COMPREHENSIVE NUTRIENT GAP ASSESSMENT (CONGA)

FINDINGS FOR CHILDREN 6–23 MONTHS IN **SOUTH AFRICA**

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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 49% of infants and young children 6–23 months of age in South Africa 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 South Africa 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, **vitamin A** and **calcium** are micronutrients of concern among young children in South Africa.
- **More research** is required on **other nutrients** which may also represent important gaps in young children's diets in South Africa.
- The best food sources of micronutrients of concern in South Africa are **chicken liver** (vitamin A), **small fish** (calcium, vitamin A), **beef liver** (vitamin A), **spinach** (vitamin A, calcium), **fresh milk** (vitamin A, calcium), **carrots** (vitamin A), and **mango** (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 SOUTH AFRICA?

Based on available evidence, micronutrients of concern[3] during the complementary feeding period in South Africa are **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 South Africa[4]

	Vit A	Ca	Iron	Vit B_{12}	Iodine	Vit B_1	Niacin	Zinc	Vit B_6	Folate	Vit C
Gap burden	Mod	Mod	Low	Low	Low	Low	Low	Low	Low	Low	Low
Evidence certainty	Mod	Mod	Mod	Mod	Low	Low	Low	Low	Low	Low	Low

Vitamin A

Vitamin A deficiency has severe consequences, even with mild deficiency, including night blindness, increased susceptibility to infections, and death (4). Data reveal inadequate consumption of vitamin A-rich foods by infants and young children, and national estimates of vitamin A deficiency indicate a problem of severe public health significance for young children in South Africa.

Calcium

Calcium deficiency increases risk of rickets, but the broader health implications of deficiency in young children are poorly understood (5). Nutrient intake, diet modeling, food consumption, and food supply nutrient availability data all suggest that calcium needs are unmet in children. However, no biochemical data was available to indicate the level of deficiency.

Other micronutrients

Burdens of iron and Vitamin B_{12} gaps were low based on moderate certainty evidence. Burdens of iodine, niacin, zinc, folate, and vitamins B_1, B_6, 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 South Africa.

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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 South Africa are summarized in Table 2. The best complementary food sources of micronutrients of concern are **chicken liver** (vitamin A), **small fish** (calcium, vitamin A), **beef liver** (vitamin A), **spinach** (vitamin A, calcium), **fresh milk** (vitamin A, calcium), **carrots** (vitamin A), and **mango** (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 South Africa are very low (approximately 50% at one year and 13% at two years of age) (3). Efforts to improve 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 (6).

Table 2. Recommended actions to address complementary feeding gaps in South Africa

Nutrient gap	Recommended actions to increase dietary intake
Vitamin A	• Increase rates of **continued breastfeeding**. • Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in vitamin A, including **beef liver**, **chicken liver**, **carrots**, **spinach**, **eggs**, **mango**, **fresh milk**, **fish**, and **sour milk**, 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**.[5]
Calcium	• Increase rates of **continued breastfeeding**. • Assess and ensure availability, accessibility, affordability, and desirability of natural foods rich in calcium, including **small fish**, **spinach**, and **fresh milk**, as well as **calcium-fortified** foods. • Consider calcium-containing **micronutrient powders** and/or **supplementation**. • Collect **biochemical** and **dietary data** in young children.

5 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 vitamin A and calcium in South Africa. There may also be other important gaps, but evidence is limited. The best food sources of micronutrients of concern that are relatively available in South Africa are chicken liver, small fish, beef liver, spinach, fresh milk, carrots, and mango. 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.

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ANNEX

Key evidence used to inform ratings[6]

Vitamin A	Moderate burden gap	Moderate certainty evidence

Biochemical data: National vitamin A deficiency prevalence (serum retinol < 0.7 μmol/L) among children under 5 y was 44% in the 2012 SANHANES (1).

Dietary data: 73% of children 6–23 m consumed vitamin A-rich foods in the past 24 h nationally in the 2016 DHS. Additionally, 41% of children 12–23 m were reported to have ever consumed liver (with 70% of these children having consumed it at least once in the previous month) in the 2016 DHS (2).

Diet modeling: The diets of 0% of breastfed children 6–17 months were found to be inadequate in vitamin A in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume vitamin A in quantities greater than the EAR in 2011 (4). Median vitamin A intake in children 24–59 months in a small semi-urban town was found to be greater than the EAR in 2010/11 (5).

Food supply nutrient availability: The amount of vitamin A available in the food supply estimated to be inadequate for 0% of the national population in 2011 (6).

Supplementation: Nationally, the proportion of children 6–59 months receiving vitamin A supplements in the past 6 months was 72% in 2016 (2,6).

Calcium	Moderate burden gap	Moderate certainty evidence

Dietary data: Animal milk was consumed by 23% and 37% of breastfed and non-breastfed children 6–23 m,[7] respectively, and cheese, yogurt or other milk products were consumed by 46% and 55% of breastfed and non-breastfed children 6–23 months, respectively, in the past 24 h nationally in the 2016 DHS (2).

Diet modeling: The diets of 95% of breastfed children 6–17 m were found to be inadequate in calcium in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume calcium in quantities lower than the EAR in 2011 (4). Median calcium intake in children 24–59 m in a small semi-urban town was found to be only 21% of the EAR in 2010/11 (5).

Food supply nutrient availability: The amount of calcium available in the food supply estimated to be inadequate for 80% of the national population in 2011 (6).

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6 DHS, Demographic and Health Survey; EAR, Estimated Average Requirement; h, hours; Mod, Moderate; m, months; RNI, Reference Nutrient Intake; SANHANES, South African National Health and Nutrition Examination Survey; y, years.

7 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) (7).

Iron	Low burden gap	Moderate certainty evidence
Biochemical data: National prevalence of iron depletion (serum ferritin < 15 ng/mL and Hemoglobin ≥ 11 g/dL) among children under 5 y was 8% in the 2012 SANHANES (1). National prevalence of anemia in children 6–59 months was 61% in the 2016 DHS (2). **Dietary data:** 61% of children 6–23 m consumed iron-rich foods in the past 24 h nationally in the 2016 DHS (consumption only 27% in infants 6–8 m) (2). **Diet modeling:** The diets of 94% of breastfed children 6–17 m were found to be inadequate in iron in one urban and one rural area in 2011 (3) The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume iron in quantities greater than the EAR in 2011 (4). Median iron intake in children 24–59 m in a small semi-urban town was found to be greater than the EAR in 2010/11 (5). **Food supply nutrient availability:** The amount of iron available in the food supply estimated to be inadequate for 0% of the national population in 2011 (6).		
Vitamin B_{12}	Low burden gap	Moderate certainty evidence
Dietary data: Among breastfed children 6–23 m, 41% consumed meat, fish or poultry, 23% consumed animal milk, 46% consumed other dairy products, and 38% consumed eggs in the past 24 h nationally in the 2016 DHS. Rates were slightly higher, but similar, in non-breastfed children (2). **Diet modeling:** The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume vitamin B_{12} in quantities greater than the EAR in 2011 (4). Median vitamin B_{12} intake in children 24–59 m in a small semi-urban town was found to be above the EAR in 2010/11 (5). **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 (6).		
Iodine	Low burden gap	Low certainty evidence
Household iodized salt coverage: Nationally, 89% of children < 5 ywere residing in a household with adequately iodized salt in the 2016 DHS (2).		
Vitamin B_1 (thiamine)	Low burden gap	Low certainty evidence
Dietary data: 66% of breastfed and 76% of non-breastfed children 6–23 m consumed grains (whole grains contain moderate amounts of thiamine) in the past 24 h nationally in the 2016 DHS (2). **Diet modeling:** The diets of 48% of breastfed children 6–17 m were found to be inadequate in thiamine in one urban and one rural area in 2011 (3). Approximately half of children 12–36 m included in a study in two disadvantaged communities were found to consume thiamine in quantities above the EAR in 2011 (4). Median thiamine intake in children 24–59 m in a small semi-urban town was found to be greater than EAR in 2010/11 (5). **Food supply nutrient availability:** The amount of thiamine available in the food supply estimated to be inadequate for 0% of the national population in 2011 (6).		

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Niacin	Low burden gap	Low certainty evidence

Dietary data: 41% of breastfed and 51% of non-breastfed children 6–23 m consumed meat, fish, or poultry (the highest sources of niacin) in the past 24 h nationally in the 2016 DHS (2).

Diet modeling: The diets of 89% of breastfed children 6–17 m were found to be inadequate in niacin in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume niacin in quantities greater than the EAR in 2011 (4). Median niacin intake in children 24–59 m in a small semi-urban town was found to be greater than the EAR in 2010/11 (5).

Food supply nutrient availability: The amount of niacin available in the food supply estimated to be inadequate for 0% of the national population in 2011 (6).

Zinc	Low burden gap	Low certainty evidence

Dietary data: 41% of breastfed and 51% of non-breastfed children 6–23 m consumed meat, fish, or poultry in the past 24 h nationally in the 2016 DHS (2).

Diet modeling: The diets of 100% of breastfed children 6–17 m were found to be inadequate in zinc in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume zinc in quantities greater than the EAR in 2011 (4). Median zinc intake in children 24–59 m in a small semi-urban town was found to be greater than the EAR in 2010/11 (5).

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 (6).

Vitamin B_6	Low burden gap	Low certainty evidence

Diet modeling: The diets of 77% of breastfed children 6–17 m were found to be inadequate in vitamin B_6 in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume vitamin B_6 in quantities greater than the EAR in 2011 (4). Median vitamin B_6 intake in children 24–59 m in a small semi-urban town was found to be greater than the EAR in 2010/11 (5).

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 (6).

Folate	Low burden gap	Low certainty evidence

Diet modeling: The diets of 4% of breastfed children 6–17 m were found to be inadequate in folate in one urban and one rural area in 2011 (3). The majority of children 12–36 m included in a study in two disadvantaged communities were found to consume folate in quantities below the EAR in 2011 (4). Median folate intake in children 24–59 m in a small semi-urban town was found to be 95% of the EAR in 2010/11 (5).

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 (6).

Vitamin C	Low burden gap	Low certainty evidence

Diet modeling: The diets of 0% of breastfed children 6–17 m were found to be inadequate in vitamin C in one urban and one rural area in 2011 (3). Median vitamin C intake in children 24–59 m in a small semi-urban town was found to be 91% of the EAR in 2010/11 (5).

Food supply nutrient availability: The amount of vitamin C available in the food supply estimated to be inadequate for 20% of the national population in 2011 (6).

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