from a CONGA conducted in Tanzania and key policy and programmatic actions required. There are several other nutrients that may be limited in the diets of young children, including omega-3 fats (e.g., DHA) and specific essential amino acids (i.e., the quality of protein). The CONGA method can be extended in the future to these and others as more data becomes available.

KEY MESSAGES

- Based on available evidence, **iron**, **vitamin A**, and **calcium** are micronutrients of concern among young children in Tanzania.
- **More research** is required on **other nutrients**, like iodine, which may also represent important gaps in young children's diets in Tanzania.
- The best food sources of micronutrients of concern in Tanzania are **chicken liver** (iron, vitamin A), **beef liver** (vitamin A, iron), **spinach** (iron, vitamin A, calcium), **small dried fish** (calcium, iron), **milk** (calcium, vitamin A), **beef** (iron), and **beans** (iron).
- **More research** is needed to understand the primary barriers to consuming these foods, such as limited **availability**, **accessibility**, **affordability**, or **desirability**.
- **Biofortification**, **fortification**, and **supplementation** can also help fill gaps for micronutrients of concern, particularly where food insecurity, social norms, palatability, and desirability make sufficient consumption from accessible diverse foods infeasible.

1 Micronutrients investigated via CONGA include iron, vitamin A, zinc, calcium, iodine, Vitamin B_1 (thiamine), niacin, vitamin B_{12}, vitamin B_6, folate, and vitamin C.

HOW DOES CONGA WORK?

We reviewed and summarized findings from nationally representative and quality sub-national surveys, grey literature, and journal articles related to infant and young child feeding practices, micronutrient deficiencies, dietary intake, household consumption and expenditure, and the food supply. Experts reviewed this evidence to rate the burden of gap (none, low, moderate, or high) and certainty of available evidence (low, moderate, or high) for 11 micronutrients commonly lacking in young children's diets.[2] We then identified the most nutrient-dense, locally available food sources of micronutrients of concern based on food composition data and local price data.

WHAT DID CONGA FIND IN TANZANIA?

Based on available evidence, micronutrients of concern[3] during the complementary feeding period in Tanzania are **iron**, **vitamin A**, and **calcium** (Table 1). The annex describes specific evidence considered for all ratings. We summarize consequences of deficiencies in micronutrients of concern and justifications for their ratings below.

Table 1. Nutrient gaps and evidence ratings for children 6–23 months in Tanzania[4]

	Iron	Vit A	Ca	Iodine	Vit B_{12}	Vit B_1	Niacin	Zinc	Vit B_6	Folate	Vit C
Gap burden	High	High	High	Mod	Low	Low	Low	Low	None	None	None
Evidence certainty	High	High	Mod	Low	Low	Low	Low	Low	Low	Low	Low

Iron

Iron deficiency is a primary cause of anemia and can result in cognitive impairment, decreased work productivity, and death (4). Data reveal low consumption of iron-rich foods during the complementary feeding period with no improvement over time, and recent national surveys indicate high prevalence of iron deficiency and anemia in young children.

Vitamin A

Vitamin A deficiency has severe consequences, even with mild deficiency, including night blindness, increased susceptibility to infections, and death (5). Data reveal low availability of vitamin A in the national food supply and inadequate consumption of vitamin A-rich foods by infants and young children. National estimates of vitamin A deficiency indicate a problem of severe public health significance for young children in Tanzania.

2 Iron, zinc, iodine, vitamin A, calcium, folate, vitamin C, vitamin B_{12}, thiamine, niacin, and vitamin B_6.

3 Micronutrients of concern are those with at least a moderate burden gap *and* moderate certainty of evidence. There may also be other important nutrient gaps, but evidence is limited.

4 Ca, Calcium; Mod, Moderate; Vit, Vitamin.

Calcium

Calcium deficiency increases risk of rickets, but the broader health implications of deficiency in young children are poorly understood (6). Data on availability of calcium in the national food supply and intake of calcium and calcium-rich foods in young children suggest calcium needs are widely unmet in children and the broader population. However, no biochemical data was available to indicate the level of deficiency.

Other micronutrients

Burdens of iodine, niacin, zinc, folate, and vitamins B_1, B_6, B_{12}, and C gaps were based on low certainty evidence. More data is needed to generate higher quality evidence on the burden of these nutrient gaps in Tanzania, particularly for iodine.

WHAT CAN BE DONE TO ADDRESS THESE GAPS?

Recommended actions to address each nutrient gap in Tanzania are summarized in Table 2. The best complementary food sources of micronutrients of concern are **chicken liver** (iron, vitamin A), **beef liver** (vitamin A, iron), **spinach** (iron, vitamin A, calcium), **small dried fish** (calcium, iron), **milk** (calcium, vitamin A), **beef** (iron), and **beans** (iron) (Table 2). More research is needed to understand the primary barriers to consuming these foods, like limited availability, accessibility, affordability, or desirability. **Biofortified** and **fortified** foods (including fortified complementary foods), **point-of-use fortification** products like micronutrient powders and lipid-based nutrient supplements, and supplements can also help fill nutrient gaps. **Continued breastfeeding** rates in Tanzania are high at one year of age but decrease to < 50% at age two years (3). Efforts to maintain continued breastfeeding rates should be prioritized to help fill vitamin A and calcium gaps. Improving the **quality** of **pregnant** and **lactating women's diets** can also improve their children's nutrition through improved birth outcomes, nutrient transfers at birth, and more nutrient dense breast milk (7).

Table 2. Recommended actions to address complementary feeding gaps in Tanzania

Nutrient gap	Recommended actions to increase dietary intake
Iron	• Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in iron, including **chicken liver**, **beef liver**, **beef**, **spinach**, **beans**, and **small dried fish**, as well as **iron-biofortified** and **fortified** foods. • Ensure **adequate coverage** and **quality** of large-scale **iron fortification**. • Consider **micronutrient powders** and/or **supplementation**.[5]
Vitamin A	• Improve rates of **continued breastfeeding**. • Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in vitamin A, including **chicken liver**, **beef liver**, **carrots**, **spinach**, **eggs**, **milk**, **mango**, and **papaya**, as well as **vitamin A-biofortified** and **fortified** foods. • Ensure **adequate coverage** and **quality** of large-scale **vitamin A fortification**. • Consider **micronutrient powders** and/or continued **supplementation**.[6]
Calcium	• Improve rates of **continued breastfeeding**. • Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in calcium, including **small dried fish**, **spinach**, and **milk**, as well as **calcium-fortified** foods. • Consider calcium-containing **micronutrient powders** and/or **supplementation**. • Collect **biochemical** and **dietary data** in young children.

CONCLUSION

There is clear evidence of significant complementary feeding gaps in iron, vitamin A, and calcium in Tanzania. There may also be other important gaps, but evidence is limited. The best food sources of micronutrients of concern that are relatively available in Tanzania are chicken liver, beef liver, spinach, small dried fish, milk, beef, and beans. These foods need to be available, accessible, affordable, and desirable as complementary foods to be consumed in adequate quantities by young children. Other approaches to fill gaps for micronutrients of concern should also be considered, including biofortification, fortification, and supplementation, particularly where food insecurity, social norms, palatability, and desirability make sufficient consumption from accessible diverse foods infeasible. Continued breastfeeding should be encouraged and can help young children consume enough vitamin A and calcium.

5 Some potential risks have been associated with supplemental iron in children with adequate iron status. Products with low iron doses may be more appropriate in this context.

6 Vitamin A toxicity can occur if excess is consumed over long time periods. Vitamin A supplementation programs should review status and dietary intake regularly.

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ANNEX

Key evidence used to inform ratings[7]

Iron	High burden gap	High certainty evidence
Biochemical data: National iron deficiency (soluble transferrin receptor > 8.3 mg/L) prevalence was 35% and 42% among children 6–59 m and 6–23 m, respectively, in the 2010 DHS (1). Prevalence of anemia was found to be 58% among children 6–59 months in the 2015/16 DHS (and > 75% in children 6–23 m), with no change since 2010 (1,2). **Dietary data:** 36% of children 6–23 m ate iron-rich foods in the past 24 h nationally in 2015/16 (little change from 2010) (2,3). **Diet modeling:** Iron needs were unmet for children 6–8, 9–11, and 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of iron available in the food supply estimated to be inadequate for 19% of the national population in 2011 (5).		
Vitamin A	High burden gap	High certainty evidence
Biochemical data: National vitamin A deficiency prevalence (retinol binding protein < 0.825 µmol/L) among children 6–23 m was 33% in 2010 (1). **Dietary data:** 76% of children 6–23 m consumed vitamin A-rich foods in the past 24 h nationally in the 2015/16 DHS (small improvement from 2010) (1,2). **Food supply nutrient availability:** The amount of vitamin A available in the food supply estimated to be inadequate for 71% of the national population in 2011 (5). **Supplementation:** Nationally, the proportion of children 6–59 m receiving vitamin A supplements in the past 6 months decreased from 61% in 2010 to 41% in the 2015/16 DHS (1,2).		
Calcium	High burden gap	High certainty evidence
Dietary data: Animal milk was consumed by 17% and 19% of breastfed and non-breastfed children 6–23 m,[8] respectively, and cheese, yogurt or other milk products consumed by 8% and 9%, respectively, in the past 24 h nationally in the 2015/16 DHS (2). **Diet modeling:** Calcium needs unmet for children 6–8 and 9–11 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of calcium available in the food supply estimated to be inadequate for 83% of the national population in 2011 (5).		

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7 DHS, Demographic and Health Survey; h, hours; Mod, Moderate; m, months; WRA, women of reproductive age (15–49 years); y, years.

8 The estimates for consumption of animal milk are for all children 6–23 months, however, it is recommended that children under 12 months of age do not consume milks (flavoured or plain) (7).

Iodine	Moderate burden gap	Low certainty evidence
Biochemical data: Nationally, 34% of WRA, 35% of pregnant WRA, and 44% of breastfeeding WRA had urinary iodine concentrations < 100 μg/L in the 2015/16 DHS (2). **Household iodized salt coverage:** Nationally, 61% of households had adequately iodized salt in the 2015/16 DHS (2). A re-analysis of this DHS data found that 68% of households had adequately iodized salt in 2015/16 (6).		
Vitamin B_{12}	Low burden gap	Low certainty evidence
Dietary data: Among children 6–23 m, only 30% consumed meat, fish, or poultry, 17% consumed animal milk, 8% consumed other dairy products, and 7% consumed eggs in the past 24 h nationally in the 2015/16 DHS (2). **Diet modeling:** Vitamin B_{12} needs met for children 6–8, 9–11, and 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of vitamin B_{12} available in the food supply estimated to be inadequate for 11% of the national population in 2011 (5).		
Vitamin B_1 (thiamine)	Low burden gap	Low certainty evidence
Dietary data: 83% of children 6–23 m consumed grains (whole grains contain moderate amounts of thiamine) in the past 24 h nationally in the 2015/16 DHS (2). **Diet modeling:** Thiamine needs unmet for children 6–8 m but met for children 9–11 and 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of thiamine available in the food supply estimated to be inadequate for 13% of the national population in 2011 (5).		
Niacin	Low burden gap	Low certainty evidence
Dietary data: 30% of children 6–23 m consumed meat, fish, or poultry (the highest sources of niacin) in the past 24 h nationally in the 2015/16 DHS (2). **Diet modeling:** Niacin needs met for children 6–8 and 9–11 m but not for children 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of niacin available in the food supply estimated to be inadequate for 8% of the national population in 2011(5).		
Zinc	Low burden gap	Low certainty evidence
Dietary data: Animal source food are consumed infrequently, with only 30% of children 6–23 m consuming meat, fish, or poultry in the past 24 h nationally in the 2015/16 DHS (2). **Diet modeling:** Zinc needs unmet for children 6–8 m; but met for children 9–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of zinc available in the food supply estimated to be inadequate for 0% of the national population in 2011 (5).		

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Vitamin B_6	No burden	Low certainty evidence
Diet modeling: Vitamin B_6 needs met for children 6–8, 9–11, and 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of vitamin B_6 available in the food supply estimated to be inadequate for 0% of the national population in 2011 (5).		
Folate	No burden	Low certainty evidence
Diet modeling: Folate needs met for children 6–8, 9–11, and 12–23 met in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of folate available in the food supply estimated to be inadequate for 0% of the national population in 2011 (5).		
Vitamin C	No burden	Low certainty evidence
Diet modeling: Vitamin C needs met for children 6–8, 9–11, and 12–23 m in six rural villages from Bahi District in 2015 (4). **Food supply nutrient availability:** The amount of vitamin C available in the food supply estimated to be inadequate for 1% of the national population in 2011 (5).		

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