COMPREHENSIVE NUTRIENT GAP ASSESSMENT (CONGA)

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

December 2019

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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 30% of infants and young children aged 6–23 months in Mozambique 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 Mozambique 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** and **vitamin A** are micronutrients of concern among young children in Mozambique.
- **More research** is required on **other nutrients**, like calcium, zinc, and iodine, which may also represent important gaps in young children's diets in Mozambique.
- The best food sources of micronutrients of concern in Mozambique are **chicken liver** (iron, vitamin A), **beef offal** (vitamin A, iron), **sweet potato leaves** (iron, vitamin A), **beef** (iron), **dried fish** (iron), **orange-fleshed sweet potato** (vitamin A), **butter beans** (iron), and **eggs** (vitamin A).
- **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 MOZAMBIQUE?

Based on available evidence, micronutrients of concern[3] during the complementary feeding period in Mozambique are **iron** and **vitamin A** (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 Mozambique[4]

	Iron	Vit A	Ca	Zinc	Iodine	Folate	Niacin	Vit B_{12}	Vit B_1	Vit C	Vit B_6
Gap burden	High	Mod	High	Mod	Mod	Low	Low	Low	Low	None	None
Evidence certainty	High	High	Low	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 very low availability of iron in the national food supply, low consumption of iron-rich foods at the household level, and inadequate iron consumption during the complementary feeding period. 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 very low availability of vitamin A in the national food supply and inadequate consumption of vitamin A-rich foods during the complementary feeding period. Recent national estimates of vitamin A deficiency indicate a problem of moderate public health significance for young children in Mozambique.

Other micronutrients

Burdens of calcium, zinc, iodine, folate, niacin, 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 gaps in Mozambique, particularly for calcium, zinc, and iodine.

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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.

WHAT CAN BE DONE TO ADDRESS THESE GAPS?

Recommended actions to address each nutrient gap in Mozambique are summarized in Table 2. The best complementary food sources of micronutrients of concern are **chicken liver** (iron, vitamin A), **beef offal** (vitamin A, iron), **sweet potato leaves** (iron, vitamin A), **beef** (iron), **dried fish** (iron), **orange-fleshed sweet potato** (vitamin A), **butter beans** (iron), and **eggs** (vitamin A) (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 Mozambique decrease rapidly between one and two years of age. A 2014 national survey found that continued breastfeeding decreased from 87% in children 12–17 months to 61% in children 18–23 months (6). Efforts to improve continued breastfeeding rates should be prioritized to help fill the vitamin A gap, as well as possible gaps in iodine and calcium. 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 Mozambique

Nutrient gap	Recommended actions to increase dietary intake
Iron	• Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in iron, including **beef offal**, **dried fish**, **beef**, **butter beans**, and **sweet potato leaves**, 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 **beef liver**, **chicken liver**, **orange-fleshed sweet potato**, **sweet potato leaves**, **eggs**, **mango**, **fresh milk**, and **fatty fish**, 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]

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.

CONCLUSION

There is clear evidence of significant complementary feeding gaps in iron and vitamin A in Mozambique. There may also be other important gaps, but evidence is limited. The best food sources of micronutrients of concern that are relatively available in Mozambique are chicken liver, beef offal, sweet potato leaves, beef, dried fish, orange-fleshed sweet potato, butter beans, and eggs. 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.

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ANNEX

Key evidence used to inform ratings[7]

Iron	High burden gap	High certainty evidence

Biochemical data: The 2012/12 NMS found that prevalence of iron deficiency (plasma ferritin < 12 μg/L) in children 6–59 m was 19% (15% in 6–11 m and 37% in 12–23 m). The same survey found prevalence of anemia and iron deficiency anemia (hemoglobin < 110 g/L adjusted for altitude and hemoglobin < 110 g/L with plasma ferritin < 12.0 μg/L) to be 71% and 17%, respectively (1). The 2015 DHS found prevalence of anemia (hemoglobin <11.0 g/dL) in children 6–59 m to be 64% (down from 69% in 2011) (1,2,3).

Dietary data: 45% of children 6–23 m consumed iron-rich foods in the past 24 h nationally, per the 2011 DHS (2).

Household consumption: Approximately 13% of households consumed heme-rich foods daily in the 7 days prior to the 2013 CFSVA (a decrease from 22% in 2009). The same survey found that 39% of households did not consume any heme-rich foods in the 7 days prior to the survey. Additionally, 0% of households considered to have 'poor' food security and 2% of households considered to have 'acceptable' food security consumed heme-rich foods daily. Nationally the consumption of heme-rich foods decreased from 2006 to 2013 (4).

Food supply nutrient availability: The amount of iron available in the food supply estimated to be inadequate for 95% of the national population in 2011 (5).

Supplementation: The 2011 DHS found that national iron supplementation coverage for children 6–59 m was 24% in the week prior to the survey (2), and the 2012/13 NMS found coverage to be 11% in the 6 m prior to the survey (1,5).

Vitamin A	Moderate burden gap	High certainty evidence

Biochemical data: Vitamin A deficiency (retinol binding protein < 0.70 μmol/L) in children 6–59 m was 19% in the 2012/2013 NMS (14% in those 6–11 m and 25% in those 12–23 m) (1).

Dietary data: 71% of children 6–23 m consumed vitamin A-rich foods in the past 24 h nationally, per the 2011 DHS (2).

Household consumption: The 2013 CFSVA found that approximately 63% of households consumed vitamin-A rich foods in 2013 (a large increase from 23% in 2006 and 32% in 2009). However, within households defined as having 'poor' food security, consumption was very infrequent (4).

Food supply nutrient availability: The amount of vitamin A available in the food supply estimated to be inadequate for 100% of the national population in 2011 (5).

Supplementation: National vitamin A supplementation coverage for children 6–59 m was 75% in the 2011 DHS (2), and 61% in the 2012/13 NMS (1).

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7 CFSVA, Comprehensive Food Security & Vulnerability Analysis; DHS, Demographic and Health Survey; FCS, Food Consumption Survey; h, hours; m, months; NMS, National Micronutrient Survey; RNI, Reference Nutrient Intake; WRA, women of reproductive age (15–49 years); y, years.

Calcium	High burden gap	Low certainty evidence
Dietary data: Animal milk was consumed by 3% and 12% of breastfed and non-breasted children 6–23 m,[8] respectively, and cheese, yogurt or other dairy products were consumed by 8% and 19% of breastfed and non-breastfed children 6–23 m, respectively, in the past 24 h nationally per the 2011 DHS (2). **Food supply nutrient availability:** The amount of calcium available in the food supply estimated to be inadequate for 88% of the national population in 2011 (5).		
Zinc	Moderate burden gap	Low certainty evidence
Dietary data: 39% children 6–23 m consumed meat, fish, or poultry in the past 24 h nationally, per the 2011 DHS (2). **Food supply nutrient availability:** The amount of zinc available in the food supply estimated to be inadequate for 71% of the national population in 2011 (5).		
Iodine	Moderate burden gap	Low certainty evidence
Biochemical data: There is reference to a recent 2011/12 national survey on urinary iodine concentration of WRA in several documents, however, the actual survey data was unable to be located. Quoted results indicate median urinary iodine concentration of 97 µg/L in WRA. **Household iodized salt coverage:** 45% of households had iodized salt in 2011 (1).		
Vitamin B_{12}	Low burden gap	Low certainty evidence
Biochemical data: Vitamin B_{12} deficiency (plasma B_{12} < 150 pmol/L) was found to be 11% in non-pregnant WRA in the 2012/13 NMS (1). **Dietary data:** Among breastfed children 6–23 m, 39% consumed meat, fish or poultry, 3% consumed animal milk, 8% consumed other dairy, and 17% consumed eggs in the past 24 h nationally per the 2011 DHS (2). **Food supply nutrient availability:** The amount of vitamin B_{12} available in the food supply estimated to be inadequate for 48% of the national population in 2011 (5).		
Vitamin B_1 (thiamine)	Low burden gap	Low certainty evidence
Dietary data: 74% of breastfed children 6–23 m consumed grains (whole grains contain moderate amounts of thiamine) in the past 24 h nationally per the 2011 DHS (2). **Food supply nutrient availability:** The amount of thiamine available in the food supply estimated to be inadequate for 26% of the national population in 2011 (5).		

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

Niacin	Low burden gap	Low certainty evidence
Dietary data: 39% children 6–23 m consumed meat, fish, or poultry (the best niacin sources) in the past 24 h nationally per the 2011 DHS (2). **Food supply nutrient availability:** The amount of niacin available in the food supply estimated to be inadequate for 26% of the national population in 2011 (5).		
Folate	Low burden gap	Low certainty evidence
Biochemical data: Prevalence of folate deficiency among non-pregnant WRA (as measured by plasma folate < 10 nmol/L) was 2% in the 2012/13 NMS (1). **Food supply nutrient availability:** The amount of folate available in the food supply estimated to be inadequate for 24% of the national population in 2011 (5).		
Vitamin C	No burden	Low certainty evidence
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).		
Vitamin B_6	No burden	Low certainty evidence
Food supply nutrient availability: The amount of vitamin B_6 available in the food supply estimated to be inadequate for 2% of the national population in 2011 (5).		

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Recommended citation

GAIN and UNICEF. Comprehensive Nutrient Gap Assessment (CONGA): Findings for children 6–23 months in Mozambique. GAIN. Geneva, Switzerland, 2019.

Acknowledgements

This briefing paper was written by Jessica M White, Heather Kelahan, and Ty Beal. It was produced by GAIN and UNICEF under the Regional Initiatives for Sustained Nutrition and Growth (RISING) program, supported by the Bill & Melinda Gates Foundation and the Ministry of the Foreign Affairs of the Netherlands. We thank nutrition teams in UNICEF ESARO and Headquarters for their helpful feedback on earlier drafts; Saul S Morris and Alison Tumilowicz for their contribution to the methods; Joanne E Arsenault, Harriet Okronipa, and Guy-Marino Hinnouho for their role as expert reviewers; and Wendy Gonzalez and Sharada Keats for their help framing this briefing paper series. Cover photo credit: ©Unsplash/Zach Vessels.

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