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Regional Landscape Analysis of Trends and Factors of Young Children's Diets

in UNICEF's West and Central Africa Region (WCAR)

PennState

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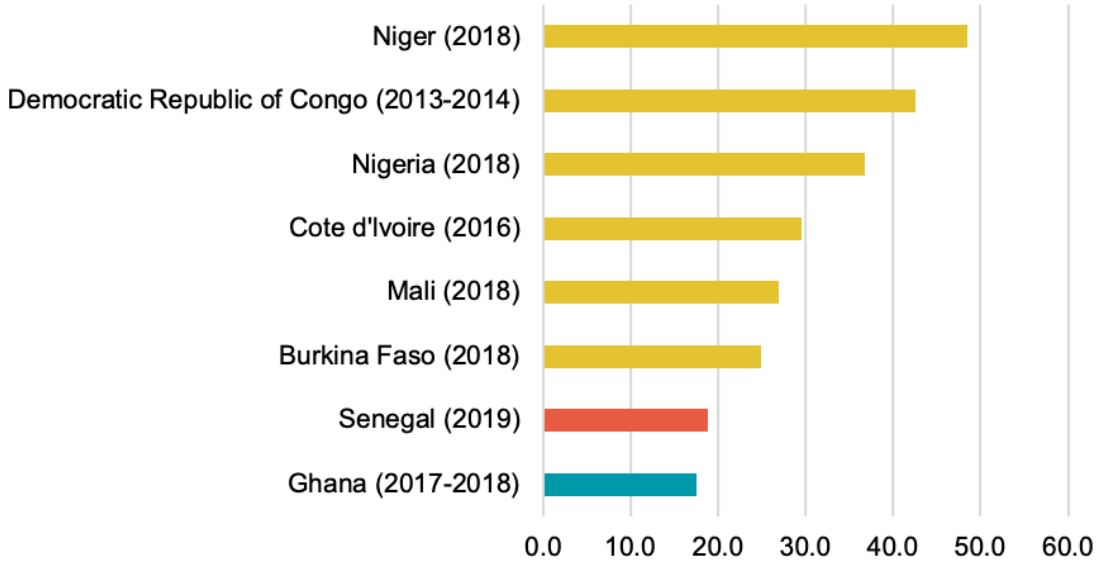
INTRODUCTION

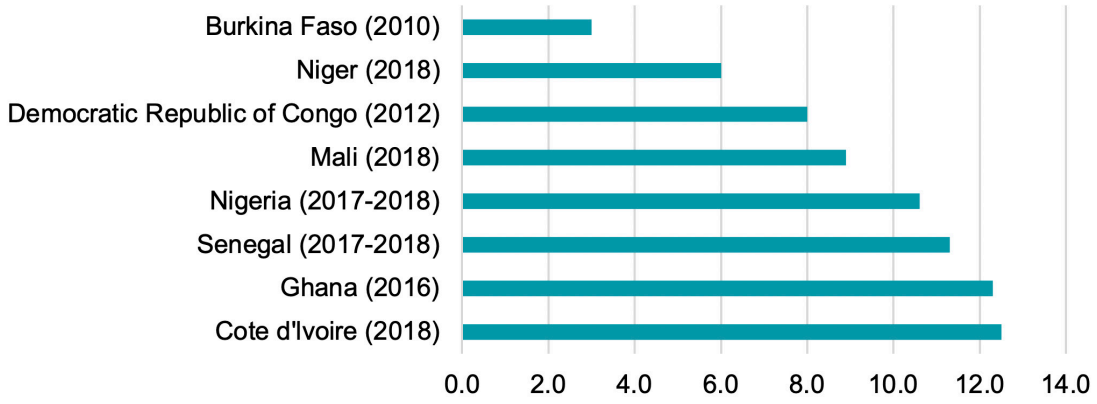
The prevalence of stunting in children younger than 5 years has decreased globally during the past two decades, affecting one in five children in the world (22%) (Global Nutrition Report, 2020). However, in UNICEF's West and Central Africa Region (WCAR), the current prevalence of stunting remains among the highest: 32.7% of children were estimated to be stunted in 2019 (UNICEF, WHO and World Bank, 2020). In the 8 focus countries of the region, the prevalence of stunting ranges from 17.5% in Ghana to 48.5% in Niger (UNICEF, WHO, and World Bank, 2020). Of the eight countries, seven are off course to meet the Sustainable Development Goal target of a 40% reduction in stunting by 2025 (Figure 1.1).

Figure 1.1 Stunting prevalence of the 8 focus countries in UNICEF's West and Central Africa Region. Orange bars: off course, some progress; Red bar: off course, no progress, Yellow bar: off course, some progress; Blue bar: on course, good progress. Source: Data are extracted from UNICEF/WHO/World Bank Joint Child Malnutrition Estimates Expanded Database: Stunting, March 2020, New York and the data sources include Demographic and Health Surveys (DHS), the Multiple Indicator Cluster Surveys (MICS), Standardized Monitoring and Assessment of Relief and Transitions (SMART).



Among all the causes of stunted growth in children, inadequate child feeding is one of the most proximal and immediate determinants (Black et al., 2013, Stewart et al., 2013). The complementary feeding period, between 6 and 23 months, is also associated with the largest proportion of stunting occurrence (Victora et al., 2010). As defined by the World Health Organization (WHO, 2010), inappropriate complementary feeding includes early or delayed introduction of solid or semi-solid foods, and/or inadequate quantity or quality of complementary foods. The minimum acceptable diet is an indicator that defines the minimum requirements in terms of feeding frequency and dietary diversity and was only met by 3.0–12.5% of children 6–23 months of age in the 8 focus countries in 2010–2018 (Figure 1.2).

Figure 1.2. Proportion of children 6–23 months of age meeting the minimum acceptable diet in the 8 focus countries in UNICEF's West and Central Africa Region, 2010–2018. Source: Demographic and Health Surveys and the Multiple Indicator Cluster Surveys



It is critical to understand the status of complementary feeding, how it is changing over time, and what factors predict sub-optimal feeding practices. Further, understanding the programmatic and policy contexts through discussions with stakeholders will help contextualize and identify unmet needs and populations at risk, thus informing and prioritizing the design and implementation of policies, programs, and intervention strategies.

This WCAR complementary feeding report is composed of 11 chapters. Chapter 1 (this chapter) sets the stage in terms of the overall background of children's nutrition and feeding status. Chapter 2 provides an overview of the methods used in the data analysis, literature review, and qualitative interviews. Chapter 3 presents the regional findings of the trends and influencing factors of complementary feeding practices from 2010–2018. Chapters 4–11 present country-specific findings for the eight focus countries. We also include supplemental documents in the appendix for readers' reference.

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CHAPTER 2

RESEARCH METHODS

SPECIFIC AIMS

The objective of this study was to provide an in-depth understanding of complementary feeding in UNICEF's West and Central Africa Region (UNICEF-WCAR) as well as to generate appropriate intervention recommendations to address the regional and country-specific complementary feeding situations.

To do so, this study has the following aims:

1. To conduct both a regional and an 8 country-specific quantitative analysis describing key complementary feeding indicators, how they are changing over time, and their determinants
2. To describe the current evidence base related to the efficacy and effectiveness of complementary feeding interventions in WCAR and 8 selected countries
3. To contextualize the state of the evidence around the complementary feeding situation in WCAR taking a multi-level and systematic perspective while considering the programmatic and policy contexts both regionally and within the 8 select countries
4. To share and validate findings among regional stakeholders and build consensus around the most appropriate evidence-informed intervention recommendations for improved planning, implementing, and monitoring of complementary feeding in WCAR

Study design–overview of the landscape analysis

This multi-phase, mixed methods descriptive study included a quantitative analysis, an in-depth literature review, and qualitative data collection and analysis. Results from these analyses were shared with country stakeholders during a validation workshop for feedback in Dakar, Senegal in February, 2020.

Study setting–geographic focus

This study had both a regional and country-specific focus. At both levels, quantitative and qualitative analyses were conducted, as well as in-depth literature reviews to triangulate results for more credible and valid findings.

First, at the regional level, we examined all 24 WCAR countries. We described key complementary feeding indicators, broadly interpreted existing regional evidence broadly, and outlined key informant narratives that help contextualize this regional nutrition situation.

Second, at the country level, we focused on 8 specific countries (Burkina Faso, Cote d'Ivoire, Ghana, Mali, Niger, Nigeria, Senegal, and Democratic Republic of Congo). This detailed analysis at the country level also described key complementary feeding indicators, country-specific evidence from published literature on efficacy and effectiveness intervention trials, and informant interviews to contextualize each country's nutrition situation.

DATA COLLECTION AND ANALYTIC METHODS

Data collection and analysis included 3 interrelated components whose specific methods are described in the following sub-sections: 1) quantitative analysis, 2) literature review, and 3) qualitative analysis.

Quantitative analysis

Overview

The quantitative analysis consisted of two parts:

Part 1: A secondary data analysis describing an overview of regional complementary feeding trends and key indicators among 24 countries in UNICEF-WCAR;

Part 2: A risk factors analysis of selected complementary feeding practices in 8 focus countries.

Data sources

We included national survey data from DHS, MICS, SMART and other representative national surveys, which included questions regarding complementary foods and feeding practices in children aged 6 to 23 months.

Part 1: The country-specific risk factor analysis included the most recent datasets of the 8 focus countries. Information about complementary feeding practices and selected risk factor variables were extracted for the analysis.

Part 2: Country-specific risk factor analysis included the most recent datasets of the 8 focus countries. Information about complementary feeding practices and selected risk factor variables were extracted for the analysis.

Inclusion and exclusion criteria

Part 1, regional overview (24 countries): Included for analysis were the feeding practices of infants and children aged 6–23 months detailed in national survey reports published prior to February 29, 2020. If there were two or more national reports included for the same country and year, the mean of the estimates was calculated and used for the regional analysis.

Part 2, country-specific risk factor analysis (8 countries): The inclusion criteria of mother-child pairs in the most recent national dataset were 1) youngest singletons aged 6–23 months; 2) mothers of reproductive age between 15–49 years; 3) infants and children were alive at the time of survey; and 4) children usually living with their mothers.

Definitions of key complementary feeding indicators

WHO definition

We defined the following complementary feeding indicators per WHO definitions (WHO, 2010). WHO-defined complementary feeding indicators were used in both regional and country-level analyses.

Continued Breastfeeding:

- Continued breastfeeding at 1 year is defined as the percentage of children 12–15 months of age who were fed breast milk during the previous day.
- Continued breastfeeding at 2 years is defined as the percentage of children 20–23 months of age who were fed breast milk during the previous day.

Complementary Feeding Practice and Intake of Nutrient-Rich Foods:

- Introduction of solid, semi-solid or soft foods (Intro) is defined as the percentage of infants 6–8 months of age who received solid, semi-solid or soft foods during the previous day.
- Minimum meal frequency (MMF) is defined as the percentage of breastfed children 6–23 months of age who received solid, semi-solid or soft foods the minimum number of times or more during the previous day AND the number of non-breastfed children 6–23 months of age who received solid, semi-solid or soft foods or milk feeds the minimum number of times or more during the previous day. Minimum number of complementary foods is defined as: 2 times solid, semi-solid or soft foods for breastfed infants 6–8 months of age; 3 times solid, semi-solid or soft foods for breastfed children 9–23 months of age; and 4 times solid, semi-solid or soft foods and/or milk feeds for non-breastfed children 6–23 months of age. This definition has been applied since 2010. The following DHS reports also reported MMF per the WHO 2010 definition and therefore were included for the country-specific analysis: Democratic Republic of the Congo (2007), Ghana (2008), Nigeria (2008), Sao Tome and Principe (2008), and Sierra Leone (2008).

  Minimum dietary diversity (MDD) is defined as the percentage of children 6–23 months of age who received foods from ≥ 4 (out of 7) food groups during the previous day. The eight food groups are: (i) grains, roots and tubers; (ii) legumes and nuts; (iii) dairy products (infant formula, milk, yogurt, cheese); (iv) flesh foods (meat, fish, poultry and liver/organ meats); (v) eggs; (vi) vitamin-A rich fruits and vegetables; (vii) other fruits and vegetables. Prior to 2010, MDD was reported separately by child breastfeeding

status and the definition was not consistent with the WHO 2010 definition. Therefore, only national MDD data published in or later than 2010 were included for regional overview analysis.

- Minimum acceptable diet (MAD) is defined as the percentage of breast children 6–23 months of age who received at least the minimum dietary diversity (4 or more out of 7 food groups) and the minimum meal frequency during the previous day AND non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day. The definition has been applied consistently across DHS and MICS reports between 2010 to 2020. Prior to 2010, MAD was defined as achieving 3 feeding practices: feeding with maternal milk or milk products daily, MDD and MMF. Therefore, only national MDD data published in or later than 2010 were included in this regional overview analysis.
- Intake of vitamin A-rich foods is defined as the percentage of children 6–23 months of age who received a vitamin A-rich food during the previous day. Vitamin A-rich foods included fruits and vegetables naturally rich in vitamin A and foods made with red palm oil or red palm nut.
- Intake of animal-source/iron-rich foods is defined as the percentage of children 6–23 months of age who received an animal-source food during the previous day. Animal-source foods included dairy, eggs, and flesh foods. Foods fortified with iron are excluded in this indicator.

Supplementation and Fortification: The following indicators were reported in the included national reports. The definitions of each indicators are provided as the following:

- Vitamin A supplementation is defined as the percentage of children under 5 who received vitamin A supplementation in the past 6 months.
- Iron supplementation is defined as the percentage of children under 5 who received iron supplementation in the past 7 days.
- Multiple micronutrient powder use is defined as the percentage of children 6–23 months of age who received multiple micronutrient powder in the past 7 days.
- Iodized salt use is defined as the percentage of households with children 6–59 months of age that use iodized salt.
- Intake of iron fortified foods is defined as the percentage of children 6–23 months of age who received iron fortified foods during the previous day.

Definitions of standard indicators used to assess complementary feeding are being reexamined and redefined by UNICEF. The following indicators have been redefined by UNICEF. These UNICEF-defined data have been reported by UNICEF (UNICEF, 2019) and we have extracted data that was last updated in October 2019. The UNICEF-defined complementary feeding indicators were only used in country-level analyses.

- Minimum dietary diversity (MDD) is defined as the percentage of children 6–23 months of age who received foods from ≥ 5 (out of 8) food groups during the previous day. The eight food groups are: (i) breastmilk; (ii) grains, roots and tubers; (iii) legumes and nuts; (iv) dairy products (infant formula, milk, yogurt, cheese); (v) flesh foods (meat, fish, poultry and liver/organ meats); (vi) eggs; (vii) vitamin-A rich fruits and vegetables; (viii) other fruits and vegetables.

- Minimum acceptable diet (MAD) is defined as the percentage of breast-fed children 6–23 months of age who received at least the minimum dietary diversity and the minimum meal frequency during the previous day AND non-breastfed children 6–23 months of age who received at least two milk feedings and had at least the minimum dietary diversity not including milk feeds and the minimum meal frequency during the previous day.

Proposed risk factors and definitions

We conducted the quantitative analysis based on an existing conceptual framework (Stewart et al., 2013) and our prior complementary feeding analysis for the UNICEF Regional Office for South Asia (ROSA) (Na et al., 2017a, Na et al., 2018a, Na et al., 2018b, Na et al., 2017b). Based on this conceptual framework, we selected the risk factor variables from three levels: 1) individual, 2) household and 3) community characteristics. Their definitions are listed in Appendix Table 1.

The individual factors included child, maternal and paternal characteristics:

- Child characteristics including sex, age, birth order, birth interval, supplementation usage (vitamin A and iron), and child morbidity (diarrhea, fever, and cough).
- Maternal characteristics included age, smoking status, education, occupation, nutritional status (height and BMI), breastfeeding practices, utilization of reproductive health care, exposure to media, and women's empowerment (involvement in decision making and attitude towards domestic violence).
- Paternal characteristics included age, education and occupation.

The household factors described household structures and socioeconomic status, including place of residence, sex of household head, number of household members, number of children under five years, types of cooking fuel, water characteristics (source and location of drinking water, time to get to water sources), and overall household wealth index.

The community-level factors described cluster-level (usually the primary sampling unit) features that describe the broader environment the mothers and children live in. Community-level factors involved in this analysis included cluster-level of maternal education, women's empowerment, sanitation, and access to health care.

Statistical analysis

Part 1, regional overview (24 countries): A secondary data analysis of the published key complementary feeding indicators was conducted with the goal to 1) identifying data gaps; and 2) presenting the regional trend and current status of complementary feeding. The national prevalence of key feeding indicator data was extracted from DHS, MICS, SMART, and UNICEF-IYCF databases of all 24 countries and of all years. A data availability table was composed to summarize what complementary feeding indicators have been reported. UN country-age-specific population data (United Nations, 2019) were used to create figures presenting regional trends of key complementary feeding indicators using the population size weighted estimates.

Part 2, country-specific analysis (8 countries): The outcomes of interest in this second phase analysis were Intro, MDD, MMF, MAD. Using the most current national survey data

of the 8 focus countries, we applied the statistical analysis methods performed for the UNICEF-ROSA First Food Project in South Asia with modifications (Na et al., 2017b, Na et al., 2017a, Na et al., 2018b, Na et al., 2018a).

Specifically, proportions, means, and trends are expressed with adjustment for the complex sampling at country level. We first performed bivariate associations between risk factors and outcome of interest to select risk factors at p=0.1 level to be included in the multivariable analysis. Collinearity was checked in multivariable models using the estimated variance inflation factors (VIF) and variables with VIF > 5 were removed from the multivariable models.

Literature review

Overview

We developed a search strategy with UNICEF-WCARO and the Penn State Libraries to identify eligible literature regarding the programmatic and policy context for complementary feeding in WCAR (e.g. programs and policies regarding strategies, implementation, monitoring, legal and trade environment for complementary foods, cost studies and value chain data of key complementary foods, existing evidence of efficacy and effectiveness intervention trials and programs in improving the access component of complementary feeding). The objective of the desk review was to provide background knowledge in order to triangulate quantitative and qualitative findings.

Given the scope and timeline of this project, most of the information regarding program/policy strategies, implementation, monitoring, environment, cost, and value chain data was extracted from the grey literature. This literature was be searched for information from all 24 countries in the UNICEF-WCAR. The published literature was also searched with an emphasis on efficacy and effectiveness intervention trials designed to improve the access component of complementary feeding. Given the magnitude of the published literature on these topics, the searches included all 24 countries (for a broad understanding of the situation) but data extraction and summary were focused on the 8 core countries listed above (see “Study setting–geographic focus”).

General inclusion and exclusion criteria

The range of years for the searches was limited to 2010–date, the searches were limited to human studies only, and the age range was 1–23 months (due to search functions; we then extracted data only from the studies that focused on children 6–23 month). Specifically, the following inclusion and exclusion criteria were applied to screen and select intervention trials:

Inclusion criteria for intervention trials:

- intervention trials, including randomized controlled trials, cluster randomized controlled trials, factorial randomized controlled trials, crossover randomized trials, parallel randomized controlled trials, randomized trials, effectiveness trials, efficacy trials, and pre-post studies.
- postnatal nutritional/dietary relevant interventions (providing diet, nutrient supplements, fortified foods, MNPs, single or multiple nutrients)Cochrane Library and Cochrane Reviews

- infants and young children aged from 6-23 monthsPAIS Index (especially helpful for policy papers)
- primary outcomes including growth (weight, height, weight for age, height for age, weight for height), nutritional biomarkers, nutrition-relevant diseases (anemia, stunting), acute moderate malnutrition

Exclusion criteria for trial data:

- cross-sectional, case-control, and review papers
- prenatal/antenatal intervention (to mother or within first 2 months to child)
- other intervention types besides nutritional/dietary relevant interventions (such as nutritional education, cash transfer, etc)
- wrong population (outside age range, such as neonates, preschoolers, mothers, etc)
- population with disease or symptoms of certain diseases (such as malaria, infectious diseases, born from mothers with HIV)
- animal studies, cell studies

Data sources

The following databases were used in the literature searches:

- Web of Science (especially helpful for the grey literature)
- PubMed (especially helpful for the peer reviewed literature)
- Cochrane Library and Cochrane Reviews
- Embase (especially helpful for the peer reviewed literature)
- PAIS Index (especially helpful for policy papers)
- Policy File Index (especially helpful for policy papers)

As discussed with the UNICEF staff during the virtual inception meeting, in addition to the above, the UNICEF regional office provided us with a few key national reports that contained information regarding the programmatic and policy context for complementary feeding in WCAR.

Search terms

We used a combination of relevant indexing terms (medical subject heading or MeSH terms; Theaurus terms; and keywords) to find articles/reports on the programmatic and policy context for complementary feeding in WCAR:

- "Complementary Feeding"
- "Complementary Feedings"
- "Infant Food"
- "Feeding Behavior"
- "Infant Nutritional Physiological Phenomena"
- "Infant Nutritional Physiology"
- "Infant Nutrition Physiology"
- "Supplementary Feeding"
- "Supplementary Feedings"
- "Central Africa"
- "West Africa"
- "Western Africa"
- "Burkina Faso"
- "Upper Volta"
- "Burkina Fasso"
- "Cote d'Ivoire"
- "Ivory Coast"
- "Democratic Republic of the Congo"
- "Congo (Kinshasa)"
- "Zaire"
- "Belgian Congo"
- "Katanga"
- "Ghana"
- "Republic of Ghana"
- "Gold Coast"
- "Mali"
- "Republic of Mali"
- "Niger"
- "Republic of Niger"
- "Nigeria"
- "Federal Republic of Nigeria"
- "Senegal"
- "Republic of Senegal"

The above search terms returned the broadest results which were then narrowed down with the addition of the following search terms (using the proper combination words of "AND" and "OR"):

- "Access"
- "Services"
- "Delivery of Health Care"
- "Health Services Administration"
- "Efficacy"
- "Outcome Assessment"
- "Treatment Outcome"
- "Effectiveness"
- "Cost"
- "Cost-effectiveness"
- "Barrier"
- "Facilitator"
- "Program"
- "Policy"
- "Value Chain"

Qualitative data collection and analysis

Design

To contextualize findings stemming from the quantitative analysis and literature review components of this study, this qualitative component took a multi-sectoral perspective, whereby purposive sampling procedures, data collection instruments, interview questions, and analytic approaches considered a multi-level framework with policy, community, institutional, household, interpersonal, and intrapersonal levels of influence on complementary feeding. Where appropriate, analysis also took into consideration systems-level influences, specifically those within the health system, food system, water, sanitation, hygiene (WASH) system, and the social protection system.

Data collection

We conducted qualitative interviews remotely over the phone or using Zoom technology. Interviews were digitally recorded and conducted in either English or French based on the preference of each participant. Data collection was conducted over two iterative phases:

Phase 1 (In-depth interviews with 13 regional key informants). In collaboration with UNICEF-WCARO, we identified and recruited 13 key informants across the region to provide a regional perspective. The key informants were purposefully sampled and represented individuals who could speak about complementary feeding from a macro level. This group of individuals included professionals representing senior-level stakeholders representing government, academic/research institutions, multi-lateral organizations, and donor organizations. These key informant interviews were guided by an in-depth interview guide, which was developed in conjunction with UNICEF and based on emergent findings from the quantitative and literature review analyses (Appendix 2).

Phase 2 (Semi-structured interviews with 26 country-level informants). Emergent findings from phase 1 interviews were used to inform phase 2 interview guide content (Appendix 2). In collaboration with UNICEF-WCAR, we identified and recruited country-specific informants in the same 8 focus countries previously discussed. These informants included a mix of mid-level stakeholders representing government, civil society, multi-lateral organizations, and academic/research institutions. These 26 individuals were interviewed in their professional roles and asked to speak about complementary feeding in their own country contexts.

Sample sizes were determined by type of interview based on the number of interviews needed to reach data saturation, a concept referring to the repetition of themes without the addition of new information. Based on previous research conducting similar stakeholder interviews and based on evidence of the number needed to reach data saturation, the above sample size ranges were calculated and used for recruitment of participants (Guest et al., 2006, Kodish et al., 2018).

Analysis

Digital recordings were translated and transcribed verbatim. Transcripts were uploaded into Dedoose software for data management and analysis. A collaborative team-based coding approach was employed and guided by a codebook with 52 unique codes based on interview guide content as well as research aims. Using Dedoose, manageable chunks of text were then labelled with codes through line-by-line coding procedures. Emergent themes identified during the coding process were added to the codebook and applied to relevant content. Upon completion, coded texts were extracted for interpretation by region and country. Those salient themes and sub-themes were identified and interpreted in light of the quantitative findings and literature review results. Findings are presented in thematic areas as well as by using participant quotations (Lieber et al., 2011).

Validation workshop

Preliminary findings from the three arms of this analysis were presented to regional and country-level stakeholders in Dakar, Senegal in February 2020 for validation. Stakeholder feedback was collected and considered in refinement of interpretations and additional analyses included in this report.

Synthesis

In order to triangulate findings in this report, findings from quantitative analysis were first presented to show the current status and trend of complementary feeding at the regional or country level. Findings from the literature review and qualitative analysis were synthesized to help understand the complementary feeding data, to identify the needs for future research, and to identify potential actions to take to improve complementary feeding. When contextualizing risk factors around each complementary feeding indicator for WCAR and for each one of the 8 focus countries, the strategic action framework was primarily applied to synthesize available evidence and discuss risk factors at policy, institutional, community, household, and individual levels. The situation analysis of boosters and barriers of complementary feeding practices was also summarized from a systematic perspective (e.g. actions through the food system, health system, water and sanitation system and social protection system) and the summary tables are available in the appendix.

Ethical approval

This study involves human-subjects research components (qualitative interviews and validation workshop) and has been granted an exemption from The Pennsylvania State University Institutional Review Board, which indicated that this study poses minimal to no risk to participants. Further, exemption was granted because the study participants will only be interviewed and/or attending the validation workshop in their professional roles.

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What are the trends of complementary feeding practices in WCAR in the past decade?

What are the potential factors that explained the observed trends?

In the next chapter, findings from the quantitative data analysis, literature review and qualitative research will help answer these questions from a regional perspective.

CHAPTER 3

REGIONAL FINDINGS

EXECUTIVE SUMMARY

This chapter presents research findings around complementary feeding in the West and Central Africa (WCAR) region. Our regional-level trend analysis of complementary feeding practices revealed that:

- The population weighted regional proportion of children who were **breastfed at 1 year** was 84.7% in 2018. The trend has been steadily high with mean proportion of 88.6% between 2010–2018. **Continued breastfeeding at 2 years,** however, was about 50-60% lower from the proportion of continued breastfeeding at 1 year with a rate of 33.6% in 2018 and a mean of 45.5% between 2010-2018.
- **Complementary foods** were given to 70.2% of children 6-8 months in 2018. Despite a slight upward trend between 2010–2018, only about two-thirds of children 6-8 months (65.5%), on average, had been **given complementary foods** in WCAR between 2010-2018.
- The proportion of children 6-23 months meeting **minimum meal frequency** was 39.8% in 2018. The proportion increased from 25.6% in 2010 to 50.1% in 2013 and then remained relatively stable around 40% between 2014–2018; **minimum dietary diversity** and **minimum acceptable diet** have been stagnant in the past decade. In 2018, MDD was achieved in only 22.2% of children aged 6-23 months and 10.1% of children 6–23 months achieved MAD. No Central African country reported MMF, MDD, or MAD between 2015–2018.
- **Vitamin A-rich foods** and **iron-rich foods** were consumed by 58.3% and 40.8%, respectively, of children 6–23 months in 2018. **Vitamin A-rich foods** and **iron-rich foods** were consumed by 54.2% and 41.5%, respectively, of children 6–23 months between 2010–2018. The limited data suggested intake of these nutrient-rich foods has been relatively stable in WCAR.
- The coverage of **vitamin A supplementation** in children 6-59 months has decreased from 81.3% in 2010 to 47.0% in 2018. Data on **Iron supplementation** in children 6-59 months data was only available in about a quarter of the included reports. The coverage was 17.5% in 2018 and the average rate was only 10.4% in 2010-2018. **Reporting of multiple micronutrient powder use** in children 6–23 months was extremely scarce and the two countries that reported numbers indicated low rates of 1.6% and 9.6%.
- **Iodized salt use in households with children under 5** was available in 3 in 10 national reports. The coverage has followed a "U" shape between 2010–2018 with a current rate of 94.3% in 2018. In 2017-2018, **iron-rich and fortified foods** in children 6-23 months were reported jointly in only two countries with the proportions being 45.6% and 57.7%.

DATA AVAILABILITY FOR REGIONAL ANALYSIS

Quantitative data

Complementary feeding practice data used for the analysis were extracted from 75 national reports between 2010–2018 from 23 WCAR countries (except for Cape Verde whose latest report was published in 2005). Data sources include 28 DHS, 23 MICS, 19 NNS/SMART reports, and data of 5 other national reports extracted from the UNICEF's IYCF global dataset.

Literature review

Both grey and peer-reviewed literature were included. In order to be included in this chapter, the literature had to be focused on the region of WCAR as opposed to one specific country. As such, 54 grey literature reports and 8 peer-reviewed articles are included here.

Qualitative interview

Semi-structured interviews were conducted via phone with 13 key informants–participants who could speak not only about their own experiences working in the region, but also about the region at large. Participating individuals were senior-level health and nutrition professionals representing the United Nations, non-government organizations, and donors.

COMPLEMENTARY FEEDING PRACTICES IN WCAR (2010–2018)

There are 13 complementary feeding indicators reported in the included national survey reports. Details about data availability by country and indicator are presented in the appendices. Throughout this report in both this regional and the individual country chapters, findings are presented in three categories.

I. Continued Breastfeeding:

- Continued BF at 1 year
- Continued BF at 2 years

II. Complementary Feeding Practice and Intake of Nutrient-Rich Foods:

- Introduction of solid, semi-solid and soft foods in children 6-8 months (Intro)
- Minimum meal frequency in children 6-23 months (MMF)
- Minimum dietary diversity in children 6-23 months (MDD)
- Minimum acceptable diet in children 6-23 months (MAD)
- Intake of vitamin A-rich foods in children 6-23 months
- Intake of animal-source foods/iron-rich foods in children 6-23 months

III. Supplementation and Fortification:

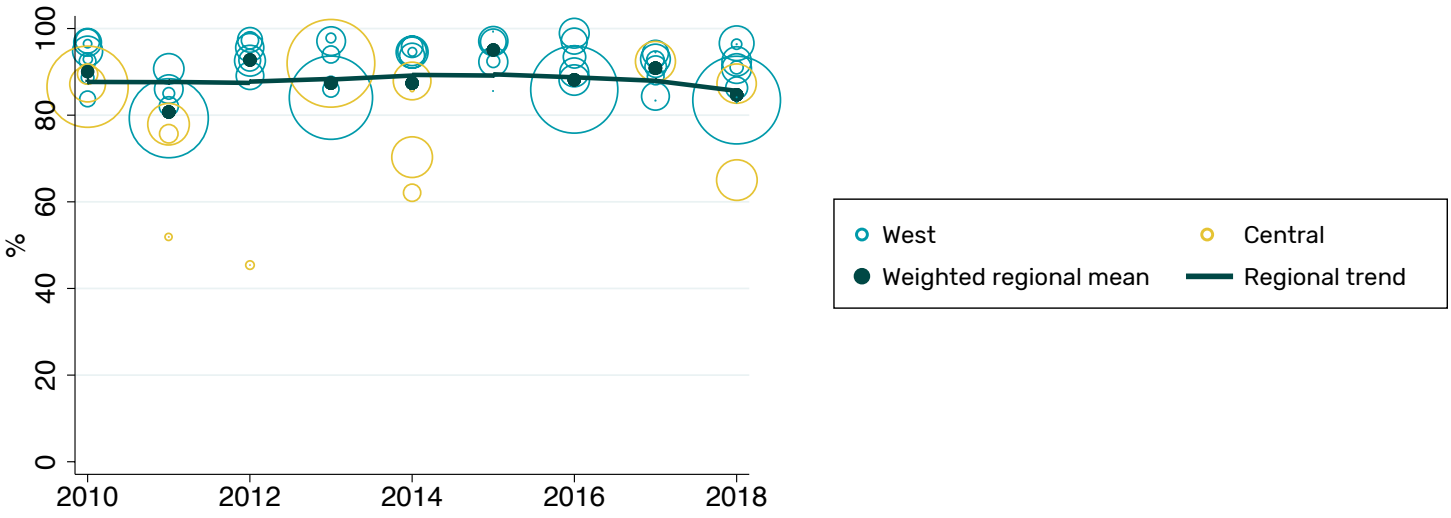
- Vitamin A supplementation in children 6-59 months
- Iron supplementation in children 6-59 months
- Multi-micronutrient powder use in children 6-23 months
- Iodized salt use in households with children under 5 (CU5)
- Intake of iron-rich or iron fortified foods in children 6-23 months

I. CONTINUED BREASTFEEDING

Data availability and trends

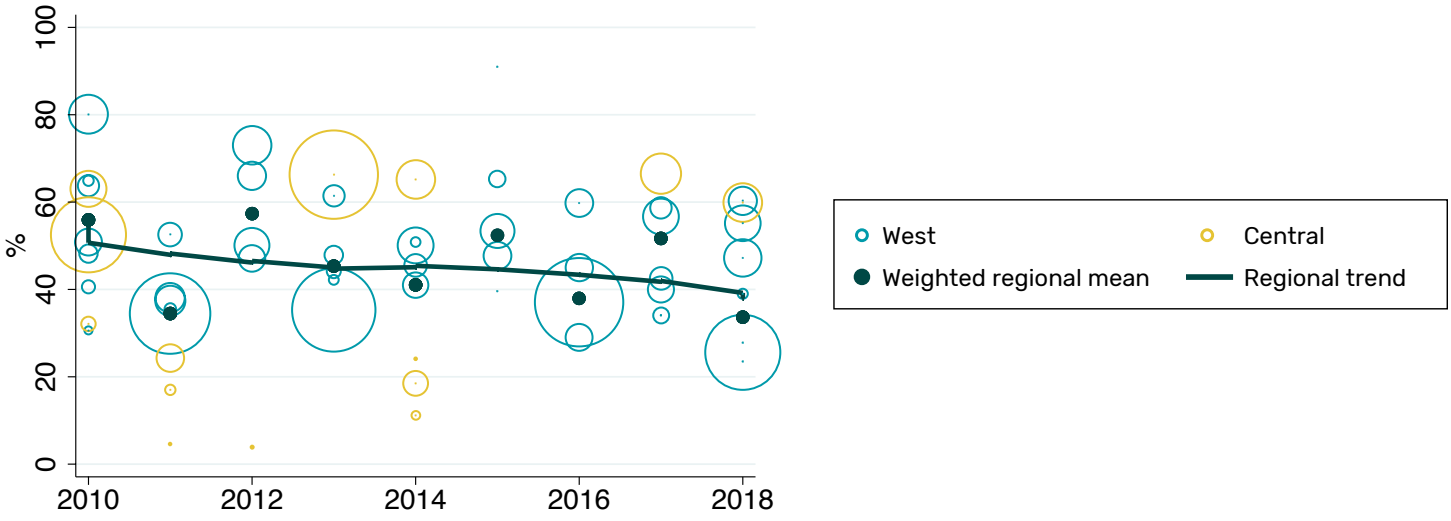
Data on **continued breastfeeding at 1 year** have been reported in 71/75 (94.7%) included national reports. The population-weighted regional proportion of children who were breastfed at 1 year was 84.7% in 2018. The trend from 2010-2018 has been stably high with an average proportion of 88.6%. (Figure 3.1). As can be seen, this rate has been rather steady between 2010–2018.

Figure 3.1. Continued breastfeeding at 1 year in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Continued breastfeeding at 2 years had a lower reporting rate of 77.3% (58 out of 75 reports).Continued breastfeeding at 2 years was practiced in 33.6% of children in 2018, according to the population-weighted regional proportion. The populavtion-weighted average proportion of children who were breastfed at 2 years was 45.5% between 2010-2018, which was almost half of the proportion of continued breastfeeding at 1 year (Figure 3.2). There was an initial decrease, followed by a steady value between 2012–2016 and then a slight decrease in the most recent years.

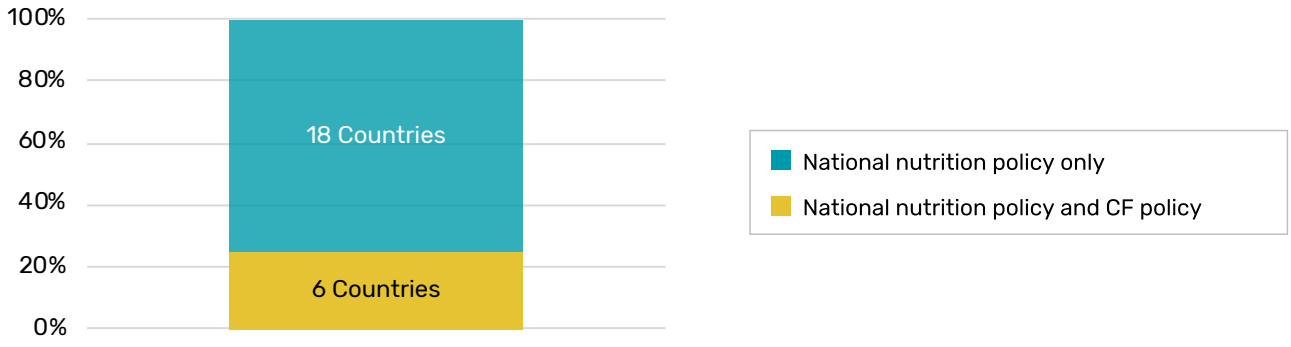
Figure 3.2. Continued breastfeeding at 2 years in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Influencing factors of continued breastfeeding:

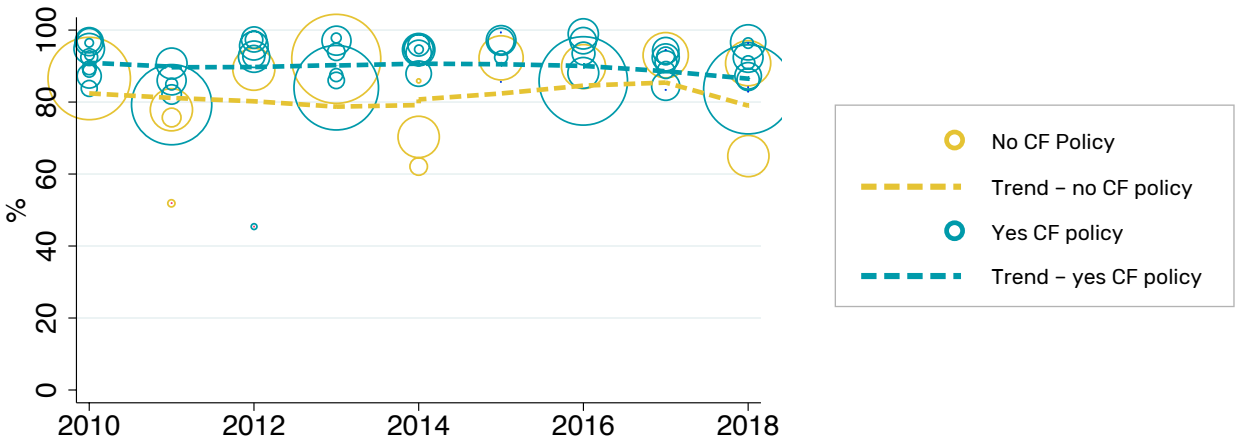
At the policy level, all of the 24 WCAR countries have a national nutrition policy and/or strategy implemented. There are 18 countries that have a complementary feeding policy included as part of the national nutrition policy or strategy. For the other 6 countries, the national nutrition policy or strategy was either not identified or not updated since the 1990s (CLM 2017; GOL 2019; HAN-CI-Global 2017; Ministere de la Sante 2016; Ministério da Saúde 2015; MOH 2012, MOH 2014; Government of Sierra Leone 2019; Republic of Ghana 2016; Republic du Niger 2017; République de Côte d'Ivoire 2016; République de Guinée 2018; République de Guinée-Bissau 2014; République du Bénin 2016; République du Congo 1996; République du Gabon 2017; République du Tchad 2013; République Islamique de Mauritanie 2015; Ré- publique Togolaise 2012; The Republic of The Gambia 2010; WHO 2013a; WHO 2013b, WHO 2015) (Figure 3.3).

Figure 3.3. Complementary feeding (CF) policies in WCAR



In order to explore the relationship between existing policies and continued breastfeeding at 1 year of age, we coded the data from each country as no complementary feeding (CF) policy or yes CF policy. As can be seen in Figure 3.4, the mean population-weighted proportion of continued breastfeeding at 1 year of age in countries with a current CF policy was 88.5% whereas it was nearly 10% lower in countries with no or outdated CF policies (79.4%).

Figure 3.4. Continued breastfeeding at 1 year in WCAR by complementary feeding (CF) policy status (2010–2018). Trends were based on population weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Additional research is needed to comprehensively evaluate national policy-level effects but qualitative interviews with regional key informants provide some insights into factors influencing continued breastfeeding in WCAR.

Interview participants emphasized the continued importance of breastfeeding promotion by international, national, and local development organizations. Key informants explained that breastfeeding promotion has been a priority for governments and organizations long before complementary feeding promotion was started. Even today, with the Scaling Up Nutrition (SUN) movement focused on the First 1,000 Days, breastfeeding promotion and measurement oftentimes remain a greater priority for development and humanitarian organizations than complementary feeding.

Traditional cultures are increasingly merging with industrialized food systems through urbanization and increasing private sector presence in both urban and rural areas of the region. As a result, alternatives to breastfeeding (e.g. bottle feeding, early foods) have become more readily available to beneficiaries of nutrition programming.

> *"The other issue, for me, is that women do not continue to breastfeed [because] now we have a lot a lot of production of certain enriched flours etcetera. So, the usage of other alternatives or supplements makes it so that [the mother] thinks that she can use that product, or, well, that alternative food and think that she can stop, that will replace mother's milk even if that's not accurate."*
>
> ***— Key informant regional interview, NGO***

At the institutional level, 'organizational culture' is also an important consideration for understanding breastfeeding; agreeing upon whether breastfeeding promotion is the mandate of an organization is a continual challenge for donors and implementing agencies whose portfolios often overlap explained one key informant. Also, the same individuals whose job includes promoting breastfeeding until 1 and 2 years may not have been breastfed themselves, or breastfed their own children.

Key informants also emphasized the great socio-cultural diversity in the region, which contributes to continued breastfeeding rates that vary both within and between countries of WCAR. The socio-cultural contexts, which include longstanding traditions around maternal and child nutrition as well as demographics and livelihoods specific to particular cultural groups, affect breastfeeding patterns differentially.

> *I think we have got some examples where we've been able to kind of make progress in terms of support- ing breastfeeding…but maybe more in general I think the ongoing challenge is around the demographic of how many children people have. It's the kind of why it's the cultural factors that often make quite a big impact on people's ability or willingness of cultural prevalence around breastfeeding. You see places in kind of…you know in parts of Northern Nigeria or in Niger, where you've got young girls having babies very young and then having lots of babies and the kind of inherent challenges that presents. And so being very conscious of some of the wider aspects around family planning and equality are really important in terms of trying to make some shifts on that."*
>
> ***— Key informant regional interview, Donor organization***

At the household/individual level, there are some factors identified that may explain mothers' choice of prolonged breastfeeding. Interview participants explained that "…in this region, the tendency is to have a very long breastfeeding time…" because breast-feeding requires no financial cost and modest additional burden to the mother.

> *So first of all, this is because in a lot of areas it is not easy to find food for children. So this is easy to do, this is not very costly, and as exclusive breastfeeding is very low, but the breastfeeding time is long. Meaning that this is not an additional burden you know, they are doing breastfeeding for long…"*
>
> ***— Key informant regional interview, Donor organization***

Key informants also explained that factors including body image, stress, and lack of knowledge of the benefit of continued breastfeeding are additional factors influencing this practice.

> *…the pressing problem is lack of knowledge, in terms also of communication strategies for the change of behaviors. You have someone saying to you: 'If the child is one year old, it's fine, we can stop [breast-feeding] and just do complementary feeding and not continue.' It's because they do not know the benefits of breast milk up to two years of age, even if they have a complementary diet remaining, [it's] the really benefi-cial food for a child, even if it's complemented with other food. So that, for me, is a problem of lack of knowl-edge whether it's at the community or at the level of healthcare systems, healthcare providers do not give the messages that are needed just because they do not know."*
>
> ***— Key informant regional interview, NGO***

Despite the aforementioned influencing factors of continued breastfeeding, and myriad others not discussed by key informants, the rate of continued breastfeeding at 1 year has remained consistently high in WCAR since 2010.

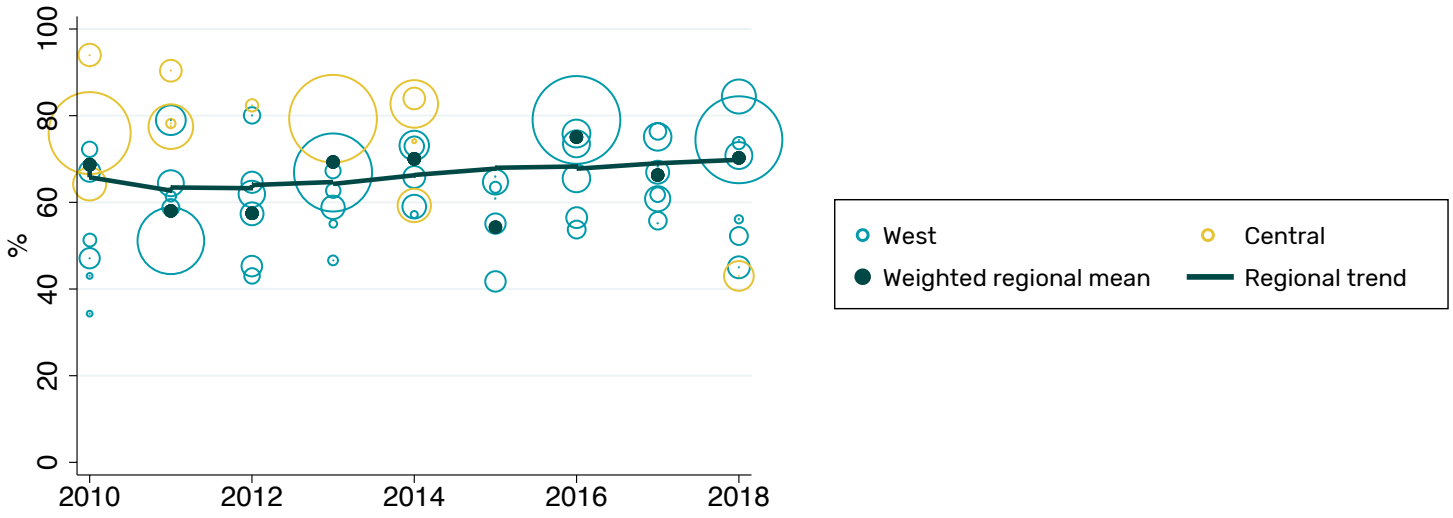
II. COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT-RICH FOODS

TIMELY INTRODUCTION OF COMPLEMENTARY FOODS (INTRO)

Data availability and trends

Data on **introduction of solid, semi-solid and soft foods** in children 6–8 months were reported in 66/75 (80.0%) national reports. Data are limited for Central Africa after the year 2014 with only one Central African country reporting this indicator in 2018. The population-weighted regional proportion of children 6–8 months who were given complementary foods was 70.2% in 2018. On average, between 2010–2018, 65.5% of children aged 6–8 months had been given complementary foods (Figure 3.5). There appears to be a slight upward trend in recent years. A review of the literature found that the rates of introduction of solid, semi-solid, or soft foods were higher in the Anglophone countries compared with the Francophone countries (Issaka et al. 2015a).

Figure 3.5. Introduction of complementary foods in children aged 6–8 months in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Influencing factors of timely introduction of complementary foods:

Table 3.1 summarizes risk factor analysis findings from the 8 focus countries to make comparisons across the region with regard to timely introduction of complementary foods.

Table 3.1. Significant factors (OR and 95%CI) of introduction of complementary foods in children 6–8 mo in 8 WCAR countries

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
N	**707**	**918**	**234**	**425**	**606**	**1043**	**577**	**394**
Child characteristics								
Birth order								
Firstborn							**1.00**	
Second to fourth born							**0.54 (0.34, 0.87)**	
Fifth or higher							**0.60 (0.35, 1.03)**	
Vitamin A supplementation		**1.86 (1.31, 2.64)**				**1.37 (0.97, 1.93)**		
Iron supplementation				**2.03 (1.10, 3.76)**				
Child had symptoms in the past two weeks								
Diarrhea		**1.65 (1.12, 2.42)**						
Occupation								
Not working					**1.00**			
Agricultural					**3.23 (1.04, 10.07)**			
Non-agricultural					**1.71 (1.12, 2.62)**			
Type of delivery assistance								
Delivered by health professional	**1.00**							
Traditional birth attendant	**1.81 (0.82, 4.01)**							
Other	**1.92 (1.10, 3.35)**							
Caesarean delivery					**0.31 (0.11, 0.89)**			
Exposure to media at least once a week								
Listening to radio	**1.41 (1.03, 1.93)**							

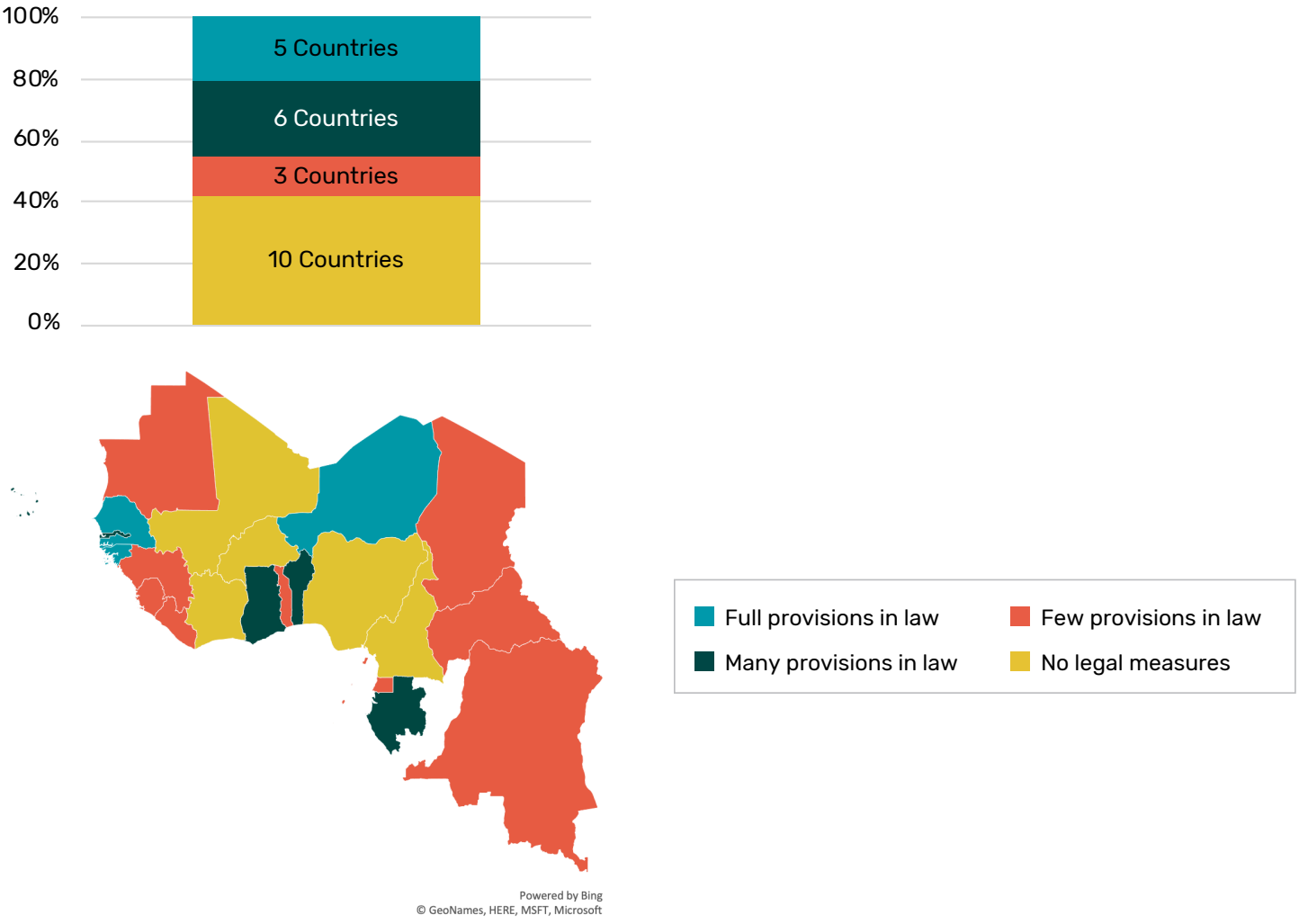
	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Maternal characteristics								
Education								
No education								**1.00**
Primary								**1.20 (0.68, 1.85)**
Secondary/Higher								**2.69 (1.23, 5.91)**
Paternal characteristics								
Age (years)								
15-29			**1.00**					
30-39			**3.63 (1.49, 8.86)**					
>= 40			**2.26 (0.92, 5.52)**					
Education								
No education			**1.00**					
Primary			**3.93 (1.21, 12.70)**					
Secondary/ Higher			**0.94 (0.37, 2.44)**					
Occupation								
Not working								
Agricultural								
Non-agricultural								
Household characteristics								
Household wealth								
1 Poorest					**1.00**		**1.00**	**1.00**
2					**1.75 (1.00, 3.05)**		**1.52 (0.94, 2.44)**	**1.90 (1.05, 3.42)**
3					**0.94 (0.54, 1.64)**		**1.82 (1.03, 3.22)**	**2.10 (1.05, 4.20)**
4					**1.87 (1.03, 3.39)**		**1.58 (0.73,3.43)**	**1.46 (0.67, 3.16)**
5 Richest					**0.77 (0.41, 1.46)**		**4.74 (1.62,13.80)**	**2.20 (0.85, 5.67)**
Community characteristics								

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Rank of access to health care								
1 Best access	**1.00**	**1.00**	**1.00**		**1.00**		**1.00**	
2	**0.76 (0.44, 1.31)**	**1.79 (1.06, 3.02)**	**0.67 (0.21, 2.14)**		**0.69 (0.38, 1.24)**		**0.53 (0.25, 1.12)**	
3	**0.55 (0.32, 0.95)**	**2.02 (1.20, 3.41)**	**0.22 (0.07, 0.72)**		**0.39 (0.21, 0.73)**		**0.48 (0.23, 1.02)**	
4	**0.56 (0.33, 0.96)**	**1.56 (0.93, 2.61)**	**0.89 (0.27, 2.97)**		**0.52 (0.28, 0.99)**		**0.44 (0.20, 0.98)**	
5 Worse access	**0.69 (0.39, 1.22)**	**1.81 (1.07, 3.07)**	**0.55 (0.16, 1.88)**		**0.64 (0.33, 1.24)**		**0.41 (0.18, 0.93)**	

Findings from this risk factor analysis, coupled with data from interviews and the literature, highlight several different types of factors influencing the timely introduction of complementary foods in WCAR countries.

At the policy level, implementation status of the International Code of Marketing of Breast-milk Substitutes and subsequent relevant World Health Assembly resolutions ("the Code") varies largely in WCAR (WHO & UNICEF 2018). More than half of the 24 WCAR countries have no or few legal measures of the Code (Figure 3.6) and many of these countries do not have a ban on the promotion of complementary foods before 6 months, do not emphasize the importance of not introducing complementary feeding before 6 months, and/or do not have clear messages on the appropriate age of introduction of foods. The enforcement of the Code may be critically associated with timely introduction of appropriate complementary foods and future analyses are warranted to examine the associations.

Figure 3.6. Legal status of the International Code of Marketing of Breast-milk Substitutes in WCAR countries. Top: number of countries by status; Bottom: geographic location by status. Bar graph and map are reproduced using data from WHO & UNICEF 2018



At the institutional and community levels, worse access to health care and nutrition services was associated with lower odds of feeding children 6–8 months solid, semi-solid and soft foods in most focus countries (7/8 countries) in univariable models and half of them (4/8 countries) in multivariable regression models. In the Democratic Republic of Congo (DRC), poorer health care access was related to an approximately two-fold increased odds of timely complementary feeding, which was also seen in univariate associations. We cannot rule out the possibility that early (prior to 6 months) or late (around 8 months) introduction of complementary foods was commonly practiced in these communities in DRC. In Liberia and Sierra Leone, mothers who did not attend any antenatal clinical were more likely to delay the introduction of complementary feeding (Issaka et al. 2015b). In Burkina Faso, a program staff explained that both early and late introduction of complementary foods occurs depending on sub-group of the population and geographic differences.

> *"Based on our experience, mainly in rural areas, what we see is that the first complementary foods are often given very early or very late to young children. A certain category of the population introduces food at the 4th month of age. There are other certain regions in rural areas where the food is introduced much later, after 9 or 10 months, as a first complementary food for children."*
>
> ***— Informant interview in Burkina Faso, NGO***

Interview participants explained that socio-cultural drivers influence the timely introduction of complementary foods differently across the region, as well as among individual cultural groups within countries. After all, WCAR is a very diverse region comprising 24 countries. Interviews conducted with professionals working in Ghana, Nigeria, Chad, Senegal, and others spoke at length about in-country diversity contributing to differential feeding practices. A government employee in Senegal explained that at "Birth, and at weaning…practices vary from one area to another, from one ethnic group to another" when asked about timely introduction of complementary foods in her country context.

Dietary patterns are influenced by longstanding dietary traditions across the globe, this region notwithstanding. They are also influenced by food availability–in many contexts, there is very limited distinction between adult diets and young child foods. A study report by the ministry of public health examining limiting factors of optimal IYCF (not necessarily just introduction of these foods) in Chad found that there is no specific diet dedicated to infants and young children. When the young child reaches the age of 7 months, he has already tasted all foods usually used in the family (Ministère de la Sante Publique 2019). This is likely a function of culture, mother's busy schedules, and the absence of fathers who are not preoccupied with their children's wellbeing.

At the household level, wealth was a significant factor of timely introduction in 7 of 8 countries in univariable models. This relationship remained significant in multivariable models in 3 of 8 countries. In these countries, the odds of introduction of complementary foods by 6-8 months of age increased by 1.5–4.7 fold in richer versus poorer households. Household poverty may contribute to limited access to the mass media (radio, television, and newspapers/magazines) which has been listed as a factor that posed risk to optimal complementary feeding practices in most of the WCAR region (Issaka et al. 2015c). Additionally, limited access to television has been identified as a risk of delayed introduction of solid, semi-solid or soft foods, particularly in Burkina Faso (Issaka et al. 2015c).

Aside from household wealth influences, mothers also face daily competing demands to infant and young child feeding, including heavy workloads (both domestic and professional) and limited spousal support (Government of Sierra Leone 2013). Additionally, interpersonal influences including in-laws, grandmothers, husbands, and other members affect the feeding practices of young mothers in particular.For example, in Senegal, younger women's ability to make independent decisions about how to feed their infants is limited. In most cases, women's practices reflect what senior women in the family have instructed them to do. In Burkina Faso, both maternal and paternal grandmothers teach first time mothers about all aspects of child care, including breastfeeding. In Mali, the active advisory role of mother in law for first time mothers supports the conclusion that 'young and first time mothers rarely make decisions alone about aspects of their children's well being' (Aubel 2011). A nutritionist working at an NGO in Nigeria spoke about the strong inter-personal influence in that cultural context when asked about timely introduction of complementary foods.

> *I think here one of the key barriers are the decision-making power of the mother. Of course, much more in the north than in the south. But overall, grandmothers are very powerful. In the north, it's more like the mother of the husband. In the south, it could be either of the two grandmothers. So, if things have been done in a certain way for many years and your mother says this is the way it has to be done, you will fol- low. Or if you don't follow, they will still do it so the mother could have been made aware that maybe she kind of believed that she shouldn't give food until six months or maybe they should feed this and not that, but if the grandmother believes contrary it's very difficult to change it. Many times, they live together…so many times the grandma is the one doing things, working…and the children stay with her. The husbands also have a say, but I think the husbands in these kinds of matters…they are easier to convince, if the child needs it or not, they don't really have a strong position. It's mostly the grandmothers that, that's the way they did it and it worked for them, so why are we changing it now?*
>
> ***— Informant interview in Nigeria, NGO***

This interpersonal influence is neither unique to Nigeria nor to this particular indicator; just as it can be a barrier to optimal infant and young child feeding, so too can it be a facilitating factor in behavior change interventions. In strongly interdependent and communal cultural contexts, such as those throughout WCAR, these interpersonal influences are important determinants of a wide range of health and nutrition behaviors that can be utilized for positive behavior change.

At the individual level, no consistent trends of introduction of complementary foods were found across the 8 countries when examining risk factors at child, maternal, and paternal levels. Though maternal education was found to be significant in 7 out of 8 countries in univariate associations, it was significant in only 1 country when household and community-level factors were also considered. Interview participants explained that exclusive breastfeeding until 6 months has been such a heavily promoted practice that many surveys may reflect socially desirable answers about timely introduction of complementary foods when in fact the actual practices may be different.

> *Well I don't think it's 80% [timely introduction], I think it's difficult because as I said, most of the people they don't even do the exclusive breastfeeding. By the time you start giving water to a baby, by 3–4 months you start adding something else, so you do more a liquid pap [water porridge], but I will say most of the people by four months they will start giving something. Then you have the other side of the coin where people really don't have access to food, where they kind of tried to delay breastfeeding for longer and they start late. It may be the knowledge about, I think the knowledge about exclusive breastfeeding has in- creased quite a lot. And people know that the right answer is that you should not incorporate [foods] until 6 months so that's what they're saying [in surveys]. The right answer is not the real practice."*
>
> — ***Informant interview in Nigeria, NGO***

From our literature search, other factors which were identified as being significantly associated with non-introduction of complementary feeding by 6-8 months of age were: young child age (Liberia, Sierra Leone, and Nigeria), children of illiterate and non-Christian mothers (Ghana), children whose mothers had a body mass index of more than 25 (Nigeria), and children whose fathers had no schooling (Sierra Leone) (Issaka et al. 2015b).

The quantitative data that we analyzed did not report religion so we were unable to examine that in our data sets. As for maternal BMI, it was missing in approximately half of the sample from all countries; in Nigeria, we looked at BMI data for 651 women but it was not univariably associated with the introduction of complementary feeding (overweight: 0.87 (0.50, 1.52); obese: 0.88 (0.47, 1.65)). Finally, we found that father's education was significant in Burkina Faso, Ghana, and Nigeria in our univariate models but did not remain significant in our multivariate models. Since Sierra Leone was not one of the focus countries for these analyses, we do not have a comparison point for those findings.

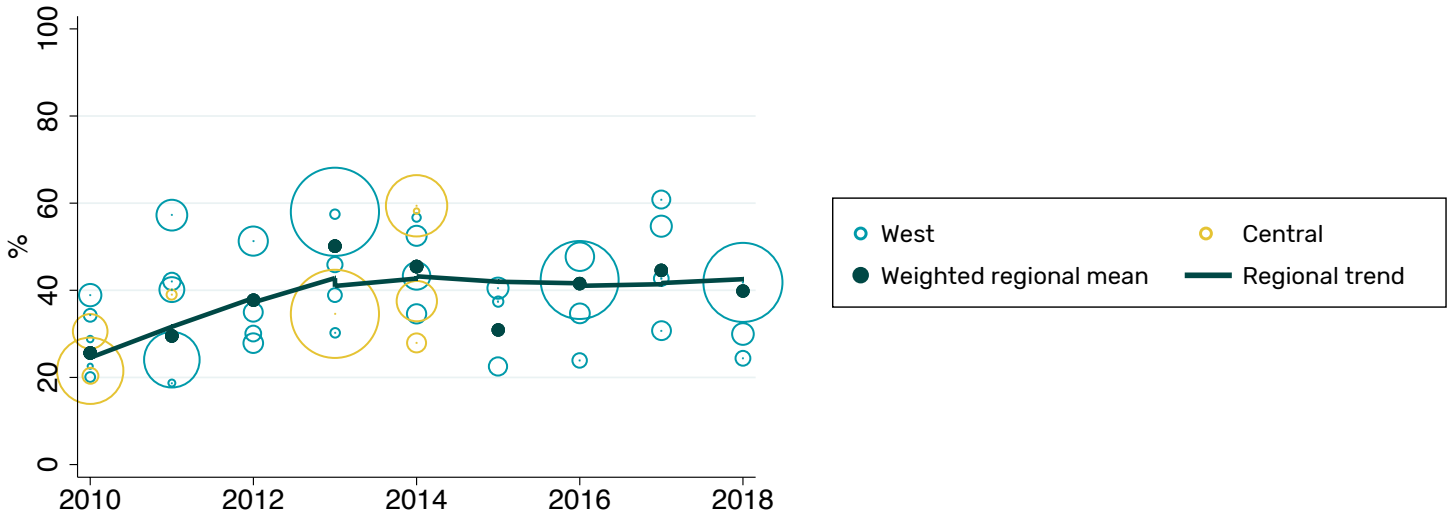
At sub-national levels, surveys and qualitative research do underscore challenges regarding infant and young child feeding, particularly related to both early and late introduction of complementary foods, infrequent feeding of children, and extremely low dietary diversity with a dearth of protein sources (USAID 2016).

MINIMUM MEAL FREQUENCY (MMF)

Data availability and trends:

Data for **MMF** were reported in 61.3% (46/75) of included reports. No Central African country reported MMF between 2015–2018. The population-weighted proportion of children meeting MMF increased from 25.6% in 2010 to 50.1% in 2013 and then remained relatively stable around 40.5% between 2014–2018. The population-weighted regional proportion was 39.8% in 2018 (Figure 3.7).

Figure 3.7. Minimum meal frequency among children aged 6–23 months in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Risk factor analyses for minimum meal frequency:

Using the most current national survey data, risk factor analyses have been conducted in 8 focus countries in WCAR. Table 3.2. summarizes findings from 8 countries to make comparisons across the region with regard to minimum meal frequency.

Table 3.2. Significant factors (OR and 95%CI) of meeting minimum meal frequency in children 6-23 months in 8 WCAR countries

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
N	**3708**	**4030**	**1404**	**2323**	**2727**	**7991**	**2687**	**2120**
Child characteristics								
Age (months)								
6–11		**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	
12–17		**0.75 (0.64, 0.87)**	**1.32 (1.01, 1.72)**	**1.88 (1.49, 2.38)**	**1.42 (1.19, 1.71)**	**0.80 (0.72, 0.89)**	**1.17 (0.94, 1.46)**	
18–23		**0.79 (0.66, 0.94)**	**1.46 (1.09, 1.97)**	**2.03 (1.57, 2.63)**	**1.28 (1.04, 1.58)**	**0.91 (0.80, 1.04)**	**1.71 (1.35, 2.16)**	
Perceived birth weight								
Average					**1.00**	**1.00**		
Larger than average/ very large					**0.66 (0.55, 0.81)**	**0.86 (0.75, 0.98)**		
Very small/smaller than average					**0.99 (0.80, 1.21)**	**0.95 (0.86, 1.05)**		
Vitamin A supplementation	**1.20 (1.04, 1.39)**			**1.37 (1.11, 1.69)**	**1.56 (1.31, 1.85)**	**1.17 (1.06, 1.29)**	**1.71 (1.42, 2.06)**	
Iron supplementation					**0.68 (0.53, 0.88)**			
Child had symptoms in the past two weeks								
Diarrhea							**0.81 (0.67, 0.98)**	
Cough		**0.83 (0.71, 0.96)**				**1.29 (1.15, 1.44)**		
Maternal characteristics								
Education								
No education		**1.00**			**1.00**			
Primary		**1.14 (0.95, 1.36)**			**1.34 (1.02, 1.76)**			
Secondary/ Higher		**1.37 (1.12, 1.68)**			**1.18 (0.81, 1.71)**			

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Occupation								
Not working	**1.00**			**1.00**	**1.00**			
Agricultural	**1.19 (0.96, 1.47)**			**1.13 (0.87, 1.45)**	**1.71 (1.08, 2.72)**			
Non-agricultural	**1.26 (1.01, 1.57)**			**1.30 (1.04, 1.63)**	**1.17 (0.96, 1.42)**			
Breastfeeding practices								
Traditional birth attendant			**0.74 (0.59, 0.94)**			**0.82 (0.74, 0.89)**		
Currently breastfeeding		**2.53 (1.95, 3.29)**	**1.97 (1.35, 2.87)**	**0.66 (0.51, 0.86)**		**1.38 (1.21, 1.57)**	**0.71 (0.55, 0.91)**	**1.48 (1.20, 1.83)**
Utilization of reproductive health care								
Type of delivery assistance								
Delivered by health professional	**1.00**			**1.00**	**1.00**			
Traditional birth attendant	**1.88 (1.30, 2.71)**			**0.66 (0.45, 0.96)**	**1.21 (0.93, 1.57)**			
Other	**1.58 (1.21, 2.06)**			**0.97 (0.76, 1.23)**	**1.53 (1.19, 1.96)**			
Timing of postnatal check-up on woman (days)								
0-1 d	**1.00**	**1.00**						
>= 2 d	**1.10 (0.94, 1.29)**	**1.28 (1.01, 1.62)**						
missing/ unknown	**0.69 (0.54, 0.88)**	**0.95 (0.75, 1.20)**						
Timing of postnatal check-up on child (days)								
0-1 d					**1.00**			
>= 2 d					**0.56 (0.42, 0.76)**			
missing/unknown					**0.68 (0.48, 0.96)**			
Exposure to media at least once a week								
Reading newspaper							**1.70 (1.07, 2.71)**	
Listening to radio					**1.32 (1.10, 1.58)**		**1.57 (1.31, 1.88)**	
Women's empowerment score					**0.93 (0.88, 0.99)**		**1.09 (1.02, 1.16)**	

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Paternal Characteristics								
Education								
No education						1.00		
Primary						0.94 (0.81, 1.10)		
Secondary/Higher						1.18 (1.04, 1.34)		
Occupation								
Not working				1.00				
Agricultural				1.88 (1.20, 2.95)				
Non-agricultural				1.81 (1.16, 2.83)				
Household characteristics								
Water characteristics								
Improved source of drinking water							0.81 (0.67, 0.98)	
Own water			0.50 (0.26, 0.93)					
Time to get to water source (min)								
0			1.00	1.00				
1-59			0.64 (0.43, 0.94)	1.31 (1.05, 1.64)				
>= 60			0.53 (0.30, 0.94)	0.66 (0.36, 1.19)				
Household wealth								
1 Poorest		1.00			1.00	1.00		1.00
2		0.99 (0.82, 1.20)			1.26 (0.96, 1.65)	0.89 (0.77, 1.02)		1.32 (1.04, 1.67)
3		1.07 (0.87, 1.30)			1.17 (0.89, 1.54)	0.82 (0.71, 0.96)		0.99 (0.75, 1.32)
4		0.79 (0.63, 0.99)			1.37 (1.03, 1.82)	0.79 (0.67, 0.93)		1.55 (1.06, 2.28)
5 Richest		0.61 (0.44, 0.85)			0.73 (0.52, 1.02)	1.02 (0.85, 1.23)		1.77 (1.13, 2.79)

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Community characteristics								
Rank of access to health care								
1 Best Access		**1.00**			**1.00**			**1.00**
2		**0.81 (0.65, 1.02)**			**0.75 (0.57, 0.98)**			**0.98 (0.73, 1.31)**
3		**0.69 (0.54, 0.87)**			**0.70 (0.51, 0.94)**			**1.37 (1.02, 1.85)**
4		**0.68 (0.53, 0.88)**			**0.60 (0.43, 0.83)**			**1.28 (0.94, 1.74)**
5 Worst Access		**0.56 (0.42, 0.74)**			**0.44 (0.30, 0.62)**			**1.07 (0.78, 1.47)**

At the community level, in 6 out of 8 countries (univariable models), poorer community-level access to health care and nutrition services was associated with lower odds of meeting MMF. After adjusting for other factors, this community indicator remained significant in 2 of these countries and poorer access was dose-responsively associated with decreased odds of meeting MMF.

At the household level, a longer time to get to a water source was associated with decreased odds of MMF in 5 countries, while wealthier households were associated with increased odds of meeting MMF in 6 out of 8 countries; both were assessed in univariate associations. In multiple regression analyses, household wealth remained significant in half of the countries; however, the directions of the relationship were inconsistent: in 2 countries, richer households had 26–77% increased odds of meeting MMF; in another 2 countries, richer household quintiles had 11–39% decreased odds. The discrepancy suggests feeding frequency may be less constrained by resources in some contexts than others. Based on these data, no assumption can be made between household wealth and sufficiency in meal frequency.v

At the individual level, there are a number of factors at child (age in months, vitamin A supplementation), maternal (education, current breastfeeding status, type of delivery assistance, timing of postnatal check-up on child, exposure to TV), and paternal level (education) that showed significant univariate relationships with MMF in 6–7 out of 8 examined countries.

After accounting for other factors, child age, child vitamin A supplementation, and breastfeeding mode were still significant in 5-6 countries. Specifically, in 4 countries, compared to children 6–11 months, the odds of children 12–17 months and 18–23 months meeting MMF increased by 17–88% and 28–103%, respectively. Older age, however, was significantly associated with decreased odds of meeting MMF by 20–25% in 2 other countries. This finding suggests that feeding a sufficient number of meals needs to be emphasized in younger children in some WCAR countries but in older children in other countries.

Children who were given vitamin A supplementation in the past 6 months were more likely to meet MMF in 5 out of 8 countries. Compared to the referent children with no vitamin A supplementation, the adjusted odds ratios (ORs) ranged from 1.17–1.71. The consistent associations suggest a potential integration channel of IYCF education to existing nutrition services, such as vitamin A supplementation services.

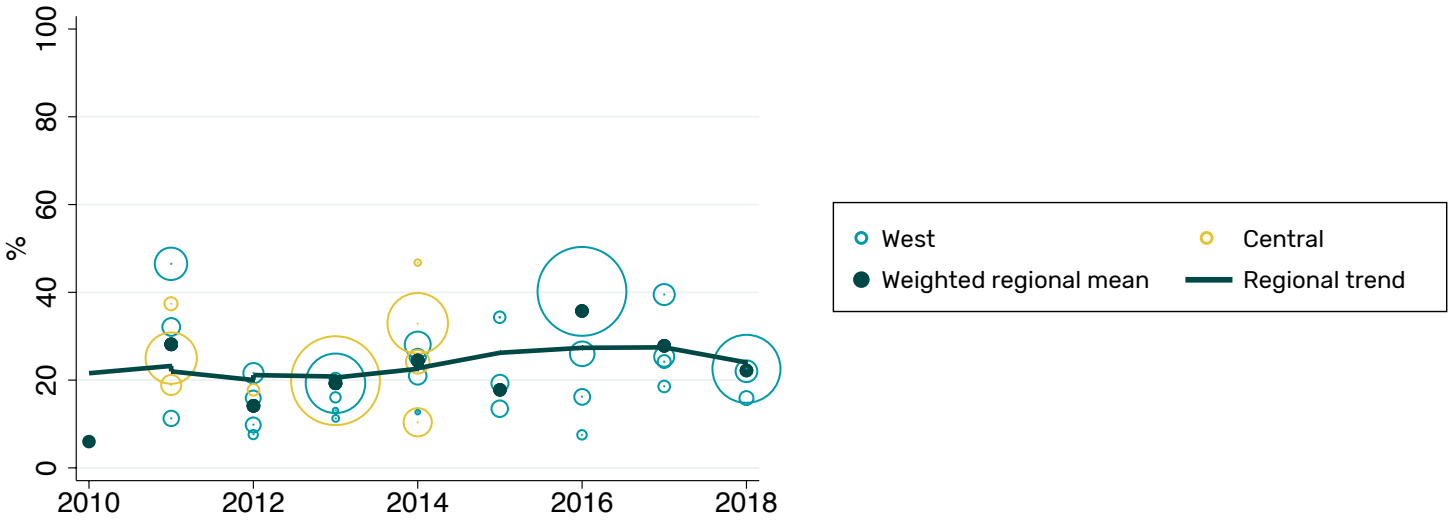
Another consistent **individual-level** factor influencing MMF was current breastfeeding mode. In 4 out of 8 countries, children who were currently breastfed were more likely to achieve MMF with ORs ranging from 1.48–2.53. However, in 2 other countries, currently breastfed children were less likely to achieve MMF with the OR being 0.66 (0.51, 0.86) and 0.77 (0.55, 0.91), respectively. The findings suggest that the associations between breastfeeding mode and meal frequency differ by context and tailored efforts are needed to identify those who are at risk of not meeting MMF and intervene.

MINIMUM DIETARY DIVERSITY (MDD)

Data availability and trends:

MDD data were available in about half of the included national reports (46/75 or 53.3%). Similar to MMF, no Central African country has reported MDD since 2014. In the years where more than one data point was available, the population-weighted mean proportion of children meeting MDD followed a flat trend with an average of only 21.7% between 2010–2018. In 2018, only 22.2% of children 6-23 months met MDD in WCAR, according to the population-weighted average in that year (Figure 3.8).

Figure 3.8. Minimum dietary diversity in children aged 6–23 months in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Risk factor analyses for minimum dietary diversity:

Using the most current national survey data, risk factor analyses have been conducted in 8 focus countries in WCAR. Table 3.3 summarizes findings from 8 countries to make comparisons across the region with regard to minimum diet diversity.

Table 3.3. Significant factors (OR and 95%CI) of meeting minimum dietary diversity in children 6-23 mo in 8 WCAR countries

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
N	**3816**	**3654**	**1281**	**2147**	**2662**	**5304**	**2681**	**2378**
Child characteristics								
Age (months)								
6–11	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
12–17	**2.49 (1.63, 3.80)**	**1.93 (1.53, 2.43)**	**3.33 (2.28, 4.87)**	**3.25 (2.41, 4.39)**	**2.66 (1.90, 3.71)**	**2.15 (1.82, 2.55)**	**3.97 (2.87, 5.49)**	**3.96 (2.97, 5.27)**
18–23	**3.81 (2.52, 5.75)**	**2.17 (1.68, 2.81)**	**3.31 (2.19, 5.01)**	**3.84 (2.77, 5.33)**	**2.38 (1.62, 3.51)**	**2.36 (1.94, 2.89)**	**6.00 (4.26, 8.43)**	**4.38 (3.14, 6.12)**
Perceived birth weight								
Average						**1.00**		
Larger than average/very large						**0.93 (0.75, 1.14)**		
Very small/smaller than average						**1.19 (1.03, 1.37)**		
Vitamin A supplementation			**1.47 (1.04, 2.08)**	**1.41 (1.09, 1.84)**		**1.26 (1.08, 1.47)**		
Iron supplementation					**2.68 (1.88, 3.84)**	**1.64 (1.37, 1.94)**		
Child had symptoms in the past two weeks								
Diarrhea			**0.65 (0.44, 0.97)**					
Cough	**1.87 (1.27, 2.74)**				**1.38 (1.01, 1.89)**	**1.21 (1.03, 1.41)**		
Maternal characteristics								
Age (years)								
15-24		**1.00**						
25-34		**1.39 (1.04, 1.86)**						
35-49		**1.50 (0.99, 2.26)**						

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Education								
No education		**1.00**	**1.00**			**1.00**		
Primary		**1.05 (0.80, 1.38)**	**1.63 (1.03, 2.56)**			**1.22 (0.97, 1.55)**		
Secondary/ Higher		**1.44 (1.06, 1.95)**	**2.09 (1.34, 3.27)**			**1.34 (1.06, 1.69)**		
Occupation								
Not working		**1.00**		**1.00**	**1.00**			
Agricultural		**1.02 (0.77, 1.35)**		**1.29 (0.94, 1.78)**	**2.99 (1.52, 5.87)**			
Non-agricultural		**1.44 (1.10, 1.87)**		**1.55 (1.19, 2.02)**	**1.58 (1.18, 2.11)**	**1.44 (1.20, 1.72)**		
Breastfeeding practices								
Put child to breast <=1 hr at birth				**1.61 (1.19, 2.19)**				
Currently breastfeeding			**0.55 (0.36, 0.84)**		**0.69 (0.48, 1.00)**	**0.61 (0.51, 0.72)**		
Utilization of reproductive health care								
Type of delivery assistance								
Delivered by health professional						**1.00**		
Traditional birth attendant						**1.60 (1.29, 1.99)**		
Other						**0.98 (0.81, 1.19)**		
Exposure to media at least once a week								
Reading newspaper				**2.14 (1.09, 4.18)**		**1.51 (1.08, 2.11)**	**1.91 (1.13, 3.23)**	
Listening to radio		**1.27 (1.01, 1.61)**	**1.44 (1.06, 1.94)**		**1.61 (1.22, 2.12)**		**1.28 (1.02, 1.61)**	
Watching TV	**1.70 (1.10, 2.63)**	**1.64 (1.17, 2.31)**						**1.39 (1.08, 1.80)**
Women's empowerment score	**1.23 (1.09, 1.38)**							

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Paternal characteristics								
Age (years)								
15-29					1.00			
30-39					1.40 (0.87, 2.26)			
>= 40					1.98 (1.16, 3.37)			
Education								
No education					1.00	1.00		
Primary					1.05 (0.71, 1.55)	0.93 (0.73, 1.19)		
Secondary/ Higher					1.66 (1.09, 2.51)	1.29 (1.04, 1.62)		
Occupation								
Working				1.00				
Agricultural				2.50 (1.29, 4.82)				
Non-Agricultural				2.55 (1.33, 4.87)				
Household character-istics								
Place of residence						0.79 (0.67, 0.92)		0.64 (0.47, 0.87)
No. of HH members				1.03 (1.01, 1.06)				
Water characteristics								
Improved source of drinking water							1.34 (1.02, 1.76)	
Time to get to water source (min)								
0					1.00			
1-59					0.65 (0.45, 0.94)			
>= 60					0.60 (0.37, 0.97)			
Household wealth								
1 Poorest		1.00	1.00		1.00	1.00	1.00	1.00
2		1.40 (1.05, 1.85)	0.83 (0.53, 1.30)		1.25 (0.67, 2.32)	1.10 (0.88, 1.37)	1.12 (0.80, 1.57)	0.94 (0.70, 1.26)
3		1.21 (0.89, 1.66)	1.19 (0.69, 2.04)		1.10 (0.59, 2.04)	1.03 (0.81, 1.31)	1.08 (0.70, 1.65)	1.02 (0.72, 1.45)
4		0.77 (0.53, 1.13)	1.53 (0.84, 2.79)		1.84 (1.02, 3.33)	1.01 (0.76, 1.33)	1.96 (1.19, 3.25)	1.14 (0.73, 1.78)
5 Richest		0.78 (0.52, 1.18)	3.14 (1.56, 6.28)		3.16 (1.68, 5.95)	1.51 (1.10, 2.08)	3.43 (1.94, 6.05)	1.67 (1.00, 2.78)

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Community characteristics								
Rank of access to health care								
1 Best access		**1.00**		**1.00**		**1.00**	**1.00**	
2		**1.40 (1.05, 1.85)**		**0.90 (0.64, 1.27)**		**1.34 (1.08, 1.67)**	**0.66 (0.47, 0.94)**	
3		**1.21 (0.89, 1.66)**		**0.61 (0.42, 0.89)**		**1.33 (1.05, 1.68)**	**0.41 (0.28, 0.60)**	
4		**0.77 (0.53, 1.13)**		**0.69 (0.44, 1.06)**		**1.01 (0.78, 1.33)**	**0.41 (0.27, 0.61)**	
5 Worst access		**0.78 (0.52, 1.18)**		**0.87 (0.53, 1.42)**		**1.19 (0.86, 1.64)**	**0.22 (0.14, 0.36)**	

At the community level, in univariable models, community-level access to health care and nutrition services were significantly associated with MDD in all 8 examined countries and poorer access was associated with decreased odds of MDD in a dose-response manner. After adjusting for other factors, the directional relationship between MDD and access to health care remained significant in 2 of these countries. In 2 other countries, when compared to the communities in the 1st quintile of best access, worse access (2nd and 3rd quintile) was related to higher odds of meeting MDD and the worst access (4th and 5th quintile) was not related to MDD ($p>0.05$).

At the household level, almost all of the examined household-level risk factors were univariately and significantly associated with MDD. However, in multiple regression analyses, only household wealth was consistently associated with higher odds of meeting MDD in 6 out of 8 examined countries. Compared to the poorest households (1st quintile), the odds of meeting MDD increased by 1.4-3.4 folds. Our finding is consistent with another regional analysis, in which wealth and MDD were associated in WCAR (Sagalova et al. 2020).

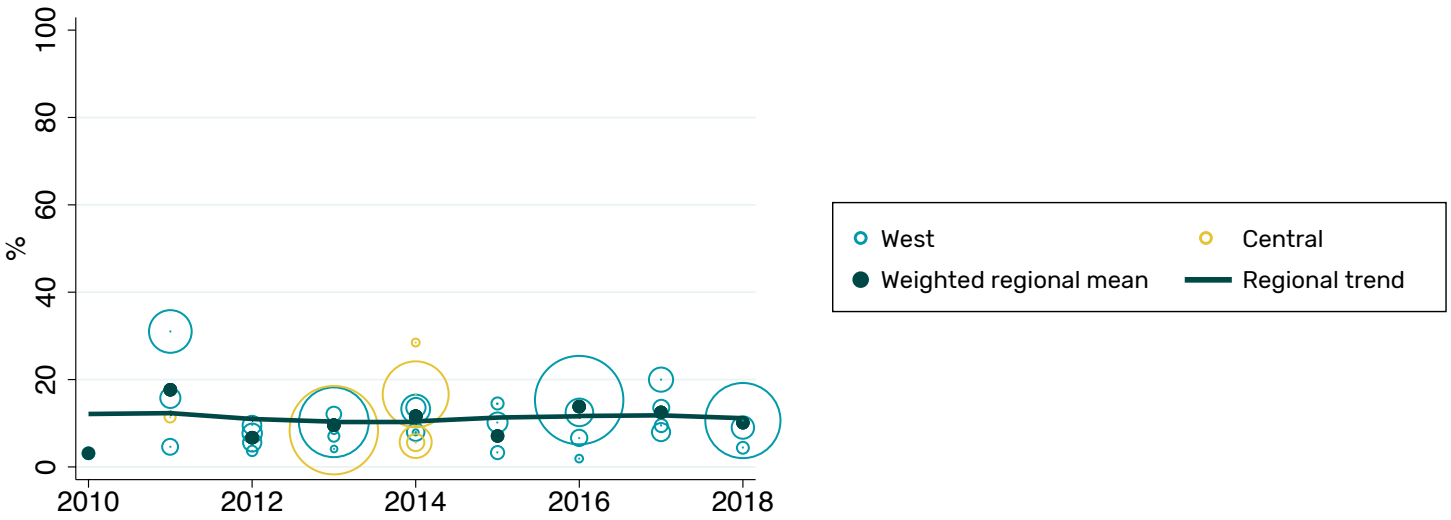
At individual level, with a few exceptions, almost all of the examined child, maternal, and paternal risk factors were univariately associated with MDD. After controlling for other risk factors, child age was one of the factors that most consistently predicted MDD. Compared to children 6-11 months, children 12-17 months and children 18-23 months were more likely to meet MDD and the odds increased by 2.2-4.0 and 2.2-6.0 folds, respectively. There were a few other **individual-level** factors that independently predicted MDD in 4 or more countries, including maternal non-agricultural occupation (compared to mothers with no work, ORs = ~1.5) and maternal exposure to radios at least once a week (compared to no exposure, ORs ranged 1.2-1.6). In the literature, a study exploring the individual-level predictors of nutrition-sensitive and nutrition-specific practices in infants and young children in WCAR found that higher birth order and maternal education were positively associated with MDD (Sagalova et al. 2020).

MINIMUM ACCEPTABLE DIET (MAD)

Data availability and trends:

Only 37 surveys have reported **MAD**, which represents just half of all those included (49.3%). Due to the lack of some MMF and MDD data, MAD was also missing in all Central African countries between 2015–2018. In 2018, only 10.1% children 6–23 months achieved MAD in the WCAR region. Similar to dietary diversity, MAD has stagnated at a population-weighted average of 10.2% between 2010–2018, despite the increased MMF trend over the same period. These findings indicate that MDD is the bigger limiting factor to MAD in children aged 6–23 months in WCAR (Figure 3.9).

Figure 3.9. Minimum acceptable diet in children aged 6–23 months in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Risk factor analyses for minimum acceptable diet:

Using the most current national survey data, risk factor analyses have been conducted in 8 focus countries in WCAR. Table 3.4 summarizes findings from 8 countries to make comparisons across the region with regard to minimum acceptable diet.

Table 3.4. Significant factors (OR and 95%CI) of meeting minimum acceptable diet in children 6–23 months in 8 WCAR countries

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
N	**3776**	**3605**	**1453**	**2265**	**2571**	**5345**	**1522**	**2043**
Child characteristics								
Age (months)								
6–11	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**		**1.00**	**1.00**
12–17	**2.34 (1.39, 3.96)**	**1.41 (1.04, 1.92)**	**2.31 (1.52, 3.51)**	**3.27 (2.10, 5.08)**	**2.44 (1.66, 3.57)**		**6.58 (2.64, 16.39)**	**3.41 (2.34, 4.96)**
18–23	**2.84 (1.69, 4.79)**	**1.32 (0.93, 1.89)**	**2.51 (1.59, 3.98)**	**2.89 (1.77, 4.71)**	**1.89 (1.18, 3.02)**		**5.75 (2.32, 14.29)**	**3.63 (2.35, 5.62)**
Perceived birth weight								
Average					**1.00**			
Larger than average/very large					**0.62 (0.39, 0.99)**			
Very small/smaller than average					**1.17 (0.82, 1.66)**			
Vitamin A supplementation	**1.99 (1.21, 3.25)**	**1.62 (1.16, 2.28)**				**1.32 (1.06, 1.63)**	**1.97 (1.07, 3.62)**	
Iron supplementation					**2.21 (1.45, 3.36)**			
Maternal characteristics								
Education								
No education					**1.00**			
Primary					**0.92 (0.56, 1.52)**			
Secondary/ Higher					**1.84 (1.04, 3.24)**			
Occupation								
Not working	**1.00**				**1.00**			
Agricultural	**2.21 (1.03, 4.74)**				**3.32 (1.60, 6.88)**			
Non-agricultural	**2.24 (1.09, 4.60)**				**1.25 (0.88, 1.78)**			

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Breastfeeding practices								
Currently breastfeeding			**4.27 (2.17, 8.41)**		**1.86 (1.08, 3.20)**			**5.74 (3.49, 9.44)**
Utilization of reproductive health care								
Type of delivery assistance								
Delivered by health professional				**1.00**		**1.00**		
Traditional birth attendant				**0.35 (0.14, 0.87)**		**1.41 (1.04, 1.89)**		
Other				**0.78 (0.50, 1.22)**		**0.82 (0.63, 1.08)**		
Timing of postnatal check-up on woman (days)								
0-1 d					**1.00**			
>= 2 d					**1.15 (0.79, 1.70)**			
missing/ unknown					**0.63 (0.40, 0.98)**			
Exposure to media at least once a week								
Listening to radio	**1.51 (1.01, 2.26)**				**1.59 (1.14, 2.21)**		**1.81 (1.06, 3.11)**	
Women's empowerment score							**1.23 (1.03, 1.46)**	
Paternal characteristics								
Occupation								
Working				**1.00**				
Agricultural				**2.83 (0.84, 9.53)**				
Non-Agricultural				**3.97 (1.21, 13.06)**				
Household characteristics								
Place of residence						**0.79 (0.63, 0.99)**		**0.65 (0.43, 0.97)**
Water characteristics								
Improved source of drinking water							**1.87 (1.11, 3.17)**	

	BURKINA FASO 2010	DEMOCRATIC REPUBLIC OF THE CONGO 2013–2014	GHANA 2014	MALI 2018	NIGER 2012	NIGERIA 2018	SENEGAL 2017	COTE D'LVOIRE 2016
Time to get to water source (min)								
0			**1.00**					
1-59			**0.60 (0.38, 0.97)**					
>= 60			**0.39 (0.15, 1.04)**					
Household wealth								
1 Poorest		**1.00**			**1.00**	**1.00**		**1.00**
2		**1.34 (0.86, 2.07)**			**1.26 (0.59, 2.69)**	**0.74 (0.54, 1.01)**		**1.35 (0.91, 2.01)**
3		**1.24 (0.79, 1.95)**			**1.35 (0.64, 2.82)**	**0.62 (0.44, 0.88)**		**0.99 (0.61, 1.60)**
4		**1.29 (0.78, 2.12)**			**1.73 (0.83, 3.61)**	**0.66 (0.45, 0.98)**		**1.22 (0.67, 2.22)**
5 Richest		**2.15 (1.13, 4.08)**			**2.54 (1.09, 5.91)**	**0.95 (0.62, 1.47)**		**2.72 (1.40, 5.29)**
Community character-istics								
Rank of access to health care								
1 Best access						**1.00**		
2						**1.44 (1.06, 1.96)**		
3						**1.79 (1.30, 2.48)**		
4						**1.55 (1.06, 2.26)**		
5 Worst access						**1.25 (0.78, 2.00)**		

At the community level, similar to MDD, community-level access to health care and nutrition services was significantly associated with MAD in all 8 examined countries in univariable models. The direction of associations was also as expected, where poorer access was dose-responsively associated with decreased odds of MAD. In the adjusted model, however, worse access (2nd to 4th quintile) was associated with higher odds of meeting MAD in one country, Nigeria. Because poor households may cluster at the community level, when household wealth was excluded in the final model for Nigeria, results remained robust, indicating that other unassessed factors in that specific context may have influenced MDD, MMF and therefore, MAD.

At the household level, we found that the majority of household-level risk factors were univariately and significantly associated with MAD. Similar to MDD, household wealth was the only significant factor identified in 4 out of 8 countries in the multivariable models. Consistent with findings in MDD, the richest households, as compared to the poorest, were more likely to meet MAD in 3 countries with increased odds by 2.2-2.7 folds. In one country, Nigeria, households in the 2nd to 4th quintile of wealth, as compared to the poorest in the 1st quintile, had 26-38% lower odds of meeting MAD, which was mostly explained by the unexpected relationship between richer household wealth and lower odds of MMF.

At individual level, we identified significant univariate associations between almostall of the examined child, maternal, and paternal risk factors with MAD. Similar to MDD, older child age was consistently associated with MAD. Children 12-17 months and children 18-23 months, as compared to children 6-11 months, were more likely to meet MAD with an increased odds by 1.4-6.6 and 1.9-5.8 fold, respectively. Findings reported in the literature also indicate that a significantly higher percentage of children from the youngest age bracket (6–11 months) fail to receive the minimum acceptable diet (Issaka et al. 2015c). Other significant **individual-level** factors identified for MAD were child vitamin A supplementation (ORs ranged 1.3-2.0) and current breastfeeding practice (ORs ranged 1.9-6.6).

INTAKE OF NUTRIENT-RICH FOODS

Data availability and trends:

Although 7 food groups were used to calculate MDD and MAD, the reporting rate of nutrient-rich foods has focused on vitamin A-rich and iron-rich foods and the reporting rates were even lower than those for MDD and MAD. About a third of reports have presented data for the intake of vitamin A-rich foods (34.7%) and iron-rich foods in children 6-23 months (33.3%). Data is missing in all Central African countries between 2015–2018. Echoing a flat trend observed in MDD, intakes of vitamin-rich foods and iron-rich foods have not been improved since 2010, with an average of 54.2% and 41.5% between 2010–2018, respectively. In 2018, the rates were 58.3% for vitamin A-rich foods and 40.8% for iron-rich foods (Figure 3.10 and 3.11).

Figure 3.10. Intake of vitamin A-rich foods in children aged 6–23 months in WCAR (2010 – 2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.

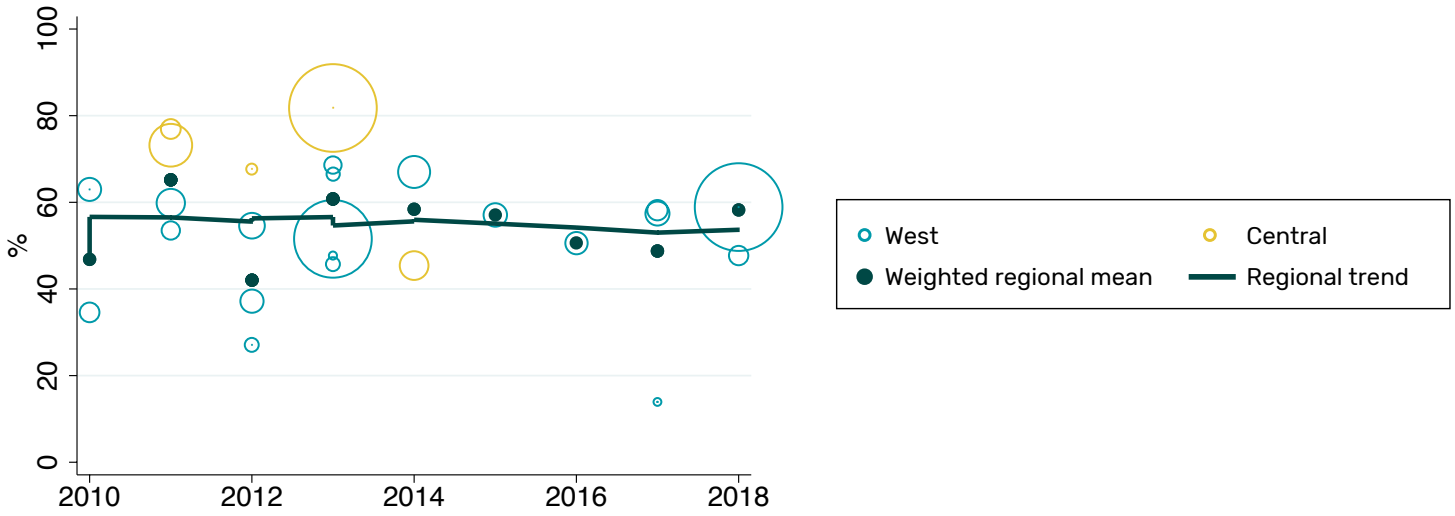
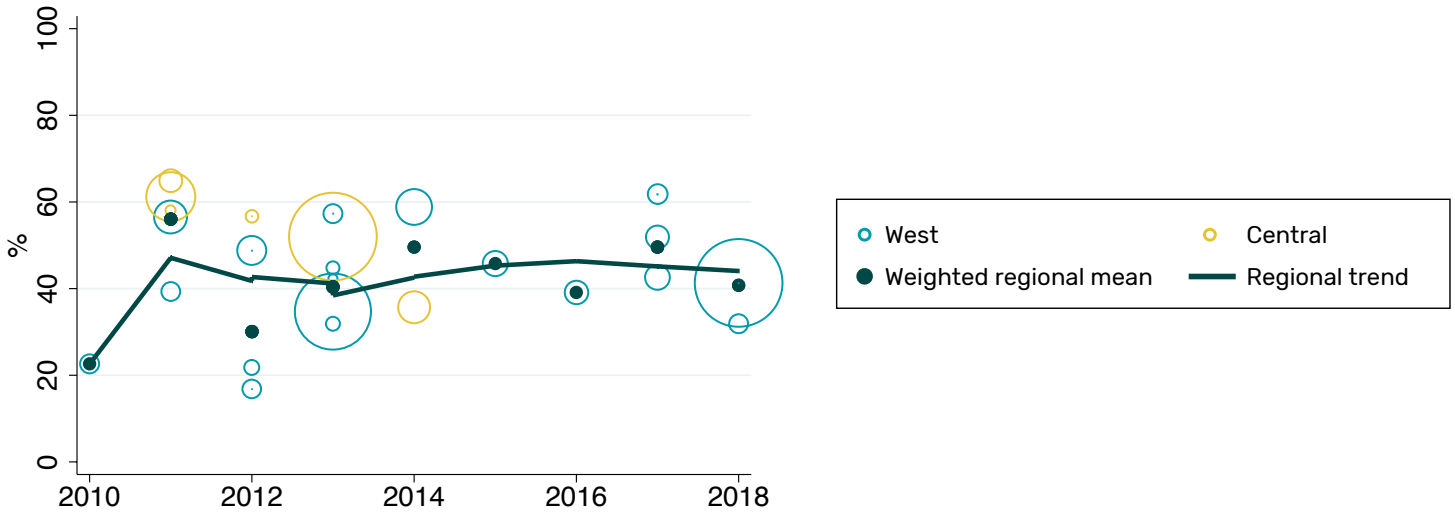


Figure 3.11. Intake of iron-rich foods in children aged 6–23 months in WCAR (2010–2018) based on population-weighted estimates of each country. Each circle represents a country's prevalence of the indicator in a particular survey year.



Contextual factors of complementary feeding practices

Findings from quantitative risk analyses, literature review of peer- and non-peer reviewed sources, and qualitative interviews with health and nutrition professionals reveal a complex, multi-level interplay of factors that influence complementary feeding in general. Contextual factors influencing MMF, MDD, and MAD are presented below by approximate level of influence.

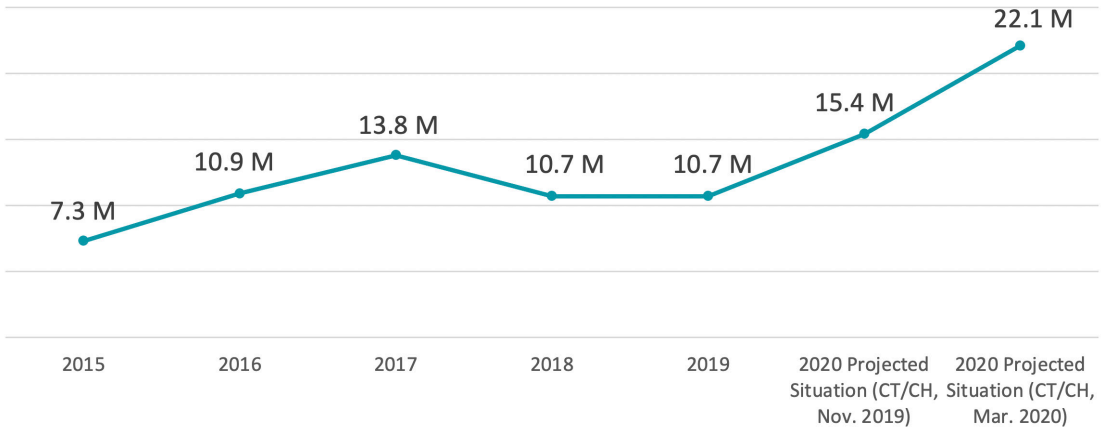
A BRIEF SITUATION ANALYSIS OF THE FOOD SYSTEM IN WCAR

Key informants explained that complementary feeding indicators in WCAR cannot be understood without first acknowledging the persistent food security challenges in the region.

Food availability

First, key informants spoke about inconsistent nutritious complementary food availability both between and within WCAR countries. The literature further underscores this challenge in the region, which has been experiencing increasingly high food insecurity since 2014 (Figure 3.12).

Figure 3.12. Number of food insecure population in West Africa Region[1].



[1]*Senegal, Mauritania, Mali, Burkina Faso, Niger, Chad, Gambia, Cote d'Ivoire, Cap Vert, Ghana, Togo, Guinea, Guinea Bissau, Sierra Leone, Liberia, Benin, Nigeria, Cameroon*

Key informants explained that this region is particularly vulnerable to climatic shocks and hazards, with great climate variability and change that impacts food production, limiting consistent food availability.

> *"We [WCAR] have the climate…because it is a region that falls victim to climate changes; it is often victim to drought, so in terms of agricultural production…that contributes to this dietary diversity problem…"*
>
> ***—Key informant regional interview, NGO***

The Sahel region is particularly susceptible to recurring seasonal droughts, further limiting food production and, as a result, the adequacy of both adult and young children's diets (WFP 2018).

The regional nutrition situation has been further impacted by the 2013–2016 Ebola Virus Disease outbreak and the current COVID-19 pandemic, where entire food systems are likely impacted leading to sub-optimal infant and young child feeding practices due to many upstream factors (Kodish et al. 2018; Kodish et al. 2019). Similarly, regional instability contributes to weakened systems and services necessary for maintaining consistent food availability and food access for most households.

> *"A country like Burkina Faso was doing very well for itself because they have areas that are producing food and were able to actually maintain a decent supply of food for basic consumption for most families…but then you throw in there the security issues that are making it very difficult for services to be provided for the food to be produced…then you destabilize the whole situation so even where a country might begin to sort itself out and produce a lot of food and provide its healthier substances to help prevent or manage disease. When you throw in there the weather challenges and also the insecurity, you destabilize the insti- tution and it becomes very difficult."*
>
> ***— Key informant regional interview, United Nations***

Within food systems, key informants explained that many of the 'best foods' (e.g. non-staple foods nutritious for young children) are exported from WCAR and thus consistent availability of nutritious, affordable foods remains a continual challenge for households.

Additionally, rapid urban growth in WCAR has also contributed to a changing environment where caregivers face many competing demands and surrogates are often in charge of feeding infants and children. Western and Central Africa is seeing a ~4.0% urban growth rate per year, among the fastest in the world (UNDESA).

Food access

Key informants spoke at length about limited nutritious food access being a primary barrier to improving young children's diets during the complementary feeding period in WCAR. Limited finances and physical access (i.e. far distance to markets, expensive transport to market) were two types of challenges interviews revealed most frequently. Key informants also discussed several underlying factors such as early marriage, young motherhood, large family structures, and poverty as inter-related contributors.

> *"…the differences between livelihoods and how families are structured have an influence on malnutrition, particularly wasting…So it's how the family structure defines access to resources and also defines certain practices that ultimately leads to different types of malnutrition and also I suppose impacts minimum acceptable diet."*
>
> ***— Key informant regional interview, United Nations***

In a paper comparing complementary feeding indicators among children aged 6–23 months in four Anglophone and seven Francophone West African Countries, the authors found that most mothers and caregivers may be aware of the role dietary diversity plays in the health of a child however, the lack of resources is a barrier for those mothers or caregivers in their effort to put knowledge into practice (Issaka et al. 2015a). Sufficient resources are important for ensuring access to nutritious foods. The most nutritious foods for young children tend to also be the most expensive (e.g. animal sources).

> *So when we look at the diet of the family of women or even child you would see that they also have very, very low diet diversity…mainly in fruits and animal-sourced foods and fruits, which are among the most expensive diets. There is one study that you might have seen about the cost an ideal diet, which was one of the studies published by my colleagues and this is an analysis of the cost of the Lancet diet in several countries. It shows that this kind of diet is just not affordable to most people in these countries, in low- and middle- income countries [such as those in WCAR].”*
>
> ***— Key informant regional interview, Academic institute***

Therefore, many households are put in a difficult position where feeding all household members with grains (food quantity) may be the better household decision, given the limited resources available, than feeding diverse diets (food quality).

> *The reality is that when you look at food production in a context where people are struggling in terms of their household income, then these things that you’re helping them to grow are actually profitable…so you sell them and then you’re just back to the kids eating whatever it is that’s going to feed their bellies…but the money that’s being brought in is used for things that matter more to the household which may involve food, but may not involve food… people are trying to make complicated choices in a resource limited set- ting…”*
>
> ***— Key informant regional interview, Donor organization***

Key informants explained this phenomenon to be persistent among poorer households with large family sizes and agricultural livelihoods living throughout the region. Further, rural markets where diverse foods are available tend to be open infrequently and are far distances for many households without reliable or affordable transportation.

Interview data also suggested that private sector marketing is a growing influence in the region, making non-nutritious young child foods aspirational and thus more attractive to mothers and children alike.

> *If we look at commercialization in our countries, our markets are full of ‘junk foods’. These junk foods that have taken up the markets are given to children, and for mothers they are convenient…they have already been prepared and [are] ready for use. So, it does not take them [mothers] time to feed their children.”*
>
> ***— Key informant regional interview, NGO***

Food utilization

Interview participants explained that, specifically in urban centers of WCAR where more parents are in the workforce, food cost, taste, and convenience drive individual consumer behaviors, including the feeding of young children. In many cases, food products targeting young children are non-nutritious snack foods fed not by mothers but by surrogates such as babysitters, grandmothers, or older siblings.

Environmental characteristics play a role in food utilization too. In rural communities where potable water is not easily accessible, it is not surprising that mothers may turn to sugary beverages for feeding young children, explained interview participants.

> *"So, it is not good to drink soft, sugar sweetened beverages, we understand that. And you tell them [local communities] it's not good to drink water that is not clean, potable water and they say, 'yes, we under- stand that'… and then you put them in a situation where they do not have potable water and they don't have the means to fetch and boil and purify water…what are they going to do? Take to sugar sweetened beverages."*
>
> ***— Key informant regional interview, United Nations***

INFLUENCING FACTORS FROM THE PERSPECTIVE OF STRATEGIC ACTIONS

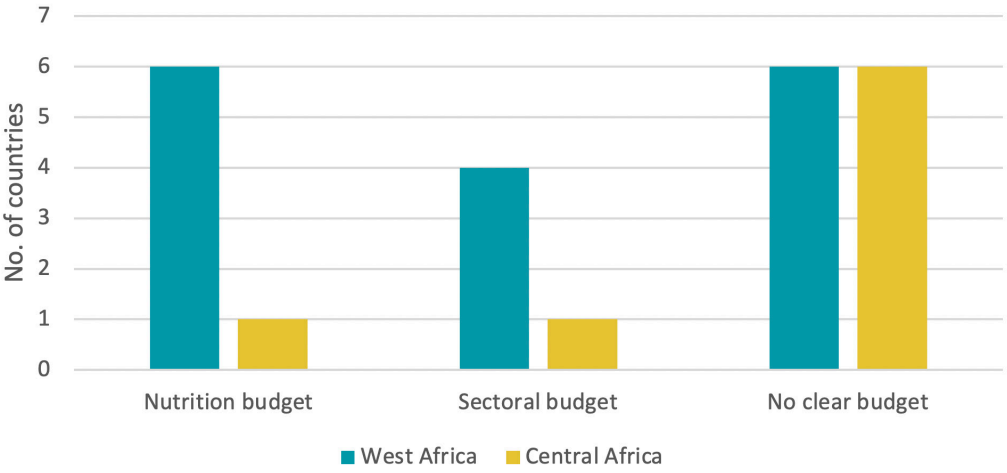
At the policy level, regional key informants explained that, throughout the regions, there are varying levels of political will toward improving young child diets. Key informants explained that even though they care about something such as preventative nutrition, it does not mean the government cares. This is particularly true in WCAR where much of the region is a humanitarian situation requiring emergency operations and treatment-based approaches.

> *"In the sub region [Sahel] where we are located, the first challenge is that we are in a zone that is qualified as 'urgent' where most of the interventions are focused on humanitarian aid, as well as are most of the finances. So to put in place preventative interventions for nutrition is a bit delicate. Available human resources are more oriented to emergency response."*
>
> ***— Key informant regional interview, NGO***

Key informants explained that most countries in WCAR have nutrition policy frameworks or strategic plans around infant and young child nutrition in place. This finding was discussed by multiple interview participants and supported by secondary policy from national governments (Figure 2.3). All countries in WCAR have nutrition policies or strategies and 9 countries have policies targeting children aged 6–23 months.

A policy is only as good as the budget behind it and thus reflective of political will. Key informants explained that most countries throughout the region have strong policies in place, but in many cases have not earmarked adequate funds for operationalizing them. Data from Scaling Up Nutrition (2015a, 2019b, 2019c, 2019d), Hunger and Nutrition Commitment Index Global (2016, 2017a, 2017b, 2018c, 2017d, 2017e, 2017f, 2017g, 2017h, 2017i, 2017j, 2019), and Hunger and Nutrition Commitment Index Africa (2016, 2017a, 2017b) were used to understand the proportion of countries with a separate budget line for nutrition compared to those with larger sectoral budgets (where nutrition may be included within a broader health budget) and those without clear budgets for nutrition at all (Figure 3.13).

Figure 3.13. Comparison of number of countries with nutrition, sectoral, and no budgets in WCAR



Reliance on only policymakers to operationalize programming to improve young child diets is a risk in a region where government systems may be heavily reliant on external capacity and financial support.

> *"So it will be very difficult to reach the nutrition related SDGs in the region, and I think the [solution] would need to be systems that exist regardless of whether somebody is investing in them or not, and so what sys- tems? I think probably very much related to commercial systems, whatever these commercial systems may be."*
>
> ***— Key informant regional interview, United Nations***

The commercial food system presents both opportunities and challenges throughout the region as key informants explained the increased supply of and demand for food products targeting young children. Interview participants explained that there are inconsistent nutrition-friendly regulations of these young child foods for breast- milk substitutes, local production certifications, and mass fortification of staple foods throughout the region. Developing consistent nutritional codes or labels on child foods is also difficult, as key informants explained there is not a universally agreed upon definition of 'junk food' in this region.

> *But, referring to what it is you call 'junk food'…we have not exactly defined that, but that will be every- thing including sugary beverages… and chips, and there is a lot of chips. I do not think that there is any- thing we can do against that, but there haven't been any codes, any policy that has limited that, notably in the countries of West Africa. They still do not have systems of code as we can see, of nutritional codes there."*
>
> ***— Key informant regional interview, Academic research institute***

Many non-nutritious foods include logos reflective of vitamins and minerals, making it difficult for policy makers to build consensus around legislation and causing confusion for consumers about nutritious vs. non-nutritious foods at point of purchase (Figure 3.14).

Figure 3.14. Example of biscuit/cookie snack food on the market in WCAR with 'vitamins and minerals' logo

Globally-established codes and policies (e.g. Breastmilk substitutes resolution 69.9 aimed at ending inappropriate promotion of foods for infants and young children) have yet to be consistently adopted and enacted at the regional levelThis point underscores what key informants explained with regard to moving legislation forward; we often speak about the knowledge of the community toward young child nutrition, but in fact the knowledge of program and policy makers related to the topic is also important.

> *…we are doing some stakeholder assessments, in terms of knowledge of some of these global policies which are adopted in the region. We realize even the knowledge of the new technical guidance [around improving nutrition] and all that is quite limited among program people and policy leaders."*
>
> ***—Key informant regional interview, NGO***

Policy influence was a key theme discussed in various ways among key informants at the regional level.

At the institutional level, environmental and community-level challenges such as climatic variability, regional instability, transient populations, logistical roadblocks due to harsh conditions, and great socio-cultural diversity within countries contribute to serious challenges tailoring and implementing nutrition programming consistently.

> *The other problematic thing is health, I'd say as well, because this knowledge that women and even men need to have, generally, one gets it at the level of health culture, in knowing also the healthcare systems that are very weak in these countries, the systems of access are more curative than they are preventive. This structure of health doesn't know how to play its role in the growth of the child and also doesn't know how to play the role of advising these mothers during growth and also after infancy of a good complemen- tary diet, that is also a part of the problem, especially focusing on prevention of malnutrition in healthcare systems. But unfortunately, you know healthcare in Chad is very weak, even weaker than healthcare in Niger, but it is especially weak in the prevention sphere."*
>
> ***— Key informant regional interview, NGO***

These same conditions contribute to inconsistent value chain management for ensuring nutritious food availability and access throughout the region. One key informant explained that the Ministry of Agriculture used to work to ensure food security, but now there is a growing reliance on local NGOs in this space.

Also, the regional focus on curative systems rather than preventative systems, particularly in the Sahel, remains a key operational challenge. Key informants emphasized that all appropriate systems are not yet fully in place across the region to enable optimal young child diets during the complementary feeding period. This 'systems' point of view is a missing piece that may help improve young children's diets in WCAR. Currently, for instance, most national social protection programs across the region do not explicitly include nutrition.

> *So, for me this is like the missing piece in the nutrition puzzle in West Africa meaning that everybody is speaking about complementary feeding for young children but we don't address it from a systems point of view."*
>
> ***— Key informant regional interview, Donor organization***

Key informants emphasized that nutrition is not fully integrated at the systems level regionally or at country level in most cases. Exclusive breast- feeding has been, and continues to be, the priority for many organizational efforts around nutrition, with complementary feeding oftentimes a secondary thought.

> *And even in terms of our programming, in most of them we talk about the first 1,000 days…to facilitate this, and that, but when you go to the core of our programs in general… I'm not saying all agencies but most agencies, in terms of placing an emphasis on complementary feeding…at times it's not there…as compared to emphasis on breastfeeding or emergency nutrition."*
>
> ***— Key informant regional interview, NGO***

Where operational efforts are in place to improve infant and young child feeding, key informants emphasized the need for stronger formative research for improved and 'more sophisticated' intervention strategies.

> *But I still think the tendency is toward quite simplistic responses. To really talk about infants, you know breast-feeding promotion, breastfeeding support, I think it's still quite an interesting public health space where we're barking at women and providing them with quite didactic sort of messaging, rather than try- ing to think through in a sophisticated way about why people do what they do."*
>
> ***— Key informant regional interview, Donor organization***

Also, layering nutrition into other systems more fully can be a key opportunity to improve/address behaviors for young child diet improvement.

> *…when the child is six months old, a visit to the health center can prompt the health team to alert the mother to give the child food in addition to breastmilk, on top of breastfeeding…to also introduce comple- mentary foods."*
>
> ***— Key informant regional interview, Academic research institute***

Within communities at the interpersonal level, health workers remain critical influencers throughout WCAR, oftentimes the bridge between clinicians and community members. Yet, adequate investment in health worker training has been limited resulting in low capacity to support mothers in both continued breastfeeding and optimal complementary feeding, which, to do well, includes a complex set of behaviors.

> *So the thing, the capacities in nutrition are low and they are low especially in the people that are actually implementing nutrition in the field. Capacity of workers and health workers and even agriculture extension officials…"*
>
> ***— Key informant regional interview, Academic research institute***

Additionally, feeding behaviors are driven by community-level traditions (e.g. food taboos) as well as recommendations from neighbors, grandmothers, and other mothers. Interpersonal influences on feeding practices are strong in communal contexts throughout the region.

> *…because a lot of habits and practices at local level are linked to recommendations from [other] mothers and grandmothers…to local knowledge this is a mix of all things taboo and it really depends from one area to another…"*
>
> ***— Key informant regional interview, Donor organization***

Findings from a paper that explored the socio-demographic factors (as well as other relevant factors) that pose risks to optimal complementary feeding practices among children aged 6–23 months in seven francophone West African countries–Benin, Burkina Faso, Cote d'Ivoire, Guinea, Mali, Niger and Senegal–indicated that cultural beliefs that prohibit young children from eating some selected nutritious foods (such as vegetables) may contribute to variation in complementary feeding patterns. These variations may also be due to different agroecological characteristics, ethnicity, and taboos in the

various countries. This calls for educational strategies to change some of the beliefs that hamper the implementation of optimal complementary feeding practices in different administrative regions in the various countries (Issaka et al. 2015b).

Another paper, which reviewed the policy implications of inadequate complementary feeding among children aged 6–23 months in West Africa, reported that a practice of low-income families is that they do not make any effort to prepare separate food of appropriate consistency, quality, and quantity for children. One major problem of feeding the child the traditional West African complementary foods is the bulky nature of it (roots and tubers) which makes it difficult to achieve an adequate protein and energy intake among infants and young children (Issaka et al. 2015d).

Clinicians, including doctors and nurses, are important influencers of mothers' feeding behaviors. However, key informants explained that nutrition is not integrated enough within the health system, particularly medical school educations, to emerge during clinic visits. Similarly, food vendors who are often present when food purchases are being made, lack the nutrition understanding to support caregivers in making informed decisions that are in the best interest of their child's health and nutrition.

At the individual level, regional key informants explained that individual nutrition knowledge of mothers is important for ensuring minimally acceptable young child diets when sourcing foods, particularly in the face of private sector advertising of products and without stores

> *"The second thing is it is not well communicated to mother and person in charge of children feeding prac- tices. Because in the local market you can find a lot of different products, some of them are fortified, some are not… but nobody is clearly communicating the difference between you know the added value and jus- tifying the difference in price for those products. Meaning that mother will mainly go for the cheaper one, basically because they just don't know the real added value sometimes… and a lot of times when you have fortified product this is not communicated."*
>
> ***— Key informant regional interview, Donor organization***

We also heard that, ***"…while there is a problem of food availability, there equally is a problem of lack of knowledge of food combination of different food groups to have a balanced diet."*** All key informants emphasized that knowledge is important but not as important as caregiver competing demands, underlying food insecurity, previous feeding experiences, and numerous other factors that have a greater impact on minimum acceptable diets of children in the region.

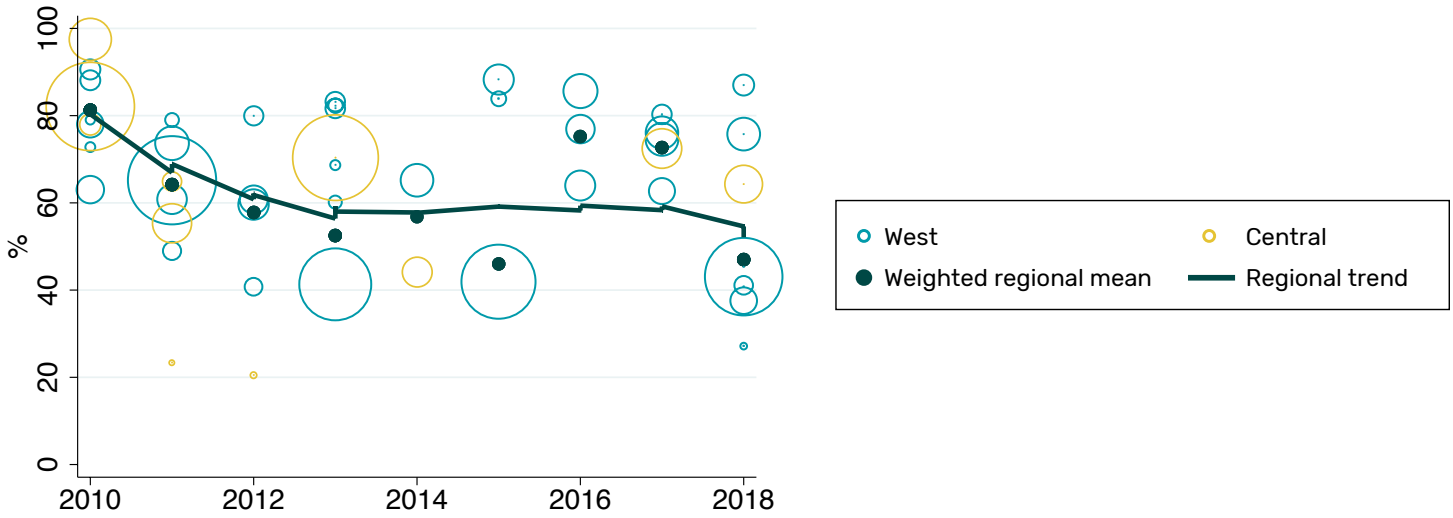
III. SUPPLEMENTATION AND FORTIFICATION

VITAMIN A SUPPLEMENTATION

Data availability and trends:

Data on vitamin A supplementation were available and extracted from 50 of 75 reports (reporting rate: 66.7%). The population-weighted proportion of children 6–59 months receiving vitamin A supplementation in the past 6 months was 81.3% in 2010, which dropped to 64.2% in 2011, and stabilized at a mean proportion of 58.3% from 2012 to 2017. In 2018, the weighted proportion again decreased to 47.0% (Figure 3.15). This is true despite the fact that all West African countries have implemented vitamin A supplementation programs either through routine programming or individual campaigns (Sight and Life, 2018).

Figure 3.15. Vitamin A supplementation among children U5 years in WCAR (2010–2018)



Regional informants recognized the decrease in vitamin A supplementation, noting compliance challenges as well as implementation challenges such as expensive programming in operationally difficult contexts in WCAR.

> *Look at the vitamin A capsule, a beautiful thing. We had to create very expensive campaign programs to get them running…now the free capsule is gone. We see in every country a significant drop in vitamin A coverage. It's pathetic that since the 80's…we are almost in 2020… we are down to coverage levels of 30% and knowing that this has major consequences for mortality. It's just like, how could we end up with this?"*
>
> ***— Key informant interview, Donor organization***

In the DRC, reduced budgets for vitamin A supplementation and resulting programming changes suggest similar challenges at the country level.

> *"The vitamin A was done through campaign door to door. That means that providers that were trained will go door to door to administer vitamin A, but I think that recently, the budget has started to reduce, now we are given during Children's Health Days…"*
>
> ***— Informant interview in DRC, Government official***

Door-to-door campaigns reach individuals at the community level, whereas Child Health Days at health clinics typically rely on individual travel in a facility-based approach. In resource-constrained settings such as those throughout WCAR, supplementation efforts that are only facility-based may contribute to reduced program coverage due to health care access challenges faced by lower-income and more remote households.

In Niger, interview participants explained that funding challenges have been addressed through integrated approaches into the health system.

> *"Yeah, so the trend is going down because of limited funding. You can say, usually we are doing it [vitamin A supplementation] as integrated with polio immunization…so when we are doing it as integration it is okay because there's no funding problem, we can do our entire country nation-wide. But from 2018, what I know, the first round was integrated and it was no problem with the coverage, but the second round it was stand-alone vitamin A campaign and because of limited funding, it has been done in only four regions out of eight. So that was like the half of the regions, that the reason why the coverage was going down."*
>
> ***— Informant interview in Niger, United Nations***

Between countries, Vitamin A supplementation coverage varied as well. The grey literature suggest coverage was highest in Togo (81.2%) and lowest in Nigeria 40.4% (Sagalova et al. 2020).

> *"[In Nigeria], VAS is well institutionalized in the national health policies. However, coverage is low in many states and inequities persist. Many states do not release sufficient funds and often release them late for the campaigns and the majority of health facilities do not implement it."*
>
> ***— Grey literature, GAVA 2012***

Nigeria is a highly populated country with public health differences by state. DRC is another example of a geographically large and diverse country within which vitamin A supplementation coverage varied as well. In DRC, for instance, Katanga has lower coverage than that of Kivu. A researcher within DRC explained many factors that contribute to such in-country differences.

> *"Right now, you know, for starters, in Kivu we have we are in a very dramatic situation …there are war conflicts…there are war conflicts, there is the sufficient income, the management, there is the absence of anthropometric materials, there is the lack of financing, all of these parameters are there. It is normal that the people have an enormous need for Vitamin A compared to [those in] Katanga. Because at the level of coverage in Kivu…it is a region where there are big war conflicts..."*
>
> ***— Informant interview in DRC, Research institute***

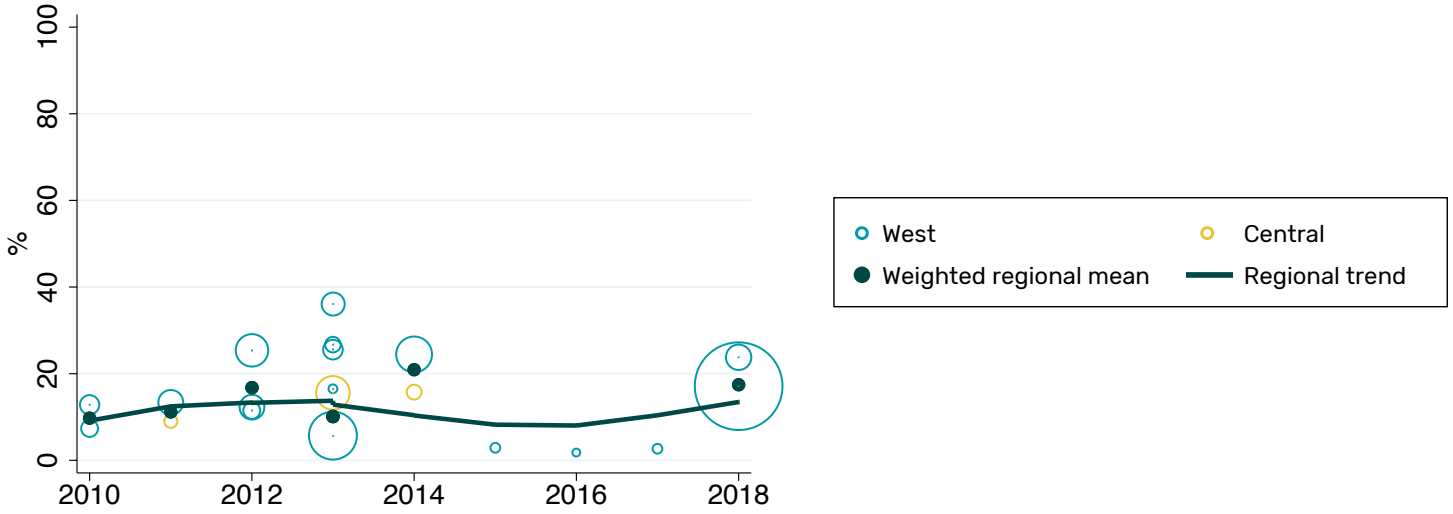
Interview participants explained that UNICEF and partners support community-based ap- proaches, such as mother-to-mother support groups (Groupes d'Apprentissage et de Suivi des Pratiques d'ANJE) in many countries throughout the region to reach more vulnerable, hard-to-reach communities (USAID & SPRING 2017; UNICEF 2020; MAMOPANEL 2017).

IRON SUPPLEMENTATION

Data availability and trends:

Data on **iron supplementation** in the past seven days in children 6–59 months has been reported in only 20 out of 75 reports (reporting rate = 26.7%). There were very limited data reported between 2015–2017. Overall, the regional trend curve, based on population-weighted proportion, shows low coverage of iron supplementation in young children with a regional proportion of 17.5% in 2018 and a mean proportion of 10.4% between 2010 and 2018 (Figure 3.16).

Figure 3.16. Iron supplementation among children 6–59 months in WCAR (2010–2018). Each circle represents a country's prevalence of the indicator in a particular survey year.



Similar findings have been reported in the literature, with low iron supplementation coverage regionally but between-country differences: Senegal (1.7%) and Sierra Leone (35.2%) (Sagalova et al. 2020). Interview participants tried to explain these findings, pointing out that iron supplements are not mandated by governments in most cases.

> *Well, the simple answer to that is, Ghana does not mandate administration of iron supplements to young children because of the studies that have shown the malaria and the supplementation can increase the risk of severe malaria and Ghana is a big area for malaria. We currently don't recommend iron supplemen- tation to young children, however in the last three of four years the government has given approval for multiple micro-nutrients supplements that are used like sprinkles that can be added to food but not as an oral pharmacological dose to children."*
>
> — ***Informant interview in Ghana, Research institute***

And in cases where iron supplementation is being administered in WCAR, informants explained that it is an approach used to improve the nutritional status of pregnant and lactating women primarily.

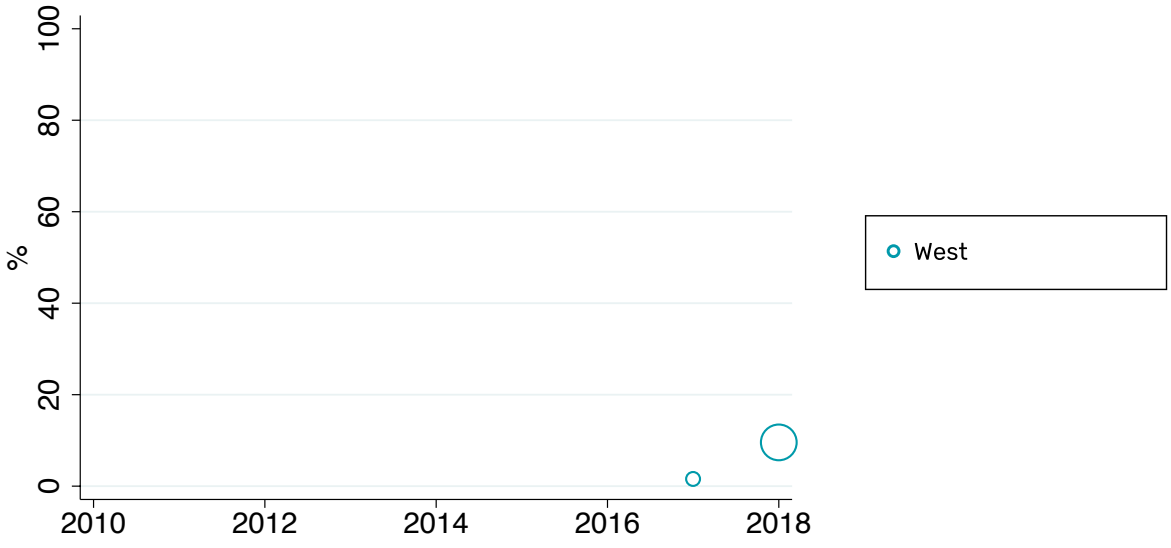
> *It is a bit complicated and very hard in strength to administer this kind of supplements to these young children. Supplementation is mainly focused on pregnant women of reproductive age. There is not a high compliance rate among pregnant women. It has many side effects I don't know if in young children it may be worse."*
>
> — ***Regional key informant interview, Research institute***

MULTIPLE MICRONUTRIENT POWDER USE

Data availability and trends:

Data on multiple micronutrient powder use were extremely limited; only two countries reported the data in national reports (reporting rate = 2.7%). Though data are too limited to suggest a regional trend, the available data showed low proportion of multiple micronutrient powder use in two countries in recent years: 1.6% in 2017 and 9.6% in 2018 (Figure 3.17).

Figure 3.17. Multiple micronutrient supplementation among children 6–23 months in WCAR (2010–2018). Each circle represents a country's prevalence of the indicator in a particular survey year.



Interview participants acknowledged the importance of home fortification with multiple micronutrients (e.g. MNP) in this region where food and nutrition security are not guaranteed for vulnerable groups including young children aged under two years.

> *…because we think that local products alone are not sufficient. Certainly, it is important to reinforce it [local food] with micronutrient powders…"*
>
> ***— Informant interview in Ivory Coast, United Nations***

Regional government and organizations prioritize different types of nutrition intervention approaches to address micronutrient deficiencies. WFP is one organization that explicitly supports 'home fortification of food for children aged 6–23 months as a priority area for strengthening and [scaling] up in the fight against malnutrition,' thus playing an active role supporting governments with integrated nutrition interventions such as those involving MNP (WFP 2019). UNICEF and Helen Keller International are other organizations using MNP in support of targeted and integrated nutrition programming, offering additional services such as nutrition counselling, cooking demonstrations, and growth monitoring as complements to provision of nutrient supplements such as MNP (Mamopanel 2017).

MICRONUTRIENT POWDER USE IN WCAR

Qualitative themes

- **MNP is being implemented throughout the region, but not yet at scale in most country contexts**
- **MNP is not a standalone intervention but combined with nutrition counseling, growth monitoring, and other complementary interventions to improve young child health and nutrition**
- **More implementation-related best practices, both from supply and demand sides, are needed for home fortification with MNP at scale**

For instance, to address high anemia rates among children aged 6–8 months in Ghana, a home fortification program using MNP was implemented in four districts linked to child welfare clinic sessions as well as IYCF counselling (UNICEF Ghana, 2010). Similarly, in Gambia, a community-based approach based on the Baby Friendly Community Initiative was design for mothers and young children; it included provision of multi-vitamin-mineral sprinkles ("Anuka") for children aged 6–23 months, as well as nutrition education for mothers (FAO 2010). Examples of these sub-national MNP programs exist throughout WCAR including, but not limited to, Niger, Nigeria, DRC, Gambia, Ghana, and Senegal.

> *There is also the smaller scale fortification with the micronutrient powders. So this fortification at home is not at the national scale…it is really targeted. Lately we have really been in the rural zones where we have observed the fortification for children with the micronutrient powders because this is really a more targeted intervention…it is one that we have put in place with UNICEF, the home fortification, but it's not at a national scale, it's not at a large scale."*
>
> ***— Informant interview in Senegal, Research institute***

Interview and grey literature data suggest the need for more implementation-related information around best practices both on supply and demand sides of MNP programming. Some governments have begun incorporating MNP into existing systems already in place at community levels.

> *This is called home fortification. So, we have a nutrition service at the community level where we have contact with at least 300,000 mothers of children under two years old, and we take the opportunity to give micronutrient powder to mothers of children who are 6 months to 23 months. And we discuss with them how to use the powder and the usefulness of supplementation."*
>
> ***— Informant interview in Senegal, Government official***

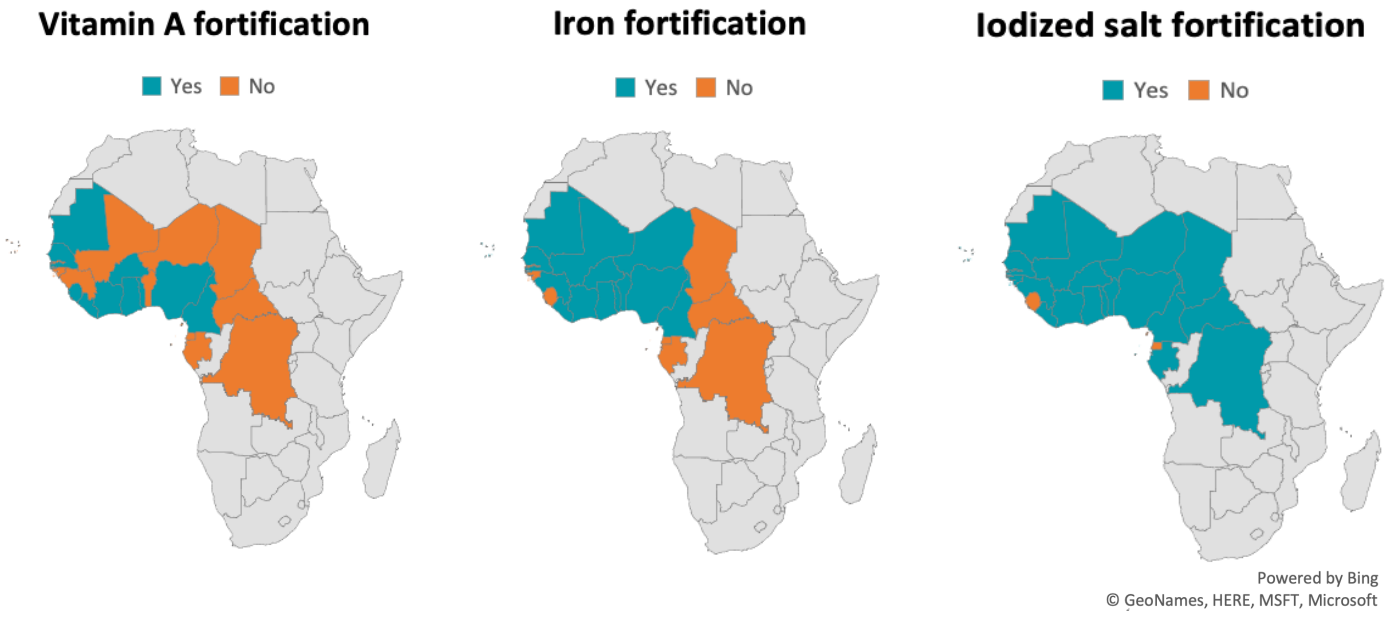
In continued efforts to scale up and integrate services, MNP programming to date has, in many cases, included operational research or program designs intended for evaluations about acceptability and effectiveness. Interview participants from Ghana and Senegal, as well as program reports and journal articles from the literature, highlight a variety of MNP-related studies since 2010 in the region.

FORTIFICATION

Fortification programs:

Policies on food vehicles fortified with select nutrients of vitamin A, iron, and iodine vary across the region (Figure 3.18) and none of these are specifically targeted at complementary foods or young child feeding. Of the 3 micronutrients with fortification programs, iodine has the best coverage. The most common food vehicles for fortification are vegetable oil (vitamin A), wheat and maize flour (iron) and salt (iodine). Twelve of 15 Economic Community of West African States (ECOWAS) countries have mandatory legislation for fortifying cooking oil and 14 out of 15 have mandatory legislation for fortifying wheat flour (USAID, 2015).

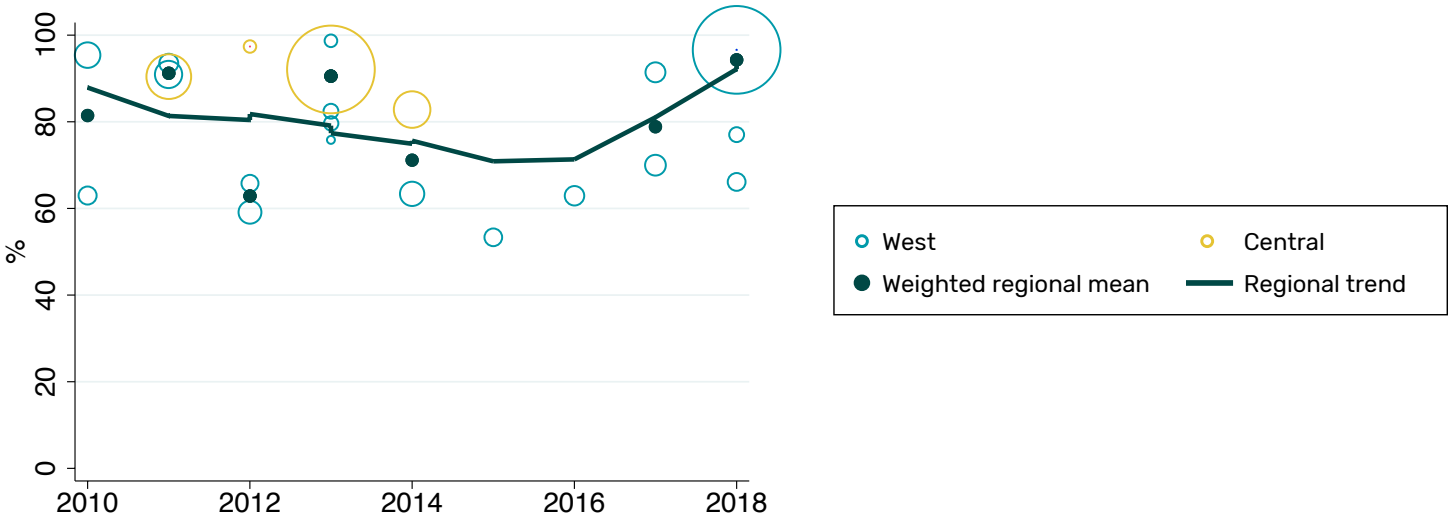
Figure 3.18. Fortification programs across the 24 WCAR countries



Data availability and trends:

Data on iodized salt use in households with children under 5 years were indicated in only 22 of 75 reports (reporting rate = 29.3%). In 2015 and 2016, only one country with a relatively low proportion reported, contributing to the "U" shaped overall regional trend below. Regionally, the weighted proportion was 94.3% in 2018 and the mean weighted proportion was 76.3% between 2010–2018 (Figure 3.19).

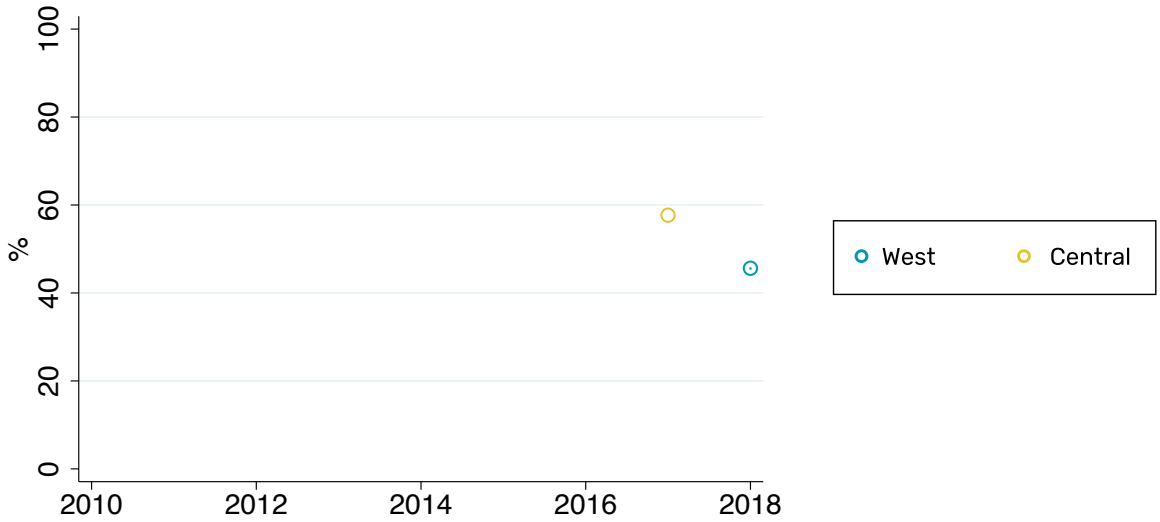
Figure 3.19. Iodized salt use among children under 5 years in WCAR (2010–2018). Each circle represents a country's prevalence of the indicator in a particular survey year.



Data availability and trends:

Data on iron-rich and fortified foods among children aged 6–23 months were reported by two countries (57.7% for iron-rich in 2017 and 45.6% for iron fortification in 2018). No regional trend can be discerned due to the limited data available for analysis (Figure 3.20).

Figure 3.20. Intake of iron-rich or iron-fortified foods among children 6–23 months in WCAR (2010–2018). Each circle represents a country's prevalence of the indicator in a particular survey year.



Regional key informant interviews described fortification as an intervention approach gaining popularity and support throughout WCAR.

> *…the appetite is there in West Africa and I will say if you take Africa in general, West Africa is one of the most advanced regions in terms of…and it comes all the way from the government level to program implementation because if you take the current foods that are fortified, which include wheat flour, vegetable oil, and then iodization of salt…in the 15 countries in the West region, there are standards and legislation…I don't know much about Central [African countries]. I would say for West [African countries]; the appetite is heavily there. Where the challenge has been as we talk to governments…the challenge has been having enough funding to monitor the implementation of those standards or policies…"*
>
> ***— Key informant interview, NGO***

In light of this momentum, several considerations were explained during regional interviews. First, while some legislation is in place for wheat flour, vegetable oil, and iodized salt, evidence-informed fortification standards and guidelines are still a need across the region. For example, the Project Healthy Children (PHC) has established national vitamin A fortification programs in 5 countries and created fortification standards that are in various stages of becoming mandatory and enforceable, but none have reached the final stage in which legislation is officially signed (PHC, 2017). In terms of salt iodization, UNICEF has a mandate to ensure that salt is iodized to standard in Liberia but it lacks the resources to implement the mandate (PHC, 2017).

> *And then some industries have started fortifying, yet none of the countries have standards or guidelines for the fortification, so what [we are] doing is trying to suggest to governments to develop guidelines for the fortification. But then they raised a lot of issues for the need for evidence so with funding…we are trying to support some of the research around that. So, in short, the appetite is there, the programs are there, but huge challenges in terms of monitoring and then cost."*
>
> ***— Key informant interview, NGO***

Our literature searches revealed that Fortify West Africa, part of the Feed the Future Initiative, works to harmonize fortification policies and standards and encourage private sector adoption of fortification to reach the most vulnerable mothers and children with vital micronutrients such as vitamin A, iron, folic acid, and B vitamins. Fortify West Africa has worked to make fortified oil and flour common even in rural communities and helped promote the Enrichi regional fortified product brand (USAID 2015).

In recent years, about half of WFP's fortified rice was distributed in the West Africa region (WFP 2017,2018). Nestle also reports fortification of Maggi bouillon with iron in this region (Nestle). Despite the availability of fortified foods, fortification typically brings increased costs for the consumer. Increased prices of fortified staple foods compared to those of non-fortified staples are oftentimes modest, but may be enough to drive choice at point of purchase, particularly among the most vulnerable households.

Third, in light of more expensive food products, appropriate messaging is needed for consumers to make informed food choices.

CONSIDERATIONS FOR FORTIFICATION IN WCAR

Qualitative themes

- **WCAR has an appetite for fortification and is seeing it become more popular, especially in west Africa**
- **Fortification should be accompanied by evidence-informed standards/guidelines, cost considerations, and appropriate messaging to consumers**
- **Fortification has a role to play in improving diets in WCAR but should not replace investments into the food system and food policies that underlie this nutrition situation**

> *…it [benefits of fortified products] is not well communicated to mothers and persons in charge of child feeding practices. Because in the local market you can find a lot of different products, some of them are fortified… some are not, but nobody is clearly communicating the difference between…the added value and justifying the difference in price for those products…meaning that the mothers will mainly go for the cheaper one, basically because they just don't know the real added value sometimes… and a lot of times when you have fortified product, this [added value] is not communicated."*
>
> ***— Key informant interview, Donor organization***

Without messaging to support consumer choice when faced with two food options of differing price points, consumers may be more apt to choose the cheaper, and in this case less nutritious, option. Appropriate communications are also important for ensuring that there is not a reliance on fortified foods, particularly during the exclusive breastfeeding period, or at the expense of other nutritious local foods.

> *…the other issue, for me, is that women do not continue to breastfeed [because] now we have a lot a lot of production of certain enriched flours etc. So, the usage of other alternatives or supplements makes it so that [the mother] thinks that she can use that product, or, well, that alternative food and thinks that she can stop, that it will replace mother's milk, even if that's not accurate. Still, we encounter wrongful knowledge [among consumers]."*
>
> ***— Key informant interview, NGO***

Third, key informants emphasized that fortification is one viable approach for improving the diets of young children, but not at the expense of other sustainable investments such as in food systems and policies.

> *…we're probably going to see an increasing focus in trying to get these quick-fix solutions out there and risking not enough investment going into things that are going to be building a food system that can actually help people access those more diverse range of foods in the future…so it's a balance of investment…and you pump a load of money in there [into fortification], but you're not putting any money in the way we kind of think about agriculture and food policy and so on and so forth. You'll end up with a very distorted food system…"*
>
> ***— Key informant interview, Donor organization***

Like supplementation efforts, fortification progress varies both between and within countries of WCAR. Regional informants described this region to have an appetite for increased fortification yet did provide careful considerations for moving forward. Individual country experiences vary and are described in more detail throughout this report in country chapters 4–11.

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The next section presents findings from the eight focus countries.

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These focus countries, although not representative of the entire WCAR region, serve to highlight and show country-level trends and risk factors of complementary feeding.

CHAPTER 4

BURKINA FASO

Complementary feeding trends, determinants, and recommendations in Burkina Faso

EXECUTIVE SUMMARY

This chapter presents research findings around comple- mentary feeding in Burkina Faso. Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year** has been universal (95.7%) between 1992–2018 and continued breast-feeding at 2 years has remained high (83.3%). The most current rate for continued breastfeeding at 1 year was 92.4% in 2018. Reporting rate for **continued breastfeeding at 2 years** was lower and the most recent rate was 80.1% in 2010.
- **Introduction of solid, semi-solid and soft foods** in children 6–8 months increased from 35.0% in 2003 to 70.8% in 2018. However, **minimum meal frequency** was achieved in 38.9% of the children aged 6 –23 months; **minimum dietary diversity** in 6.0% of children; and, as a result, **minimum acceptable diet** was achieved in 3.1% of children aged 6–23 months; all latter three indicators were only reported once in 2010.
- **Vitamin A-rich** and **iron-rich foods** were consumed by 34.6% and 22.6% of children aged 6–23 months, respectively, in 2010. Overall, though, limited nutr ent-rich food intake data were available.
- National level policies and programming efforts have ensured the successful implementation of some supplementation and fortification programs. The coverage of **vitamin A supplementation** in children 6-59 months has increased from 33.3% in 2003 to 75.8% in 2018. However, **iron supplementation** in children 6-59 months was only 7.4% in 2010.
- **Iodized salt use** in households with children under 5 doubled from 48.8% in 2003 to 95.4% in 2010. However, data was not available for **consumption of iron-fortified foods** in children 6-23 months and **multiple micronutrient powder** use in children 6-23 months.

DATA AVAILABILITY FOR BURKINA FASO

Quantitative data

Complementary feeding practice data used in this Burkina Faso chapter were extracted from 12 national reports between 1992–2018, including 4 DHS, 1 MICS, and 7 NNS/SMART reports.

Literature review

Twenty grey and 15 peer-reviewed articles were included in the analysis included in this chapter.

Qualitative interviews

Interviews were conducted with 3 informants representing government, NGOs, and the United Nations from Burkina Faso to triangulate results.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO, 2020).

Infant and Young Child Feeding (IYCF):

- Burkina Faso currently has an IYCF policy, which was put in place in 2014 by the Ministry of Health, according to the World Breastfeeding Trends Initiative (WBTi) Report (WBTi, 2015; Ministère de Sante, 2014).
    - There is a national plan of action that has been developed and it includes an IYCF policy. The IYCF policy promotes exclusive breastfeeding up to 6 months of age, with complementary feeding introduced from 6 months to 2 years of age (WBTi, 2015).

Breastfeeding recognition:

- Baby friendly feeding hospitals were implemented, starting in 1992. When implemented, all ten steps were integrated into national quality standards, policies, strategies and plans (WHO, 2017).
- Burkina Faso has enacted legislation or other legal measures encompassing all or substantially all provisions of the International Code of Marketing Breast-milk Substitutes (WHO, UNICEF, & IBFAN, 2018).

Complementary feeding policies:

- Currently, the government promotes complementary feeding (HANCI-Global, 2017).
    - Mother-to-mother support groups and IYCF Practice Learning and Monitoring Groups (GASPA) to promote the adoption of nutrition counseling are supported by national policy (Ministere de Sante, 2014)
- Relative to other HANCI countries, Burkina Faso's medium/long term national development policy (Plan National de Développement Economique et Social (PNDES)) assigns strong importance to nutrition (HANCI-Global, 2017).
- Current fortification policies are universal and do not specifically target complementary feeding practices (FFI, 2019).

Summary of women/maternal rights in Burkina Faso:

- National legislation is currently in place regarding paid maternity leave for 14 weeks (WBTi, 2015).
- National legislation is currently in place for paid breastfeeding breaks during work hours yet universal worksite accommodations for breastfeeding are not required at this time (WBTi, 2015).
- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global, 2017).
- National legislation is currently in place regarding equality of women's economic rights, though it is not currently in practice (HANCI-Global, 2017).

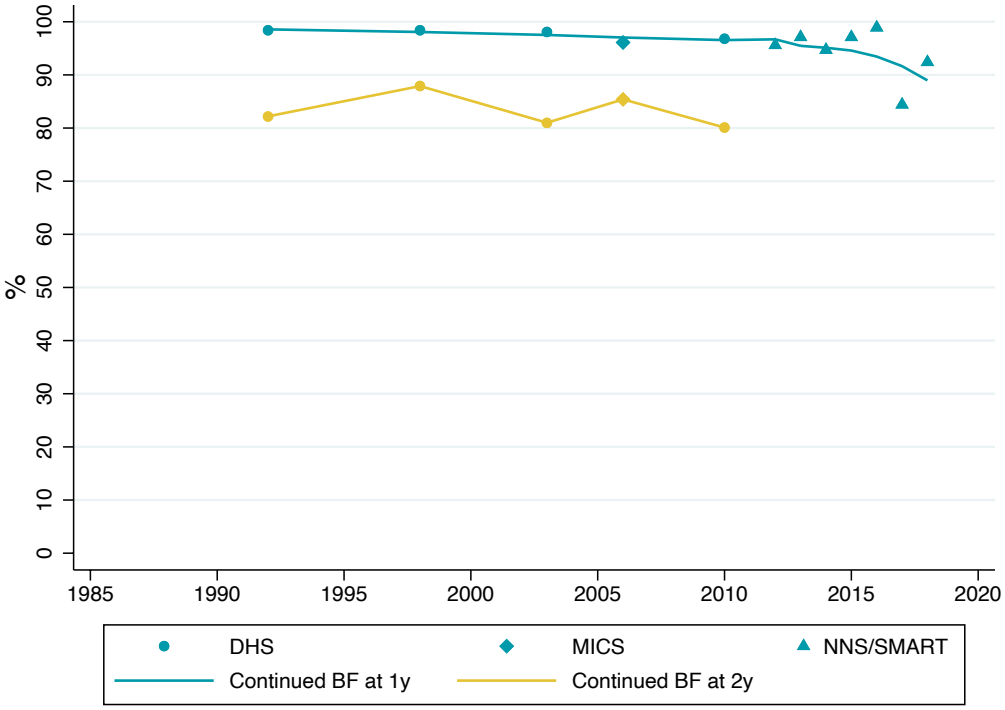
Public spending frameworks and initiatives:

- Approximately 6.75% of Burkina Faso's GDP was allocated for health expenditure in 2016, an increase from approximately 5.83% in 2013 (World Bank, 2016).
- The government has dedicated $83,372,418 to supports efforts related to optimal IYCF practices (Ministere de Sante, 2014)
- Burkina Faso has a sectoral budget earmarked for nutrition; no separate national budget exists specifically for nutrition (HANCI-Global, 2017).
- In 2018, national nutrition actors joined the Global Financing Facility to find more innovative ways to increase national investment in health (Scaling-Up Nutrition, 2019).
- In 2018, the World Bank approved an $80 million international development association grant and $20 million from the Global Financing Facility in supporting the government's efforts to strengthen health services in Burkina for women and children (World Bank, 2018)
- Burkina Faso has been a member of Codex Alimentarius, which includes codes of practice, guidelines, and other recommendations related to food, food production, and food safety since 2002 (FAO & WHO, 2020).

CONTINUED BREASTFEEDING

Data availability and trends: Continued breastfeeding at 1 year has been reported in 12 national reports between 1992–2018. Prior to 2010, continued breastfeeding data were extracted from 4 DHS (1992, 1998, 2003, 2010) and 1 MICS report (2006), respectively. Since 2012, the NNS/SMART reports became the primary data source for continued breastfeeding at 1 year, but none of these NNS/SMART reports had reported the status of continued breastfeeding at 2 years. The trends for both continued breastfeeding indicators were stable across the years in which data were available (Figure 4.1). The mean proportion of children who continually breastfed at 1 year and 2 years was 95.7% and 83.3%, respectively. The proportion reported in NNS/SMART in 2015–2018 showed some variability, ranging from 84.4% (2017) to 97.1% (2015).

Figure 4.1 Continued breastfeeding trends in Burkina Faso from 1992–2018



Influencing factors of continued breastfeeding:

At the policy level, Burkina Faso has several facilitating factors creating an enabling environment for continued breastfeeding. In 1992, Burkina Faso joined the Baby Friendly Hospital Initiative. In doing so, Burkina became one of 134 countries to achieve 'Baby Friendly' status and integrated key principles into national quality standards, policies, strategies and plans; however, Burkina Faso is not currently implementing these principles (WHO 2017). Further, Burkina Faso has adopted a national plan of action (Politique Nationale de Nutrition; Published February, 2016), which includes a specific IYCF policy (Ministere de Sante, 2016). This IYCF policy promotes exclusive breastfeeding up to 6 months of age, with complementary feeding introduced from 6 months to 2 years of age (WBTi, 2015). National legislation is also currently in place for paid breastfeeding breaks during work hours yet worksite accommodations for breastfeeding are not required at this time (WBTi, 2015).

Governmental support likely plays a role in the high rates of continued breastfeeding at 1 and 2 years of age but there is the potential that these rates could be even higher if work site accommodations for breastfeeding were required.

At the community level, our interviews have underscored the importance of socio-cultural influences on breastfeeding practices in Burkina Faso. Stakeholder interviewees explained that caregivers in Burkina Faso face competing demands with child care and feeding. For instance, income earning activities draw attention and time away from child care practices. The following quote is an example to explain how community-wide social norms and mothers' own constraints may influence continued breast feeding.

> *"This research also highlights that barriers to optimal breastfeeding practices include mother's perception that they do not make enough milk to feed their baby, limited time to breastfeed, maternal illness, difficulty breaking away from community norms (e.g., provision of water or tea to newborns) due to family/societal pressure (especially from mothers-in-laws), trouble finding recommended complementary foods, and financial barriers that limit the ability to buy nutritious foods for lactating mothers."*
>
> ***-USAID Report, 2017***

At the institutional level, program staff explained that radio broadcasting has been an effective Social and Behavior Change Communication (SBCC) strategy to promote continued breastfeeding for child survival. At the clinic level, the grey literature findings highlighted high antenatal care coverage with most women indicating some contact with a health worker at least once during pregnancy or postpartum; however, only 42% of mothers reported receiving advice on breastfeeding from a health worker (Cresswell et al., 2017).

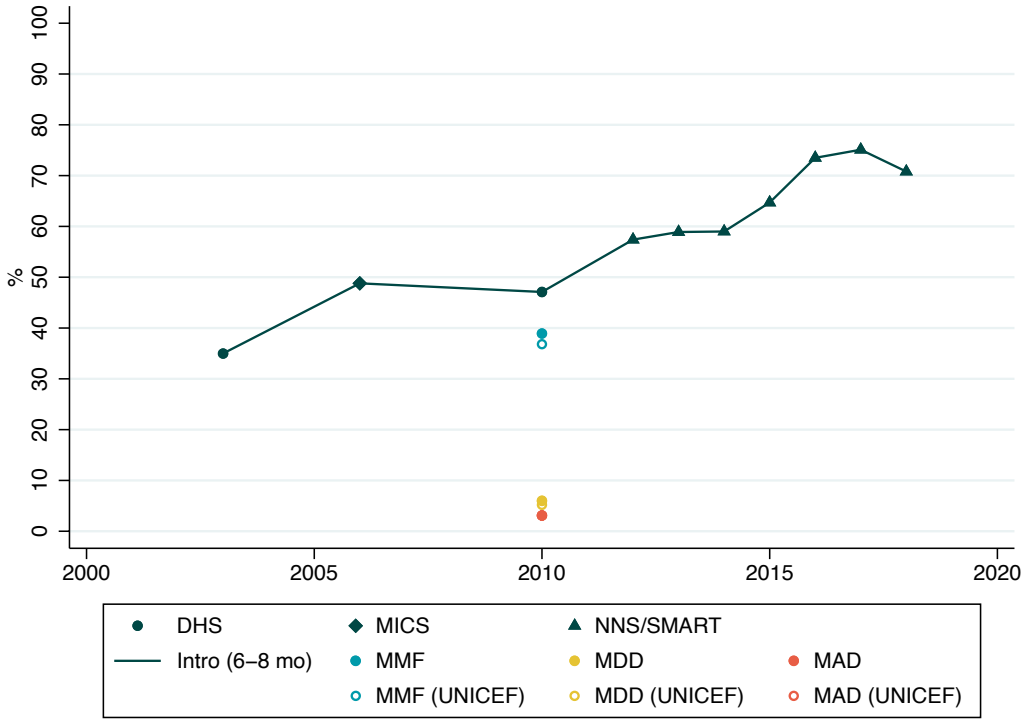
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends:

Intro: Data on the introduction of solid, semi-solid, and soft foods in children 6–8 months have been reported between 2003–2018 in 2 DHS (2003, 2010), 1 MICS (2006), and 7 NNS/SMART reports (2012–2018 annually). There has been a substantial increase in the proportion of children 6–8 months who were fed complementary foods, from 35.0% in 2003 to 70.8% in 2018 (Figure 4.2).

MMF, MDD, MAD: Data on minimum meal frequency (MMF), minimum dietary diversity (MDD) and minimum acceptable diet (MAD) were only reported in one DHS report in 2010. MMF was achieved in 38.9% of the children 6–23 months, whereas MDD and MAD were only achieved in 6.0% and 3.1% of the children 6–23 months, respectively. The UNICEF recalculated proportions of meeting MMF, MDD, and MAD were 36.8%, 5.2%, and 3.1%, respectively, which were lower than those reported in DHS (Figure 4.2).

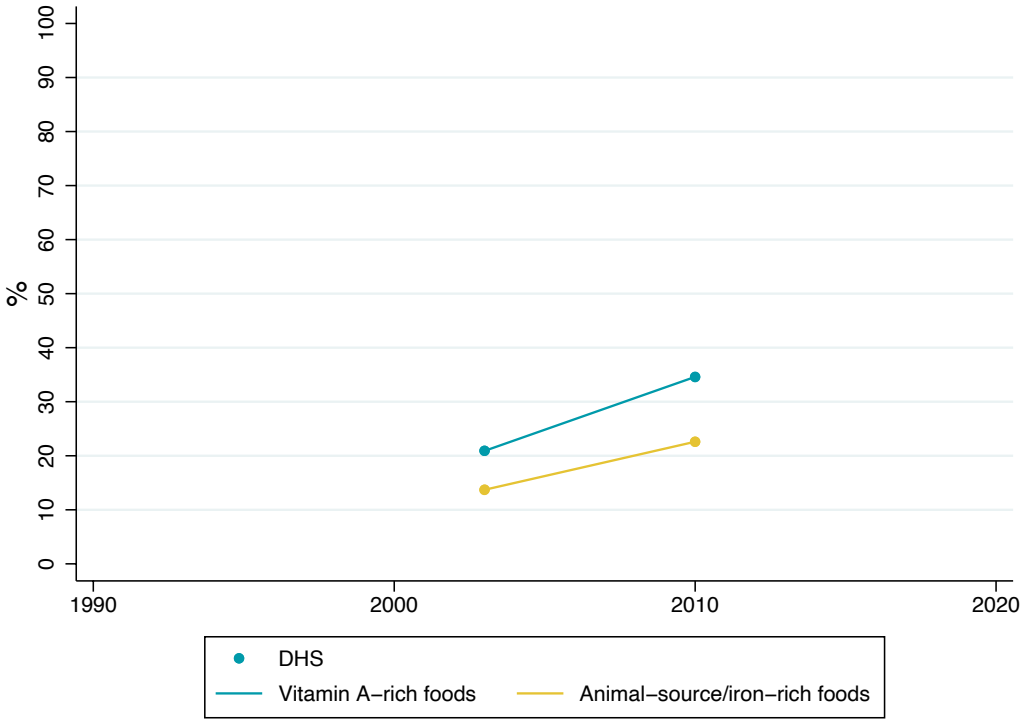
Figure 4.2. Key complementary feeding practice trends in Burkina Faso from 2003–2018



The doubled proportion of children receiving timely introduction of solid, semi-solid, and soft foods in the past 15 years is equivalent to an average annual rate at 2.4 percentage points per year or at a compound rate of increase at 4.8% per year. However, the actual increase was not linear but step-wise: the first significant improvement in this feeding indicator occurred between 2003 and 2006, where a 13.8 percentage point increase occurred; the second big improvement was between 2010 and 2012 when a 10.3 percentage point improvement was seen; and the third increase occurred between 2015 and 2016, during which the proportion increased by 8.8 percentage points. However, trend in data between 2010–2012 should to be interpreted with caution because of potential methodological differences between DHS and SMART. Since 2016, the proportion of children with timely introduction has plateaued at 70–75%. Although the general increasing trend is promising, caution is needed when interpreting introduction of complementary foods data. Given the limitation of the indicator calculated in cross-sectional samples, the data only reflect the proportion of children 6–8 months who were given solid, semi-solid, and soft foods in the past day and night, not the actual timely introduction of appropriate foods.

Nutrient-rich foods: Data on the consumption of nutrient-rich foods were reported in two rounds of DHS reports in 2003 and 2010. From 2003 to 2010, the proportion of children aged 6–23 months who consumed vitamin-A rich foods increased from 20.9% to 34.6% and the proportion of animal-source/iron-rich food intake increased from 13.7% to 22.6% (Figure 4.3).

Figure 4.3. Trends of nutrient-rich foods consumption in Burkina Faso from 2003–2010



Influencing factors of complementary feeding and nutrient rich food intake

At the policy level, Burkina Faso promotes complementary feeding through a national plan of action that has been developed with an IYCF policy. The IYCF policy promotes exclusive breastfeeding up to 6 months of age, with complementary feeding occurring from 6 months to 2 years of age (WBTi, 2015; HANCI-Global, 2017). Burkina Faso has also been a member of Codex Alimentarius, which includes codes of practice, guidelines, and other recommendations related to food, food production, and food safety, since 2002 (FAO & WHO, 2020).

Most influencing factors of complementary feeding were found at the community level both through interviews and in the supporting literature. Commonly reported barriers included longstanding norms and cultural practices that influence feeding. For instance, in certain provinces, Sawadogo et al. (2010) found that women often do not acknowledge that infants need to receive complementary foods in addition to breast milk after 6 months. They use other ethnomedical considerations such as the child's development, or the number of his/her teeth, to decide that the child deserves such foods. The child has to drink herbal teas in addition to the mother's milk until 9 months at

least, ''to become strong'' and he/she "has to express by him/herself the desire to eat". As a result, complementary food introduction is sometimes too early (4 months) or too late (after 9-10 months), explained interview participants. This finding was illustrated by one of the interviewees who described that food taboos (i.e. food proscriptions) in Burkina Faso are sometimes associated with nutrient dense foods:

> *"Now, there are still bans [taboos] around feeding children. Once I went to chat with the traditional chiefs, and there is still the belief that children should not eat eggs yet, and I was very surprised to know that it was still the case in Burkina. So, there are prohibitions around that, despite all the communications sessions, all the communication work around feeding children and young children that we had still have this problem"*
>
> ***-Interview participant in Burkina Faso, UN staff***

Nutrition program staff also discussed the strong social norms influencing complementary feeding in Burkina Faso. For instance, there are strong community-wide perceptions related to a mother's lack of adequate breastmilk to feed a child for a full two years after birth. Therefore, early introduction of complementary foods and drinks, such as bouillie (thin porridge), are common. These early foods are thought to meet children's nutritional and hydration needs in a hot climate, including rural Burkina Faso, said interviewees. Data from interviews and literature suggest that the early introduction of complementary foods is common practice for many households.

In line with global evidence suggesting the importance of women's empowerment for improved health and nutrition outcomes, evidence from the literature showed that mothers who earned an income were more likely to have fed their infant soft, semi-solid or solid food the day before the interview (Cresswell et al. 2017). In our risk factor analysis, working outside the home (as compared to those who did not work outside the home) increased a caregiver's odds of feeding their children to meet MMF and MAD. Also, higher women's empowerment was a facilitator of children meeting MDD (Table 4.1).

At the institutional/organization level, many facilitators of complementary feeding were identified. Interview participants explained that nutrition programs that raise awareness around utilizing local resources (e.g. locally-available foods) have shown promise to address household food insecurity in Burkina Faso. In particular, SBCC programs that target caregiver influencers, including grandmothers, in laws, and husbands, have been increasingly popular. More research is needed around their effectiveness, however. More recently, organizations have made consistent attempts to 'scale up' nutrition programs focused on complementary feeding, a change from the past when most programs were focused on exclusive breastfeeding or only small scale at community or district level, explained interview participants. Radio broadcasting is also a potential way to improve awareness of optimal complementary feeding, as our risk factor analysis found that mothers with more frequent exposure to radio are more likely to help their children meet Intro, MDD and MAD in Burkina Faso (Table 4.1).

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Despite these facilitators, barriers to optimal complementary feeding were also identified at institutional/organizational levels. Interview participants explained that policy efforts are important yet not always prioritized by all partners on the ground. Additional stakeholder engagement is therefore needed before community level action can be achieved. For nutrition stakeholders, the push for improved dietary diversification seems very theoretical at this stage, without sufficient community level activities and food demonstrations planned, according to interviewees.

Contributing to these challenges, universal access to basic healthcare services remains a challenge in Burkina Faso. Our risk factor analysis found that women who were from communities with poor access to health care and services were less likely to provide complementary foods by 6–8 months (Table 4.1). This finding indicates communities with poor access to health care and services should be targeted for nutrition and educational programs. One study found that while nearly all mothers attended antenatal care (ANC) at least once during pregnancy, just one third had attended postnatal care within a week of delivery and one fifth had taken the infant to a health facility due to illness in the past 15 days (Cresswell et al. 2017). This same study found that many mothers have poor knowledge in key areas of health and nutrition, and only a minority of those mothers reported receiving nutrition information and advice from health workers (Cresswell et al. 2017). Recently published survey results indicate that half of caregivers to 6-11month olds reported receiving advice on complementary feeding but, only 31% reported receiving such advice in the past month. For those with children who were 12-23 months old, 60% of caregivers reported ever receiving advice on complementary feeding and, of these, only 14% had received such advice in the past month. For those with children 0-23 months of age who had a sick child visit in the previous 2 weeks, 36% of caregivers reported receiving advice on feeding during illness (PMA 2020). Health service access is an important underlying factor of any nutrition situation.

Some studies have examined individual-level factors influencing complementary feeding in Burkina. For instance, both our risk factor analysis (Table 4.1) and others' work found older children were more likely to meet MMF (Sawadogo

et al. 2010). Researchers have found that women in the rural north who had at least a primary school education level were able to feed their children better. Caregiver knowledge has been found to be necessary but not sufficient in complementary feeding; although most mothers reported that complementary foods should be introduced from 6 months of age or older, the average reported age for introduction was 9 months, highlighting a difference between knowledge and practice (Sarrassat et al. 2019).

Despite traditional livelihoods and community life, food environments are indeed changing, according to participant interviews. Interview data suggest that complementary foods of animal origin are infrequently fed to children due to high prices; however, program staff explained increasing use of locally produced complementary foods being sold in urban as well as rural markets.

Table 4.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6–23 mo in Burkina Faso (2010)

	INTRO	MMF	MDD	MAD
N	**707**	**3708**	**3816**	**3776**
Child characteristics				
Age (months)				
6-11			**1.00**	**1.00**
12-17			**2.49 (1.63, 3.80)**	**2.34 (1.39, 3.96)**
18-23			**3.81 (2.52, 5.75)**	**2.84 (1.69, 4.79)**
Vitamin A supplementation		**1.20 (1.04, 1.39)**		**1.99 (1.21, 3.25)**
Child had symptoms in the past two weeks				
Cough			**1.87 (1.27, 2.74)**	
Maternal characteristics				
Occupation				
Not working		**1.00**		**1.00**
Agricultural		**1.19 (0.96, 1.47)**		**2.21 (1.03, 4.74)**
Non-agricultural		**1.26 (1.01, 1.57)**		**2.24 (1.09, 4.60)**
Type of delivery assistance				
Delivered by health professional	**1.00**	**1.00**		
Traditional birth attendant	**1.81 (0.82, 4.01)**	**1.88 (1.30, 2.71)**		
Other	**1.92 (1.10, 3.35)**	**1.58 (1.21, 2.06)**		
Timing of postnatal check-up on woman (days)				
0-1 d		**1.00**		
>= 2 d		**1.10 (0.94, 1.29)**		
missing/ unknown		**0.69 (0.54, 0.88)**		
Exposure to media at least once a week				
Listening to radio	**1.41 (1.03, 1.93)**		**1.70 (1.10, 2.63)**	**1.51 (1.01, 2.26)**
Women's empowerment score			**1.23 (1.09, 1.38)**	

Community characteristics	
Rank of access to health care	
1 Best access	**1.00**
2	**0.76 (0.44, 1.31)**
3	**0.55 (0.32, 0.95)**
4	**0.56 (0.33, 0.96)**
5 Worst access	**0.69 (0.39, 1.22)**

A mother cuddling her baby in Fada, in the east of Burkina Faso.

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Intervention approaches to improve complementary feeding

Interview and literature findings revealed 11 intervention types aimed at improving complementary feeding practices. Several types of interventions were discussed repeatedly by interview participants as showing promise in the Burkina context.

First, SBCC efforts (e.g. sensitizing and raising awareness to reach women, men, mother in laws and community leaders) was the most commonly mentioned intervention strategy to improve complementary feeding at scale. As part of comprehensive SBCC, efforts have been underway to roll out national mother to mother support groups through existing community structures, as well as implementing a strategic plan to scale up IYCF promotions.

"Community based growth monitoring and promotion activities are relevant where there is low awareness of the causes of malnutrition and where families do not have the necessary information to help them protect and promote children's health."

— FAO, 2005

> *"But it must be said that the implementation of the transition plan to scale-up of ANJE "Alimentation Du Nourrisson Et Du Jeune Enfant" practice at the Ministry of public health level or in each village there are groups of women who are formed, called GASPA "Groupes d'Apprentissage et de Suivi des Pratiques optimales d'Alimentation" with people and health workers. A large community that makes awareness among groups of women composed from 10 to 15 people (pregnant and breastfeeding women) and which includes demonstrations of preparedness of porridge…each year we see that there is a certain improvement in certain indicators of ANJE, of complementary food of young child in the region and also the improvement of exclusive breastfeeding. We see that integrating different strategies to raise awareness of this whole set allows us to have an impact on the different indicators."*
>
> ***-Interview, UN participant, Burkina Faso***

** According to stakeholders, mother to mother support groups are not conducted in every village of Burkina Faso, but in 30 to 40 percent of villages where there are NGOs partners that are supporting the Government to implement the intervention package of IYCF according to the IYCF scale up plan (2012-2025)*

SBCC efforts are not new in Burkina Faso. Since 2001, in collaboration with the local communities, USAID, and Plan International, UNICEF has operated a program to promote exclusive breastfeeding and child nutrition in Burkina Faso's Koupela District. The program worked in tandem with other UNICEF-supported projects–including the Baby-Friendly Hospital Initiative and community-based growth monitoring and health promotion efforts–to ensure a continued commitment to breastfeeding and health complementary feeding practices for infants and young children (Martinek 2006). However, the renewed focus on SBCC specifically for complementary feeding is new in most communities where it is being implemented.

Other nutrition-sensitive interventions have been on going as well. For instance, Nutrifaso was established in 2005 as part of the Burkina Faso chapter of Nutridev. The aim was multi-fold: 1) to support existing flour producers to improve their food products by modifying recipes and adding minerals and vitamins, 2) to extend their distribution networks to reach more shops (grocery stores, mom and pop shops and pharmacies) and health centers, 3) to support the supply side with marketing their products (including name of product and

packaging), and 4) to increase their production capacity to serve the new demand (Hystra 2014). As far as the current status of the use of fortified infant products, the East has the highest coverage at 51% and the Central South has the lowest at 1% (REACH 2015). Additional interventions to improve complementary feeding in this country context have included large-scale nutrition education programming, income generating activities for families through farming, mother to mother support groups within larger SBCC, and supplementation using micronutrient powders in home fortification (Mamopanel 2017; USAID 2017). More operations research and dissemination of findings is needed to share results of such programming between both national partners and global stakeholders.

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 4 and Appendix Table 5, respectively.

SUPPLEMENTATION AND FORTIFICATION

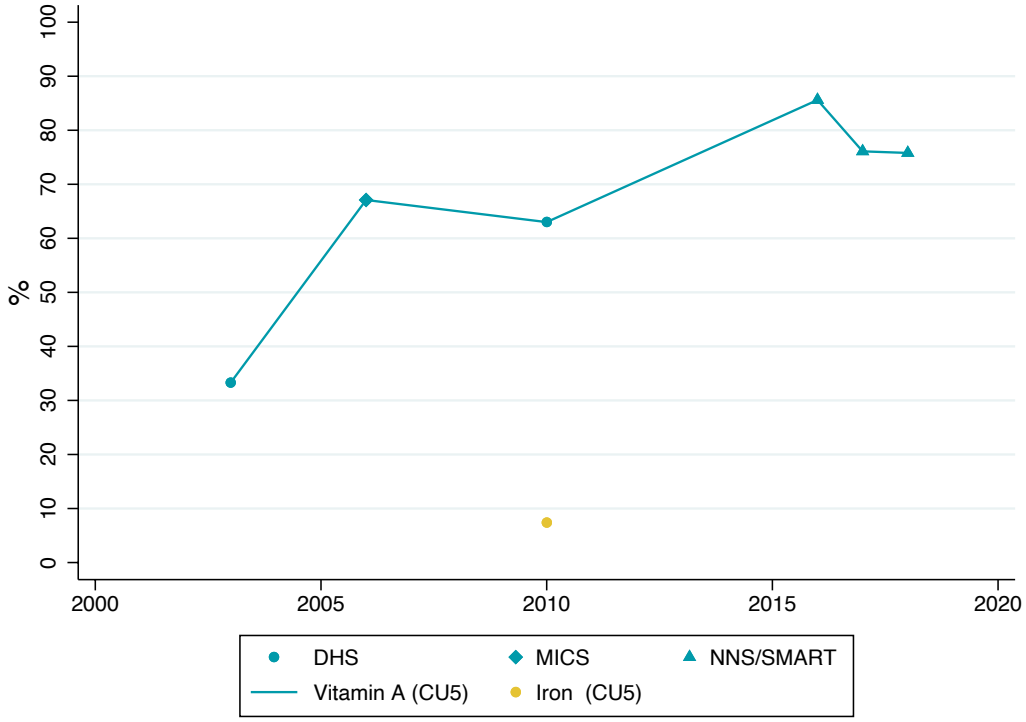
In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

Vitamin A Supplementation, Iron Supplementation, and Multiple Micronutrient Powders

Vitamin A supplementation: Data on vitamin A supplementation in children 6-59 months have been reported between 2003–2018 in 6 national reports (DHS: n=2, 2003 and 2010; MICS: n=1, 2006; NNS/SMART: n=3, 2016, 2017, 2018). Vitamin A supplementation in children 6-59 months has increased from 33.3% in 2003 to 75.8% in 2018. The improvement was equal to an annual average increase of 2.8 percentage points per year. The most substantial increase was observed between 2003 to 2006, when the proportion of vitamin A use in children 6-59 months increased from 33.8 to 67.1%. Over the 6 years between 2010 to 2016, vitamin A supplementation use in children 6-59 months increased by another 22.6 percentage points to 85.6% in 2016. Since 2016, however, the proportion has dropped by around 10 percentage points to 75.8% (Figure 4.4).

Iron supplementation: Data on iron supplementation in the past 7 days in children 6–59 months were reported in the 2010 DHS and the proportion was only 7.4% (Figure 4.4). Data on the use of multiple micronutrient powders (MNP) were not reported in any of the national reports (Figure 4.4) despite the fact that MNP usage is part of Burkina Faso's intervention plan for reducing the prevalence of anemia among children under 5 years of age (Ministere de Sante 2016).

Figure 4.4 Nutrient supplementation in Burkina Faso from 2003–2018



Influencing factors of supplementation

Vitamin A supplementation coverage is high nationally. In recent years, the government of Burkina Faso has implemented National Micronutrient Days as a strategy to provide vitamin A supplementation to children 6–59 months biannually (HANCI-Global 2017). Recent surveys indicate that 48.8% of children 6-23 months of age received a high dose Vitamin A supplement in the previous 6 months (PMA 2020).

> *"Prior to 2011, VAS was co-delivered with polio national immunization days. Since then, the government delivers VAS twice a year during Vitamin A Plus Days (JVA+). However, these campaigns remain donor- supported, and so are vulnerable to financial gaps if donor commitment changes."*
>
> ***-GAVA Report 2012***

Vitamin A supplementation is distributed during fixed-post campaigns where caregivers take their children to distribution sites in the community, as well as during door-to-door campaigns where distribution teams visit households (Ouedraogo et al. 2016).

Launched on June 25, 2002, the National Micronutrient Days include the distribution of iron supplementation, free of charge, to children under 5 years of age and to pregnant women (IMF 2004; Hess et al. 2015); however, it seems iron supplementation has not been regularly assessed or, at the very least, has not been reported at the national level. This, despite the fact that 86% of children in Burkina Faso under 5 years of age are suffering from anemia (WHO 2016).

Iron-Fortified Foods and Iodized Salt Use

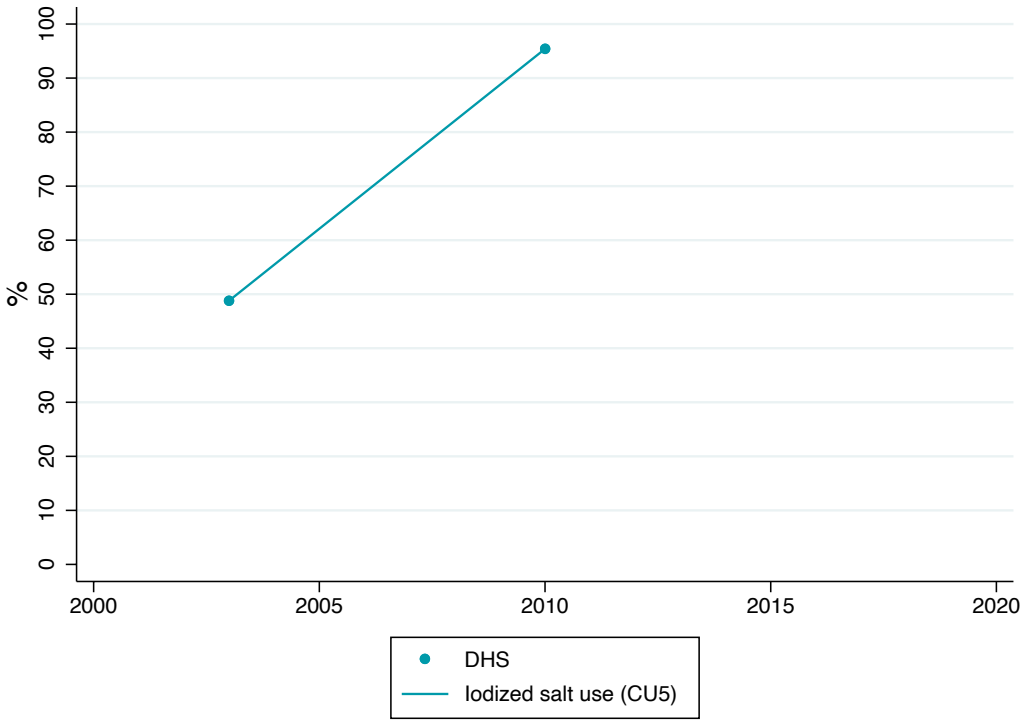
The potential for public health impact of food fortification in West Africa is high as the domestic production of food such as vegetable oil and wheat flour is centralized. Burkina Faso has had mandatory fortification of wheat flour with iron and folic acid since 2010. A GAIN market survey in Burkina Faso in 2018 showed that 62% of wheat flour available on the market was fortified, although none of the wheat flour brands were fortified within the standard range. Data on the consumption of iron-fortified foods by children 6–23 months were not reported in the Burkina Faso reports. However, results from the PMA 2020 survey conducted in 2018 revealed low household consumption of this staple food vehicle–only 16.7% of households surveyed consumed wheat flour which was industrially produced (i.e. potentially fortifiable) (PMA 2020).

Salt iodization has been mandatory since the early 1990s (Ministere de l'Industrie du Commerce et de l'Artisanat 2013). Iodized salt use in households with children under 5 years was reported in the 2003 DHS and 2010 DHS reports. Over 7 years, the proportion of iodized salt almost doubled from 48.8% to 95.4%. (Figure 4.5).

In 2018, the PMA2020 survey found that 96.8% of households reported consuming salt that was potentially fortifiable (industrially produced), however only 2.5% consumed fortified salt (confirmed by brand).

Vegetable oil fortification with vitamin A is also mandatory in Burkina Faso since 2010. The GAIN market survey found that only 39% of the oil brands available on the market were fortified to some extent and only 23% of them were fortified to the required level. Roughly half of imported brands and nearly all locally produced oil brands were not fortified at all.

Figure 4.5 Fortified foods consumption among children in Burkina Faso from 2003–2010



Influencing factors of fortified foods in complementary feeding

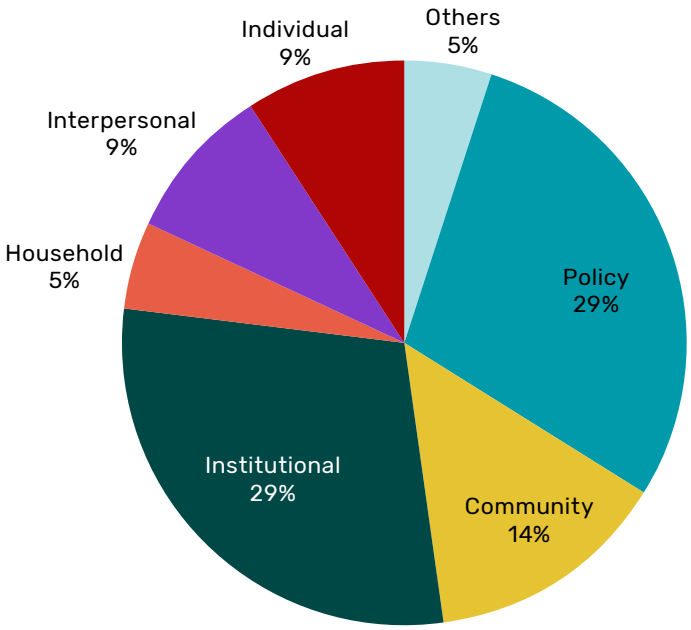
Current fortification policies are universal rather than specific to complementary foods (FFI 2019). The National Micronutrient Day, which was launched June 25, 2002, includes iron and iodine supplementation in addition to the vitamin A supplementation mentioned above (IMF 2004; Hess et al. 2015b). Interview participants explained that the implementation of universal salt iodization, coupled with the deregulation of iodized imports, has helped to increase coverage.

Despite great regional success in putting mandatory fortification policies in place, there remains a big gap in monitoring compliance and enforcement of these policies. Since 2014, surveys have been conducted using the Fortification Assessment Coverage Toolkit (FACT) in 4 countries, including Burkina Faso with results demonstrating the ongoing need for improvements in both fortification coverage and quality (Grant, Tsang, Garrett 2018). Furthermore, the population awareness of the value of fortified foods appears to remain low, despite early efforts by the national fortification alliance and several consumer associations to organize TV and radio broadcasts. A 2018 household survey (PMA2020) found that only 7% of households recognized the food fortification logo (ENRICHI) and of those households, 27% are influenced to buy food because of the logo.

PARTICIPANT RECOMMENTATIONS

Recommendations to improve complementary feeding in Burkina Faso were identified through interviews. Figure 4.6 below illustrates the types of recommendations identified by level of influence. Most recommendations to improve complementary feeding in Burkina Faso were at the policy (29%) or institutional levels (29%).

Figure 4.6 Recommendations to address complementary feeding by level of influence in Burkina Faso



- Use SBCC to improve behaviors. Participants recommended future nutrition interventions to continually improve individual-level knowledge and attitudes around breastfeeding, as well as improving IYCF practices through counselling and community mobilization activities.
- Invest in training of health workers. Within communities, interviewees high- lighted the importance of training community health workers on nutrition promotion and awareness to properly deliver nutrition knowledge to community members.
- Ensure local availability. Participants recommended that increased production of complementary foods using locally available sources should be prioritized. Promotional campaigns should then create understandable nutritional information in order to sustain the supply and demand for these foods.
- More nutrition research is needed. Additional studies are needed in Burkina Faso. Participants explained that there is not enough knowledge about the foods given to children, and generally a lack of nutrition data availability at sub-national levels. Such work can investigate the current consumption and coverage rates of fortified food vehicles at the **household level** to understand the potential for impact among target populations.

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CHAPTER 5

COTE D'IVOIRE

Complementary feeding trends, determinants, and recommendations in Cote d'Ivoire

EXECUTIVE SUMMARY

This chapter presents research findings around complementary feeding in Cote d'Ivoire. Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year** has remained high (88.2%) between 1994-2016 with a slight decrease since 1994 and the most recent reported proportion of 88.1% in 2016; however, **continued breastfeeding at 2 years** in less than half of children (41.7%) on average in a decreasing trend in the past two decades. The proportion of continued breastfeeding at 2 years was only 29.0%.
- **Introduction of solid, semi-solid and soft foods** was met by 65.5% children in 6–8 months in 2016; onaverage, the rate was 59.2% between 1994–2016. In 2016, **minimum meal frequency** was achieved in 47.7% of the children 6-23 months; **minimum dietary diversity** in 26.0% children; and, **minimum acceptable diet** was met by only 12.5% of children aged 6-23 months.
- Data for the intake of nutrient-rich food intake were scarce. In 2011, **vitamin A-rich foods** and **iron-rich foods** were consumed by 59.8% and 56.5% of children 6–23 months, respectively.
- **Vitamin A supplementation** in children 6–59 months has increased from 15.6% in 2000 to 60.8% in 2011. The coverage of **iron supplementation** in children 6–59 months was only 13.4% in 2011, when the data was reported.
- In 2011, the proportion of households with children under 5 using **iodized salt use** and **iron supplementation** in children 6–59 months was 90.9% and 13.4%, respectively. No data were available for **multiple micro-nutrient powder use** or **iron-fortified foods intake** in children 6–23 months.

DATA AVAILABILITY FOR COTE D'IVOIRE

Quantitative data

Complementary feeding practice data used in this Cote d'Ivoire chapter were extracted from 7 national reports between 1994-2016, including 3 DHS, 3 MICS, and 1 NNS/SMART reports.

Literature review

This chapter includes analysis of secondary data sources, including 18 reports (grey literature) and 6 peer-reviewed articles.

Qualitative interviews

Interviews were conducted among 2 country-level informants representing health and nutrition professionals from government and development partners.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO 2020).

Breastfeeding recognition

- A final draft of a law has been implemented moderately on the provisions of the International Code of Marketing Breast- milk Substitutes and final approval is pending (World Health Organization & UNICEF & IBFAN 2020).

Complementary feeding promotion or policies:

- The government of Côte d'Ivoire promotes complementary feeding practices (HANCI-Africa, 2017).
  - Alongside FANTA, the Ministry of Health (National Nutrition Program and the National Institute of Public Health) developed a national recipe guide based on locally grown foods to help improve complementary feeding of children. It is a guide provided to health care service providers, community personal, dieticians and NGOs that support health and nutrition programs, to be used for counselling mothers and caregivers (FANTA 2015)
- There is no specific policy on complementary feeding. There is a plan of action which includes complementary feeding (WHO 2012).

Fortification policies:

- Côte d'Ivoire has created mandatary fortification programs for food vehicles. There has been a mandatory iodization of salt since 2001, mandatory vitamin A fortification with oil and mandatory iron fortification with wheat flour since 2007 (Global Fortification Data Exchange 2020).

Summary of women/maternal rights in Côte d'Ivoire:

- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Africa 2017).
- National legislation is currently in place regarding equality of women's economic rights, though it is not currently in practice (HANCI-Africa 2017).

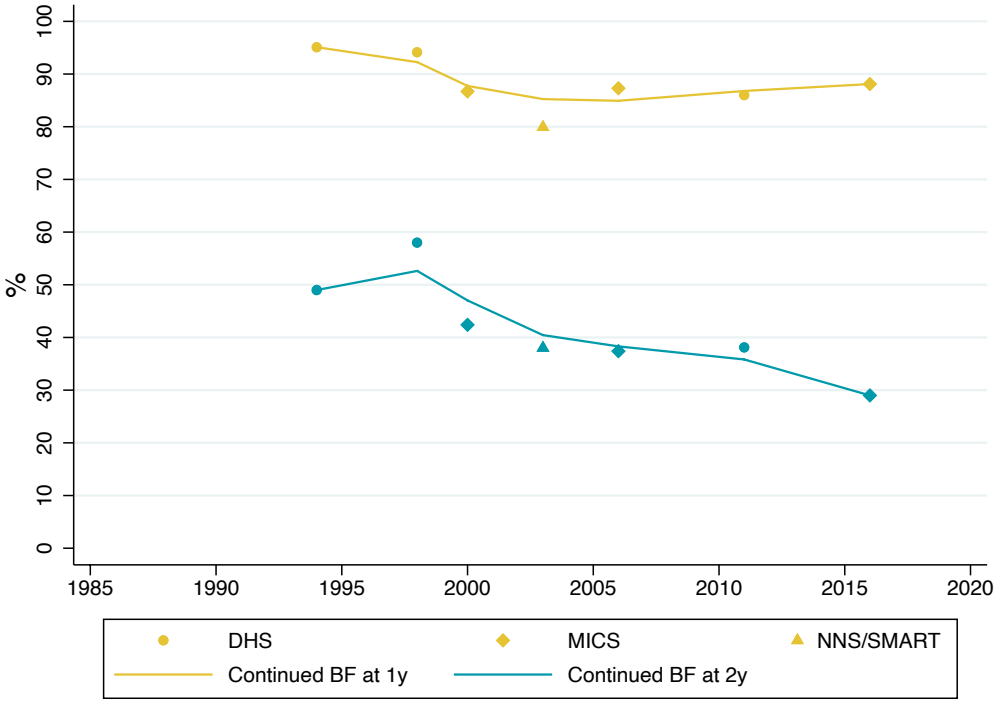
Public spending frameworks and initiatives:

- The government allocated approximately 4.40% of its GDP for health expenditure in 2016, a decrease from approximately 5.26% in 2015 (World Bank 2016).
- There is a separate national budget specifically for nutrition (HANCI-Africa 2017).
- The National Multi-Sectoral Nutrition Plan 2016-2020, with a total cost of US$470 million, was adopted in May 2016 by the Government. Investments in nutrition have been included under the priorities of the Public Investment Program (PIP). The mobilization of resources for the financing of this plan was made during a donor roundtable organized in September 2016. The government contributes up to 15% of the overall cost (Global nutrition report 2020).
- There is a financial monitoring framework in place to assess resource mobilization (Scaling-Up Nutrition 2019).

CONTINUED BREASTFEEDING

Continued breastfeeding practice was reported between 1994-2016 in 3 DHS (1994, 1998, 2011), 3 MICS (2000, 2006, 2016), and 1 NNS/SMART reports (2003) (Figure 5.1). Pooling data from over 22 years, the mean proportion of children who were continually breastfed at 1 year and 2 years was 88.2% and 41.7%, respectively. The trend for continued breastfeeding at 1 year decreased from 95.1% in 1994 to 79.9% in 2003; it then increased to 87.3% in 2006 and remained at the level. Continued breastfeeding at 2 years showed a steeper decrease from 49.0–58.0% in the 1990s to 29.0% in 2016.

Figure 5.1. Continued breastfeeding trends in Cote d'Ivoire from 1994–2016



Influencing factors of continued breastfeeding:

At the policy level, the effort to implement the International Code of Marketing Breastmilk Substitutes has been undertaken and the draft of law is currently awaiting its final approval (World Health Organization, UNICEF, IBFAN 2018). No interview participants were able to explain the decreasing trends in continued breastfeeding. However, some evidence in the literature helps to explain these trends. At community level, socio-cultural influences were mentioned as barriers to continued breastfeeding practices. Some feeding decisions are based on child sex: a common belief among mothers is that male babies need to suckle much more than female babies and breastmilk alone is not sufficient for male babies (Mouroufie et al. 2019). Male children were more likely to be breastfed at 2 years (27.0%) than female children (31.1%) according to national data in 2016 (MICS 2016); however, continued breastfeeding at 1 year was higher in male (90.5%) than female children (85.6%), indicating the mothers may decide when to stop breastfeeding based on both child sex and child age. Among individuals, maternal concerns over breast shape due to continued breastfeeding was cited as a reason for discontinued breastfeeding in a cross-sectional study in Abidjan (Mouroufie et al. 2019).

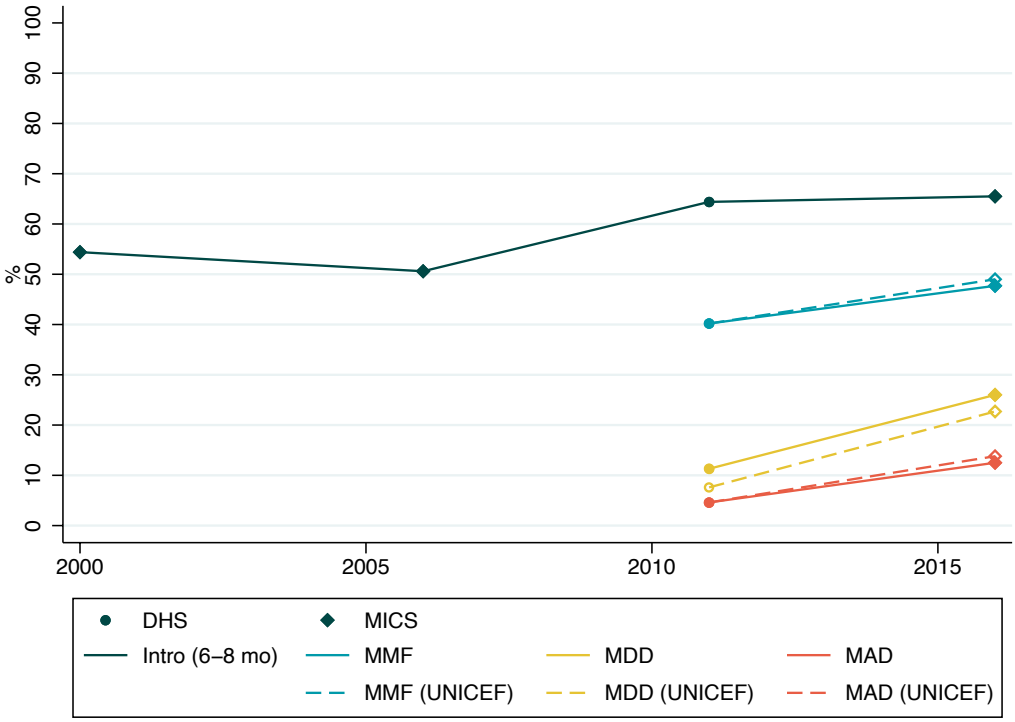
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends:

Intro: The introduction of solid, semi-solid, and soft foods in children 6-8 months was reported between 1994–2016 in 2 DHS (1994, 2011) and 3 MICS reports (200, 2006, 2016). The mean proportion of children 6-8 months given complementary foods was 59.2% and the proportion was increased by about 15 percent points since 2006.

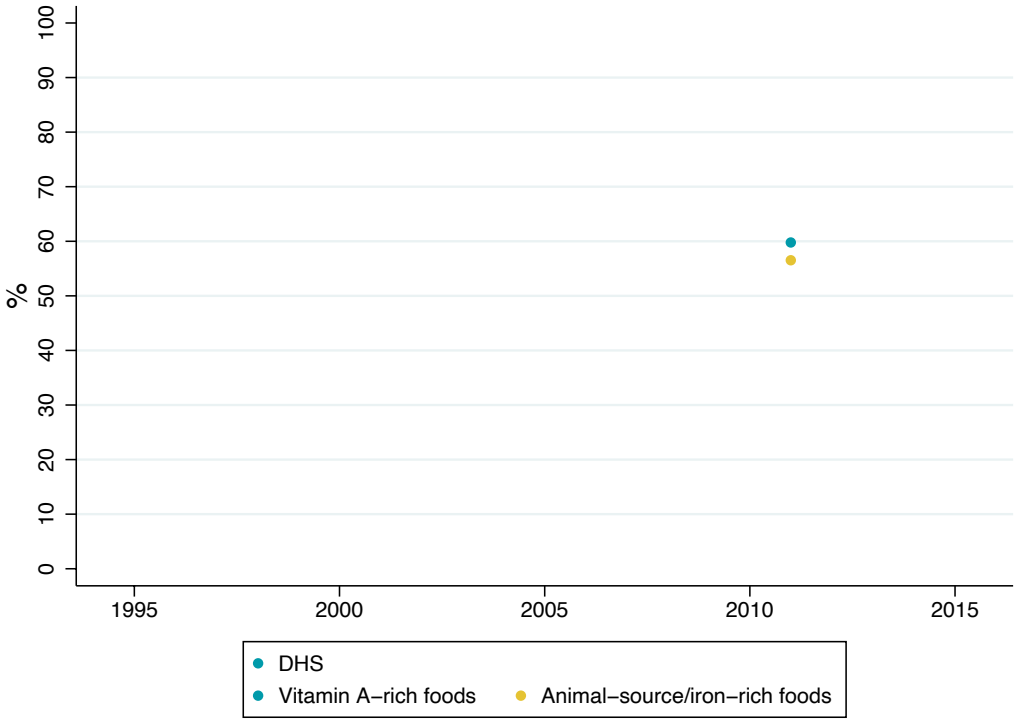
MMF, MDD, MAD: The MMF, MDD, MAD indicators were reported in two reports: the 2011 DHS and the 2016 MICS. From 2011 to 2016, MMF increased from 40.2% to 47.7% (by 7.5 percent points), MDD increased from 11.3% to 26.0% (by 14.7 percent points), and MAD increased from 4.6% to 12.5% (by 7.9 percent points). The UNICEF-recalculated proportion was showing similar improving trend, though the newly defined MDD was 3-4% lower than WHO 2010 defined MDD (Figure 5.2).

Figure 5.2. Key complementary feeding practice trends in Cote d'Ivoire from 1994–2016



Nutrient-rich foods: The intake of nutrient-rich foods have been rarely reported in the national reports. In 2011 DHS, it reported that the vitamin A-rich foods were consumed by 59.8% children 6-23 months. The proportion for animal-source/iron-rich foods was 56.5% (Figure 5.3).

Table 5.3. Trends of nutrient-rich foods consumption in Cote d'Ivoire from 1994–2016



Influencing factors of complementary feeding and nutrient rich food intake

At the policy level, the government of Côte d'Ivoire does promote complementary feeding practices, but lacks a nation-wide complementary feeding policy (HANCI-Africa 2017). Government has adopted a plan of action which includes components to improve complementary feeding practices (WHO 2012). In 2016, the government adopted The National Multi-Sectoral Nutrition Plan 2016-2020 and investments in nutrition have been included under the priorities of the Public Investment Program (Global nutrition report 2020). Donors and the government have been committed to mobilize the financial resources (Global nutrition report 2020) and a monitoring framework was set up to assess the resource mobilization process (Scaling-Up Nutrition 2019). These policies, plans, and programs have secured budget and funding specifically for nutrition (HANCI-Africa 2017). Within the PNMN 2016-2020, breastfeeding and complementary feeding are included in the list of Essential Nutrition Actions that will be promoted by the government (République de Côte d'Ivoire 2016). Other prioritized interventions expected to benefit children 6-23 months include vitamin A and zinc supplementation, home fortification of meals for children 6-23 months, strengthening of national fortification and development of biofortification of foods, etc.

Interview participants also mentioned the enabling policy environment as a primary strength for the nutrition of young children in Côte d'Ivoire. For instance, it has allowed for investment in regional campaigns that promote multiple healthy behaviors, including fruit intake, utilization of locally available foods, and proper use of water, which may have contributed to shape better feeding practices in caregivers of infants and young children.

At the community level, several barriers to optimal young child diets were identified from both interviews and literature review. Feeding grain-based complementary staple foods is commonplace. As indicated by our interview participants, caregivers often feed the infants and young children with "one cereal mixed with sugar". These foods are in general not energy-dense and as a result, children need to consume large volumes in order to reach energy requirements. Interview participants also mentioned there are taboos surrounding certain foods, such as giving eggs, meats, and other foods to infants and young children, a food proscription that may be limiting dietary diversity and a contributor to low minimal acceptable diet scores from year to year.

> *"For example, beliefs that if you give a child eggs the child will steal; when you give the child meat, the child will have worms."*
>
> ***-Informant interview in Cote d'Ivoire, UN staff***

In addition to cultural barriers, interview participants also mentioned that health workers, important influencers of caregiver feeding in Côte d'Ivoire, may have outdated information on complementary feeding, a result of inadequate trainings.

At the institutional level, the Ministry of Health and FANTA have been promoting the use of locally available foods for complementary diets by creating a national recipe guide, which was published in 2015 (FANTA 2015). The guide has been widely provided to a number of key players of health and nutrition programs who may interact with mothers of young children, including health care service providers, community personal, dieticians and NGOs in Côte d'Ivoire. The guide aimed to increase the use of more affordable and feasible local foods and therefore may have helped improve child dietary diversity in recent years. Also, USAID has worked in Côte d'Ivoire to support nutrition. In the early 2010s, USAID supported an intervention in Cote d'Ivoire where severely malnourished children were referred immediately to a health center, caregivers of children who were moderately malnourished were referred by social workers to cooking demonstrations, and caregivers of mildly malnourished children received standard counselling (USAID 2012). Nutrition education was an important component of the USAID intervention and the report indicates that efforts were put in place to ensure the intervention would be effective, even after the project ended. Data on effectiveness after the project termination do not appear to be readily available.

Several institutional-level barriers to complementary feeding have been identified. First, healthcare expenditure constituted about 4-5% of the nation's GDP in 2015-2016, which is lower than the world's average of 10.0% (World Bank 2016). Despite limited health care resources, the overall healthcare system of Côte d'Ivoire has focused primarily on curative medicine and largely neglected prevention promotion; as a result, nutrition does not have a strong presence in the healthcare system.

> *"There is community health, but the community health is an extension, I'll say, of curative health services. Often our health colleagues do not do prevention promotion, a lot of curative and its extension. In fact, health agents go into villages to deal with all the problems…diarrhea, everything that is acute respiratory infections. They are very poor in prevention promotion."*
>
> ***-Informant interview in Cote d'Iovire, UN staff***

Another barrier mentioned by interview participants was the high availability of unhealthy foods in markets which are central to the food system in Côte d'Ivoire. Such foods include salty snacks and soda drinks, which are energy-dense but nutrient-poor, and have penetrated local markets in both urban and rural areas and become "extremely available" (Nordhagen & Pries & Dissieka 2019). The current set of complementary feeding indicators could not distinguish the healthy versus unhealthy foods in children's diets. It means that if a child got a non-zero dietary diversity score but earned the score from the intake of unhealthy, yet fortified foods, the child's diet may be actually worse than indicators suggest.

At the household level, both interview participants and studies conducted in Côte d'Ivoire identified intra-household food allocation to be a barrier to optimal complementary feeding. Food sharing and intra-household food allocation practices may not be in favor of young children in some parts of Côte d'Ivoire. For example, one study found that sharing of fortified complementary foods specifically intended for children 6–23 months was common among other household members, mainly with other children, 71.9% of surveyed households (Leyvraz et al. 2016). Another barrier mentioned by interview participants was related to financial constraints of many households in Côte d'Ivoire. The risk factor analysis revealed that richer households were more likely to introduce complementary foods to children 6–8 months and children 6–23 months from those households were also more likely to meet MMF, MDD, and MAD (Table 5.1). At the individual level, interview participants discussed the lack of mothers' feeding knowledge to be a persistent barrier to optimal complementary feeding as well.

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 6 and Appendix Table 7, respectively.

Table 5.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6-23 mo in Cote d'Ivoire (2016)

	INTRO	MMF	MDD	MAD
N	**394**	**2120**	**2378**	**2043**
Child characteristics				
Age (months)				
6-11			**1.00**	**1.00**
12-17			**3.96 (2.97, 5.27)**	**3.41 (2.34, 4.96)**
18-23			**4.38 (3.14, 6.12)**	**3.63 (2.35, 5.62)**
Exposure to media at least once a week				
Watching TV			**1.39 (1.08, 1.80)**	
Maternal characteristics				
Education				
No education	**1.00**			
Primary	**1.20 (0.68, 1.85)**			
Secondary/ Higher	**2.69 (1.23, 5.91)**			
Breastfeeding practices				
Currently breastfeeding		**1.48 (1.20, 1.83)**		**5.74 (3.49, 9.44)**
Household characteristics				
Place of residence				
Household wealth			**0.64 (0.47, 0.87)**	**0.65 (0.43, 0.97)**
1 Poorest	**1.00**	**1.00**	**1.00**	**1.00**
2	**1.90 (1.05,3.42)**	**1.32 (1.04, 1.67)**	**0.94 (0.70, 1.26)**	**1.35 (0.91, 2.01)**
3	**2.10 (1.05,4.20)**	**0.99 (0.75, 1.32)**	**1.02 (0.72, 1.45)**	**0.99 (0.61, 1.60)**
4	**1.46 (0.67,3.16)**	**1.55 (1.06, 2.28)**	**1.14 (0.73, 1.78)**	**1.22 (0.67, 2.22)**
5 Richest	**2.20 (0.85,5.67)**	**1.77 (1.13, 2.79)**	**1.67 (1.00, 2.78)**	**2.72 (1.40, 5.29)**
Community characteristics				
Rank of access to health care				
1 Best access		**1.00**		
2		**0.98 (0.73, 1.31)**		
3		**1.37 (1.02, 1.85)**		
4		**1.28 (0.94, 1.74)**		
5 Worse access		**1.07 (0.78, 1.47)**		

SUPPLEMENTATION AND FORTIFICATION

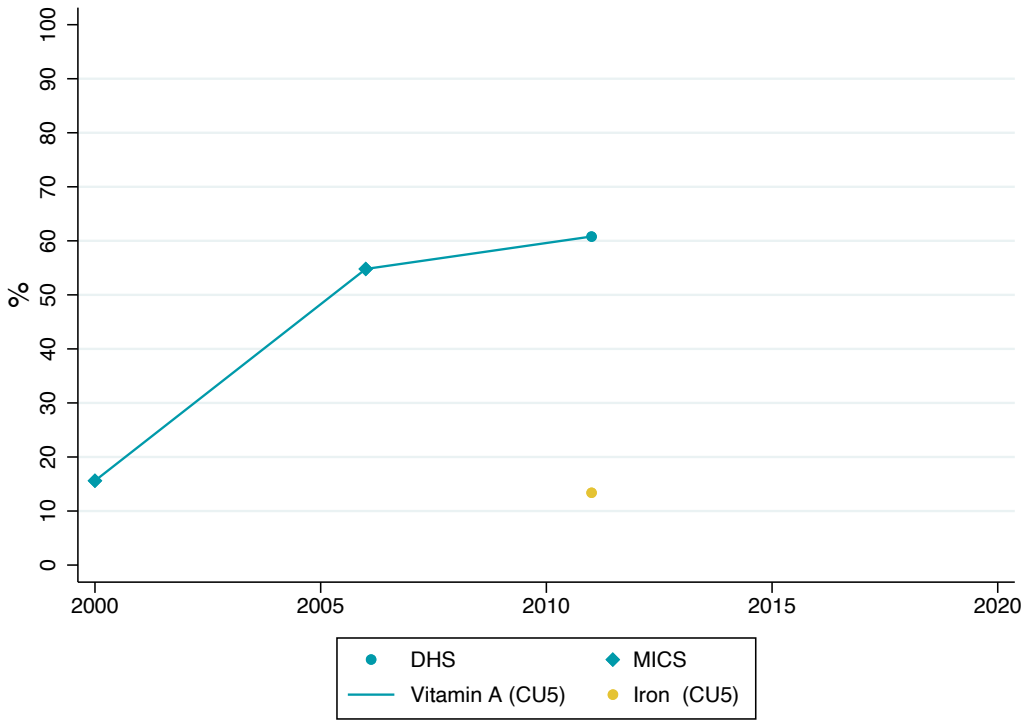
In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

Vitamin A, Multiple Micronutrients, and Iron Supplementation

Vitamin A supplementation: data on vitamin A supplementation was reported in three national reports between 2000-2011, including 2 MICS (2000 and 2006) and 1 DHS reports (2011). The proportion of children 6–59 months had vitamin A supplementation in the past 6 months increased dramatically from 15.6% in 2000 to 54.8% in 2006. Since 2006, the vitamin A supplementation further improved moderately to 60.8% in 2011 (Figure 5.4).

Iron supplementation in the past 7 days in children 6–59 months was also only reported in 2011 DHS and the proportion was 15.6%. Multiple micronutrients. Multiple micronutrient power (MNP) use was not reported in national reports during this time period.

Figure 5.4. Nutrient supplementation in Cote d'Ivoire from 2000-2011



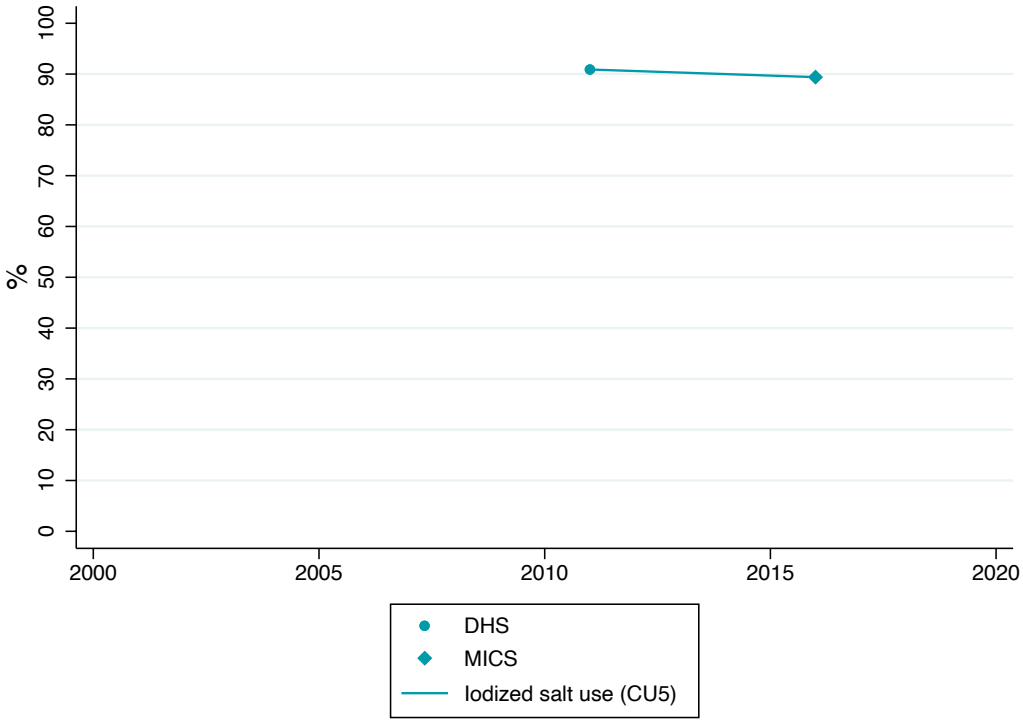
Influencing factors of vitamin A supplementation

Investment and programming efforts by government and development partners in recent years may have continued to increase vitamin A supplementation in Cote d'Ivoire. For example, a program conducted in 2018 by UNICEF reached 29 districts for routine vitamin A supplementation and deworming. There were also two additional rounds of a national campaigns providing vitamin A supplementation in 86 districts and deworming in 59 districts. Analysis revealed that the program coverage for vitamin A supplementation and deworming was high: 90.7% and 88.6%, respectively (UNICEF 2018). However, based on the 2016 MICS evaluation report shared to by the UNICEF Cote d'Ivoire team, according to the vaccine cards of children 6-59 months, 17.88% of children received their first dose of vitamin A at 6 months. 6.36% received their second dose at 12 months and 2.65% received both doses of vitamin A. These data indicate that coverage of vitamin A supplementation in young children 6–12 months was much lower than the rate in older children 12–59 months.

Iodized salt use and Iron-fortified foods

Iodized salt use in households with children under 5 years was reported in 2011 DHS (90.9%) and 2016 MICS (89.4%) (Figure 5.5). Iron fortification: No data were reported for iron-fortified food consumption in the national reports reviewed.

Figure 5.5. Iodized salt use and iron-fortified foods consumption in Cote d'Ivoire in 2011



Influencing factors of fortified foods in complementary feeding

In Cote d'Ivoire, there is support for fortification, particularly at policy levels. Large-scale food fortification is considered a cost-effective approach to deliver micronutrients and the mandatory fortification programs for food vehicles have been created in Côte d'Ivoire, including salt iodization since 2001, vitamin A-fortified oil since 2007, and iron-fortified wheat flour since 2007 (Global Fortification Data Exchange 2020). The latter two were part of the Programme Ivoirien de la Promotion des Aliments Fortifiés or PIPAF that was supported by the government, national and international stakeholders (Rohner 2016). Despite policy commitments, implementation-related fortification challenges remain.

For instance, because non-fortified alternatives are cheaper and more widely available than fortified foods, behavior change is needed among consumers (GAIN 2010). As a result, sensitization of fortification among the general public is still not widespread. According to a GAIN report, only 16% of households surveyed have heard of fortified foods (GAIN 2010). Interview participants also explained that operational challenges remain among the organizations responsible for fortification. For instance, vitamin A-fortified oil in Côte d'Ivoire is rarely fortified with recommended levels of retinol (8µg/g) (GAIN 2010) and the loss of vitamin A likely occurs during fortification, storage, and transport (GAIN 2010). Another study found that only a third of the wheat flour collected showed adequate levels of iron (Rohner et al. 2016)

Other fortified foods

In Cote d'Ivoire, there have been additional efforts made to produce locally fortified complementary foods. For example, a specialized nutritious food known as Farinor was developed in 2008 to provide energy, protein, and micro- nutrients (iron, vitamin A, and iodine) for children 6–23 months (GAIN 2014). It was composed of corn, rice or wheat and soy milk, and enriched with vitamins necessary for child growth (PKL 2020). It also contained 23.2 mg of iron, 800.4 µg of vitamin A and 0.18 µg of iodine. Then, Nutribon, was developed as a second-generation version of Farinor, and was targeted to poorer consumers in Cote d'Ivoire.

An intervention entitled, the Project to Promote the Feeding of Fortified Com- plementary Foods to Young Children in Côte d'Ivoire, known as PACE, was launched in 2009 to promote Farinor, and later, Nutribon. The project was led by Helen Keller International (HKI) and a local producer, Protein Kissée-La (PKL). Though PKL distributed the fortified complementary foods nationwide, more than 75% of the products were sold in Abidjan. At the national level, the development partners working on this project had limited success brining Nutribon into the National Nutrition Program or establishing a national standard for fortified food projects (GAIN 2014).

Another study that used locally produced fortified complementary foods and was conducted in Abidjan found that among over 1,000 participants, there was a high awareness yet low coverage of the available product. Further, only 37.8% of caregivers reportedly ever fed the child the food, with even fewer who ever fed the product in the previous month (8.8%) and week (4.6%), respectively (Leyvraz et al. 2016).

PARTICIPANT RECOMMENDATIONS

Two primary recommendations to improve complementary feeding in Côte d'Ivoire were identified through interviews.

- Across systems, participants discussed the importance of systems integration, combining social protection, health, food, and WASH systems for improving young child diets. For instance, households that are supported by social protection so that they can have enhanced purchasing power will be in a better position to improve the nutritional status of children.
- Other recommendations highlighted the importance of integrated nutrition approaches, for example fortification. Such initiatives should have integrated aims, with a focus not just on fortification as a process, but also on enhancing women's autonomy, improving the quality of complementary foods, and behavior change.

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CHAPTER 6

DEMOCRATIC REPUBLIC OF THE CONGO

Complementary feeding trends, determinants, and recommendations in Democratic Republic of the Congo

EXECUTIVE SUMMARY

Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year** was practiced in 92% of children in 2013 and has followed a stable trend between 1995–2013. **Continued breastfeeding at 2 years** was 66.3% in 2013 with variable reporting between DHS and MICS reports.
- **Introduction of solid, semi-solid and soft foods** in children 6–8 months has remained above 75% since 1995 and the most recent rate was 79.3% in 2013. **Minimum meal frequency** was achieved in only 34.6% of the children 6–23 months in 2013, though that represents an increase of ~10% from the earlier timepoints. **Minimum dietary diversity and minimum acceptable diet** were only reported in 2013 with a low rate of 19.9% and 8.4%, respectively, of children 6–23 months.
- **Vitamin A-rich foods** and **iron-rich foods** were consumed by 81.8% and 52.0%, respectively, of children 6–23 months in 2013. Compared to the other proportion reported in 2007, the proportion of vitamin A-rich food increased by 16.3%.
- The coverage of **vitamin A supplementation** in children 6–59 months increased substantially from 11.5% in 2001 to 82.1% in 2010 and then dropped to 70.4% in 2013. **Iron supplementation** in children 6–59 months was only reported once (2013) and the rate was 15.6%. **Iodized salt use** in households with children under 5 increased from 79.3% in 2007 to 92.1% in 2013. No data were reported on **multiple micronutrient powder use** nor on the **intake of iron-fortified foods** in children 6–23 months.

DATA AVAILABILITY FOR DEMOCRATIC REPUBLIC OF THE CONGO

Quantitative data

Complementary feeding practice data used in this DRC chapter were extracted from 5 national reports between 1986–2018, including 2 DHS and 3 MICS reports.

Literature review

Both grey and peer-reviewed literature focused on the Democratic Republic of the Congo were included; 15 grey literature reports and 9 peer-reviewed articles.

Qualitative interviews

Interviews were conducted with 4 informants representing government, NGOs, and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The law specifies the fundamental principles and the rules of organization for public health and a secure food supply (FAO, 2020).

Infant and Young Child Feeding (IYCF):

- Currently, the government promotes complementary feeding (HANCI-Global 2017).
- IYCF is one of the flagship programs under the National Nutrition Program (NNP). The NNP 2019 has developed a strategic and operational plan that includes IYCF activities (Global Nutrition Report 2020).

Breastfeeding recognition:

- Each year, DRC celebrates World Breastfeeding Day. For 2020, the theme is "Empower parents, facilitate breastfeeding" and preparations are underway for behavior change communication for breastfeeding and women's nutrition (Global Nutrition Report 2020).
- Baby friendly hospital initiatives (BFHI) were implemented in the early 2000s as part of a national campaign of breastfeeding promotion, led by UNICEF (Yotebieng et al. 2013). BFHI have ten steps, all of which have been integrated into DRC's national policies, strategies and plans but not all ten steps are integrated into national quality standards. The initial funding for the BFHI ended in 2004. At that time, the country's infrastructure was in shambles and the country was not ready to take over the initial UNICEF efforts (Yotebieng et al. 2013). More recent efforts (in the last five years) have led to 24% of facilities being designated as baby friendly hospitals (WHO 2017).
- Starting in 2006, DRC has enacted legislation or other legal measures encompassing many provisions of the International Code of Marketing of Breast-milk Substitutes, specifically the elimination of inappropriate promotion of breast-milk substitutes and complementary foods for infants and young children, including advertising to the general public and various forms of promotion in healthcare settings (World Health Organization, UNICEF, IBFAN 2018).

Complementary feeding promotion or policies:

- The DRC has had a nutrition plan in place since 1994 but does not have a specific complementary feeding policy (Republique du Zaire Government de Transition 1994).

Fortification policies:

- Current fortification policies are universal but do not specifically target complementary feeding practices (FFI 2019).
- Since 2003, the DRC has mandated the fortification of salt with iodine but no other food vehicle fortification has been mandated (Global Fortification Data Exchange 2020).

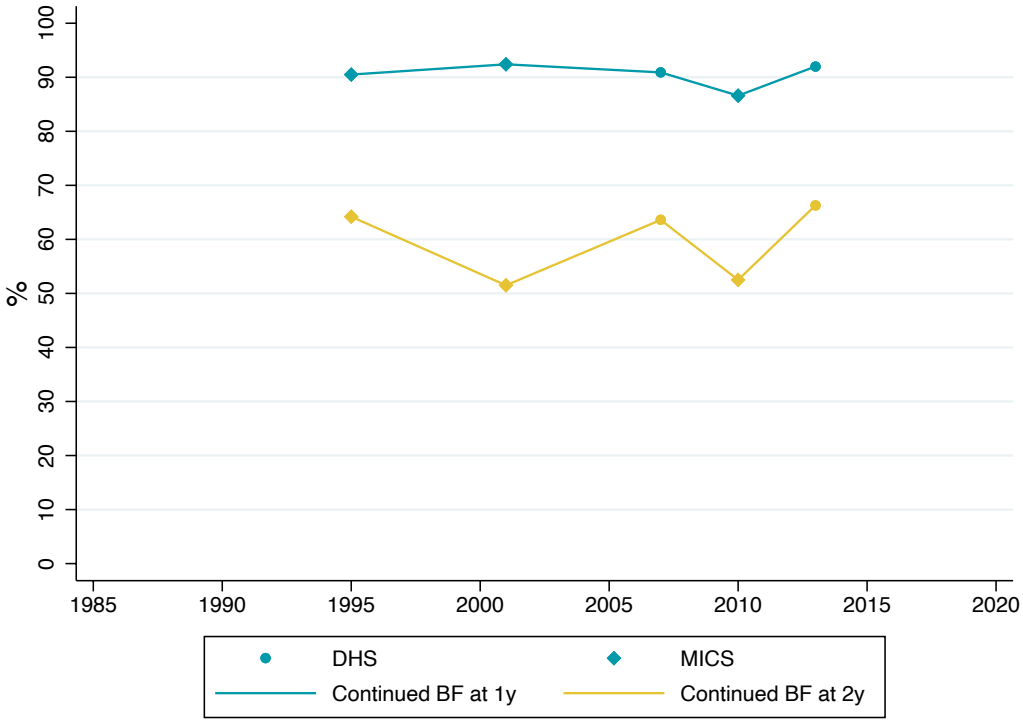
Summary of women/maternal rights in the DRC:

- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global 2017).
- No national legislation is currently in place regarding equality of women's economic rights (HANCI-Global 2017).
- Public spending frameworks and initiatives:
- There is a national budget specifically for nutrition (Scaling-Up Nutrition 2019).
- In the 2019 budget promulgated by the Ministry of Health, the government allocated 1,000,000 Congolese Francs (slightly less than US $606,000) to the National Nutrition Program (Global Nutrition Report 2020).
- There is no financial monitoring framework in place to assess resource mobilization for nutrition (Scaling-Up Nutrition 2017)
- On a broader scale, the government allocated approximately 3.87% of its GDP for health expenditure in 2016, a decrease from approximately 3.99% in 2015 (World Bank 2016).

CONTINUED BREASTFEEDING

Data availability and trends: Data on continued breastfeeding practices at 1 year and 2 years were reported from 1995 to 2013 in 5 national reports, including 3 MICS (1995, 2001, 2010) and 2 DHS reports (2007, 2013). The mean proportion of children who were breastfed at 1 year and 2 years were 90.5% and 59.6%, respectively. The proportion reported in the 3 MICS reports for continued breastfeeding at 2 years were, on average, about 12 percent points lower than those reported in the 2 DHS reports, with the reminder that they were reporting on different years.

Figure 6.1. Continued breastfeeding at 1 year (1y) and 2 years (2y) in the DRC from 1995–2013



Influencing factors of continued breastfeeding

The DRC has a policy environment that recognizes the importance of breast-feeding but the infrastructure to support this, especially continued breast-feeding at 1 and 2 years of age, is not apparent. DRC celebrates the World Breastfeeding Week every year. The Baby Friendly Hospital Initiative (BFHI) was implemented in the DRC in the early 2000s; currently 24% of facilities in the DRC carry the "Baby-Friendly" label (WHO 2017). Since 2006, the DRC has enacted legislation or other legal measures encompassing many provisions of the International Code of Marketing Breast-milk Substitutes (World Health Organization & UNICEF & IBFAN 2018)

Studies examining the barriers and facilitators to breastfeeding in the DRC have focused more heavily on exclusive breastfeeding rather than continued breastfeeding at 1 and 2 years of age. A study in South Kivu found that most mothers continued breastfeeding until their children were 24–36 months of age, yet lack of knowledge and misperceptions among mothers, mothers' high

workloads, and poverty were barriers to optimal feeding of children from 0–23 months (Burns et al. 2016). Interview data supported these findings, describing greater progress in urban than in rural DRC.

> *"So it is difficult in places, particularly if we go to rural environments, so if I go there, the majority of moms, they spend time in the fields and do not give time to breastfeed the child…that makes a big problem. And so, at the city level, like the city of Kinshasa there has been an improvement–already we have begun to understand exclusive breast- feeding and the breastfeeding up to two years and we are more pre- pared we know than the people who are in the villages. But, anyway, there has been an improvement because there are sensitization [cam- paigns]."*
>
> ***-Informant interview in DRC, Academic/Research Institute***

Other studies have found that literate mothers are more likely to practice exclusive breastfeeding and this was attributed, at least in part, to their ability to obtain knowledge from reading materials such as promotional pamphlets, broadcasting media and billboards (Dhakal & Lee & Nam 2017). These studies further indicate that the underutilization of community health workers may limit continued breastfeeding promotion and that misperceptions and traditional beliefs also play a role. For instance, traditional healers are the preferred source of information for many families when it comes to certain child illnesses and breastmilk insufficiency; mothers believe that open sores or wounds on the breast will increase the likelihood of transmitting disease to the infant through breastfeeding (Kavle et al. 2019; Maman et al. 2017). This belief was cited as a reason that many mothers cease breastfeeding at 6 months of age (Maman et al. 2017).

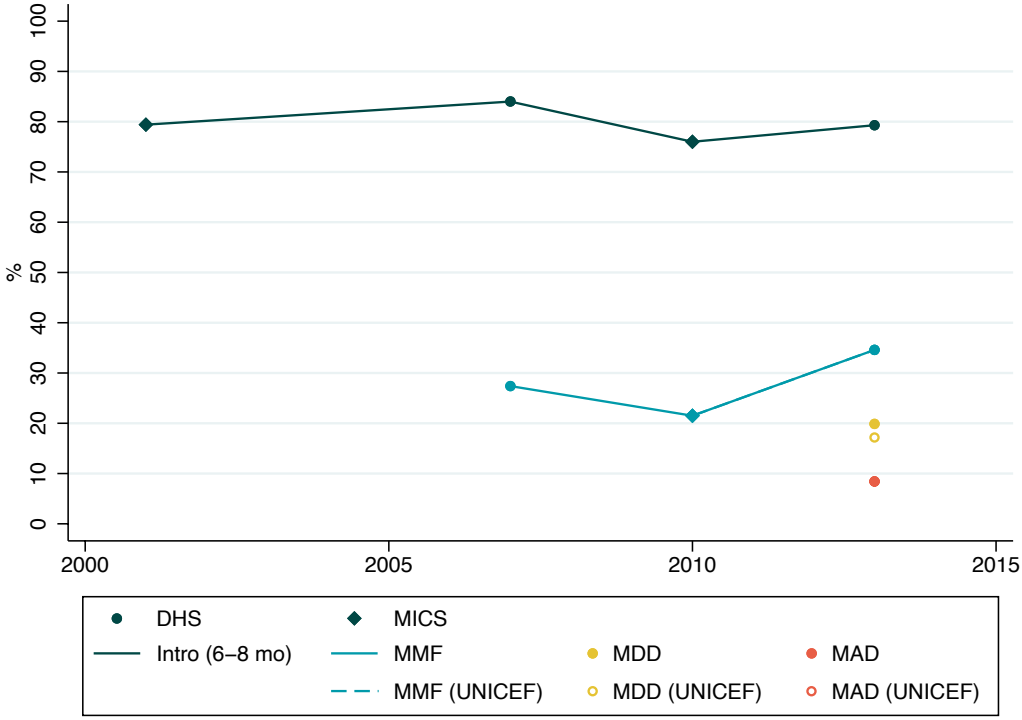
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends

Intro: Data on the timely introduction of complementary foods were reported in 4 reports between 2001 and 2013 (MICS: 2001, 2010; DHS: 2007, 2013). The mean proportion of children 6–8 months provided solid, semi-solid and soft foods was 79.7% and remained relatively stable from 2001–2013.

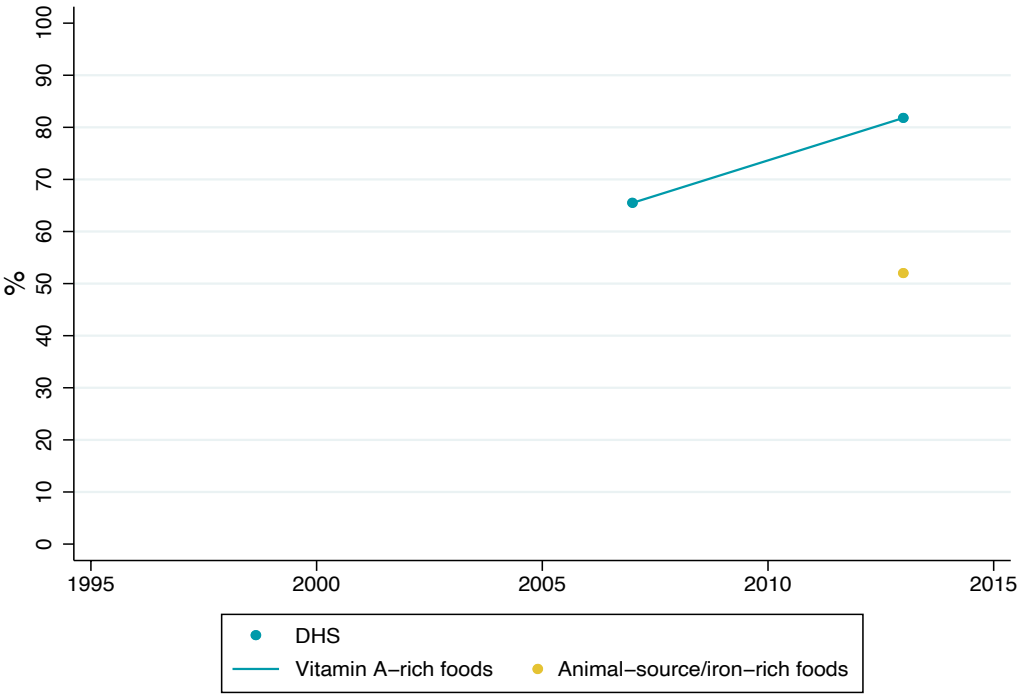
MMF, MDD, MAD: Data on minimum meal frequency (MMF) revealed that only 27.4%, 21.5%, and 34.6% of children 6–23 months achieved the minimum guidelines in 2007, 2010, and 2013, respectively. This reflects a recent increase of 13.1 percent- age points from 2010 to 2013. Data on minimum dietary diversity (MDD) and minimum acceptable diet (MAD) were only reported in the most recent DHS 2013 report and indicate that only 19.9% and 8.4% are achieving these indicators, respectively. The UNICEF redefined MDD was 17.2%, which was slightly lower than the MDD proportion based on the WHO 2020 definition.

Figure 6.2. Key complementary feeding practice trends in the DRC from 2001–2013



Vitamin A-rich foods: The consumption of vitamin A-rich foods was 65.5% in 2007 and 81.8% in 2013 (both from DHS), showing a 16.3 percentage points increase over the 6-year interval. Data on the consumption of animal-source/iron-rich foods were only reported in the DHS 2013, and the proportion of children 6–23 months consuming animal-source/iron-rich foods was 52%. No data were available in any national reports about the iron-fortified foods use in children.

Figure 6.3. Trends of nutrient-rich foods consumption in the DRC from 2007–2013



Influencing factors of complementary feeding and nutrient-rich food intake

At the policy level, IYCF is one of the flagship programs under the National Nutrition Program, highlighting political will toward nutrition (Global Nutrition Report 2020). At the community level, challenges to improve young child diets persist. Regionally, DRC has experienced conflicts and Ebola Virus Disease outbreaks, both of which contribute to systems-level impacts on the food system (WFP USA 2018; WFP 2020). Interviewees also talked about problems related to the lack of consistent food availability–specifically animal sources and some seasonal foods which are nutritious for young children.

Institutional level efforts, including those of government and development partners, to address child health and nutrition are on-going throughout the DRC. For instance, programs like Nutrition a Assise Communautaire (NAC) and Consultations Préscolaires (CPS) provide food demonstrations using locally-available foods. These demonstrations mainly target mothers, aiming to educate them about culinary practices that comply with complementary feeding guidelines. Development efforts to improve WASH (National Clean Villages and Schools program) and food security (ADRA's JENGA JAMAA II) were discussed in the literature as promising multi-sectoral interventions in DRC (USAID & FANTA 2015). Also, cash-based transfers were cited as offering good support for families in terms of increasing their purchasing power. In 2019, UNICEF and the ministry of health conducted a study to identify and assess food quality supplement for children ages 6-23 months in the DRC. They found that, overall, 122 food recipes were identified, of which 37% were for children from 6 to 8 months, 30% for children ages 9 to 11 months old and 33% for children from 12 to 23 months. Most of these recipes are made from corn, cassava, soy, rice, sorghum, wheat, potato and plantain banana. Combinations of several foods are made, including the corn with soy, sorghum, wheat, cassava; with peanut seasoning or caterpillar, or fish. All of these staple foods are generally available at affordable prices. Furthermore, in regard to diet quality, they found that 81.1% of the recipes met the WHO standard of 400 kcal (GAAD –ASBL 2019)

The DRC health system is also important for the well-being of women and children nationwide. At health centers, mothers are offered consultation and advice around the growth of children, vaccinations, and the provision of supplements, such as micronutrient powder, to improve complementary feeding. Our risk factors analysis revealed that women from communities with poorer access to health care and nutrition services had lower odds of feeding their children with sufficient meal frequency (Table 6.1).

> *"I would like to underline that thanks to this intervention of revital- ized CPS we have started to do a platform where we can capture and improve the practices of feeding and nourishing a young child because it's the platform where we can find so many mothers, so many parents, and so many caretakers to talk to them, to show them, and to even have them live and experience and favor the changes at the level of the mother, I think that that is a thing, of course."*
>
> ***— Interview participant in DRC, UN official***

Education is provided through the health system as well; exclusive breast-feeding and the timely introduction of complementary foods are two nutrition focal areas. Studies have found that exposure to these programs is important: mothers with high program exposure have been shown to be more likely to wait until 6 months to introduce water or complementary foods compared with mothers with low program exposure (Locks et al. 2019). However, there is low attendance of mothers at healthcare facilities and the high reliance on self-medication and traditional healers, stemming from perceptions of inappropriate quality of care as well as longstanding cultural belief systems (Ministere de La Sante Publique 2011).

Health workers are important influencers whose job includes referring and accompanying families to the health center in the DRC. They also provide nutrition advice and are involved in community-based nutrition programming.

> *"But, in any case, at the community level, there are community pro- moters which go to households to try to do a little bit of counseling for the parents on how to feed the child. So, the advice is not enough, it is still necessary to do demonstrations. We do demonstrations so, right now, I think at least up to October, we had a study where we tried to put in place an…on the recipes for complementary foods that are local and improved"*
>
> ***— Interview participant in DRC, UN official***

Studies suggest that health workers are underutilized for nutrition services, including counselling (Kavle et al 2019). Despite health worker influence, limited program coverage is a contributing barrier to all children receiving optimal nutrition services and promotion.

> *"Whether it be CPS, whether it be nutrition…the problem that we have is the coverage. We are not all over the country, not even in three quar- ters [of the country]… unfortunately we do not have enough contacts with mothers…"*
>
> ***— Informant interview in DRC, Government official***

Affordability seems to be one of the main household-level barriers. Families struggle financially to meet the nutrition needs of their family throughout the DRC. Although food may be available within the community, households may not have enough purchasing power to provide nutritious food for their children throughout the year, especially in larger households. This translates into poor, non-diverse diets that mainly depend on grain and legumes. Our risk factor analysis was in line with these findings where we found household wealth to be associated with better odds of MDD and MAD (Table 6.1). Moreover, household food processing and food preparation practices contribute to non-nutritious meals in many cases, according to interviews.

> *Secondly, the big problem with these [diets] is the processing, the modes of preparation of these foods, because the food needs to be well prepared with respect to the modes of preparation. And you know that during the preparation of local foods, especially the legumes, there is a problem …that can affect the nutritional content in grains… and legumes as well. We find more anti-nutritional factors that can pose a serious problem to the growth of the child…the majority of porridges, complementary foods formulated in DRC, are very thick, that means that the mom prepares only a porridge with which she adds a lot of water, that reduces the nutritional value of the food."*
>
> ***— Interview participant in DRC, Academia/Research Institute***

High fertility rates, ignorance of good feeding practices, poor hygiene, and inadequate food diversity was also mentioned as underlying household barriers in the literature (USAID & FANTA 2015).

At the individual level, mothers have competing demands that make it difficult to optimally feed children during the first two years in the DRC.

> *Maybe it is also the occupation of the mothers, since we have working women…I mean for me all women are workers, even the ones who go to the farm, they are workers. I think that it is equally to the caregivers to give clear messages and shows what needs to be done during the moth- ers' absence, I think that is a problem we have."*
>
> ***-Interview participant in DRC, Government official***

Studies support this observation. Mothers often place their children for hours in the care of nannies, neighbors, or family members who commonly offer porridge to soothe children when crying, which was a frequently cited reason for early introduction of complementary foods (Kavle et al. 2019). Limited knowledge and comprehension of parents to use local diets to provide nutritious foods to their children emerged as another continual challenge. We also found the maternal education, a broader indicator of mother's knowledge, comprehension, and ability to learn, is a strong predictor for achieving MMF and MDD (Table 6.1). One interviewee discussed the influence of processed foods on normative views: among a growing proportion of mothers, there may be a growing perception that store- bought foods are more nutritious for young children than local foods.

> *…So, I think a lot of people think that in order for the child to eat better after 6 months, you'll have to buy him food from the factory [processed food], I think that is the problem that we have here. The survey that we are working on right now aims to show that it is in the basket at home where you can get everything needed to create a child's food that is adequate…"*
>
> ***— Informant interview in DRC, Government official***

In addition, widespread knowledge about adequate complementary food preparation using local ingredients needs to be improved. Research has found that a combination of factors influence feeding, with barriers at the individual level such as knowledge, attitudes, beliefs and skills, the interpersonal level, particularly support from family, friends, and healthcare providers, and at the community level such as community support groups or breastfeeding friendly hospital policies (Yotebieng et al. 2013).

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 8 and Appendix Table 9, respectively.

Table 6.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6–23 months in Democratic Republic of the Congo (2013-14)

	INTRO	MMF	MDD	MAD
N	**918**	**4030**	**3654**	**3605**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	**1.00**
12-17		**0.75 (0.64, 0.87)**	**1.93 (1.53, 2.43)**	**1.41 (1.04, 1.92)**
18-23		**0.79 (0.66, 0.94)**	**2.17 (1.68, 2.81)**	**1.32 (0.93, 1.89)**
Vitamin A supplementation	**1.86 (1.31, 2.64)**			**1.62 (1.16, 2.28)**
Child had symptoms in the past two weeks				
Diarrhea	**1.65 (1.12, 2.42)**			
Cough		**0.83 (0.71, 0.96)**		
Maternal characteristics				
Age (years)				
15-24			**1.00**	
25-34			**1.39 (1.04, 1.86)**	
35-49			**1.50 (0.99, 2.26)**	
Education				
No education		**1.00**	**1.00**	
Primary		**1.14 (0.95, 1.36)**	**1.05 (0.80, 1.38)**	
Secondary/ Higher		**1.37 (1.12, 1.68)**	**1.44 (1.06, 1.95)**	
Occupation				
Not working			**1.00**	
Agricultural			**1.02 (0.77, 1.35)**	
Non-agricultural			**1.44 (1.10, 1.87)**	
Breastfeeding practices				
Currently breastfeeding		**2.53 (1.95, 3.29)**		**6.62 (3.16, 13.87)**
Exposure to media at least once a week				
Listening to radio			**1.27 (1.01, 1.61)**	
Watching TV			**1.64 (1.17, 2.31)**	

Timing of postnatal check-up on women (days)				
0-1 d		**1.00**		
>= 2 d		**1.28 (1.01, 1.62)**		
Missing / unknown		**0.95 (0.75, 1.20)**		
Household characteristics				
Household wealth				
1 Poorest		**1.00**	**1.00**	**1.00**
2		**0.99 (0.82, 1.20)**	**1.40 (1.05, 1.85)**	**1.34 (0.86, 2.07)**
3		**1.07 (0.87, 1.30)**	**1.21 (0.89, 1.66)**	**1.24 (0.79, 1.95)**
4		**0.79 (0.63, 0.99)**	**0.77 (0.53, 1.13)**	**1.29 (0.78, 2.12)**
5 Richest		**0.61 (0.44, 0.85)**	**0.78 (0.52, 1.18)**	**2.15 (1.13, 4.08)**
Community characteristics				
Rank of access to health care				
1 Best access	**1.00**	**1.00**	**1.00**	
2	**1.79 (1.06, 3.02)**	**0.81 (0.65, 1.02)**	**1.40 (1.05, 1.85)**	
3	**2.02 (1.20, 3.41)**	**0.69 (0.54, 0.87)**	**1.21 (0.89, 1.66)**	
4	**1.56 (0.93, 2.61)**	**0.68 (0.53, 0.88)**	**0.77 (0.53, 1.13)**	
5 Worst access	**1.81 (1.07, 3.07)**	**0.56 (0.42, 0.74)**	**0.78 (0.52, 1.18)**	

A community mobilizer explains to mothers and mothers-to-be in Kinshasa, Nsele, DRC the good practices for the health and nutrition of their children.

SUPPLEMENTATION AND FORTIFICATION

In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

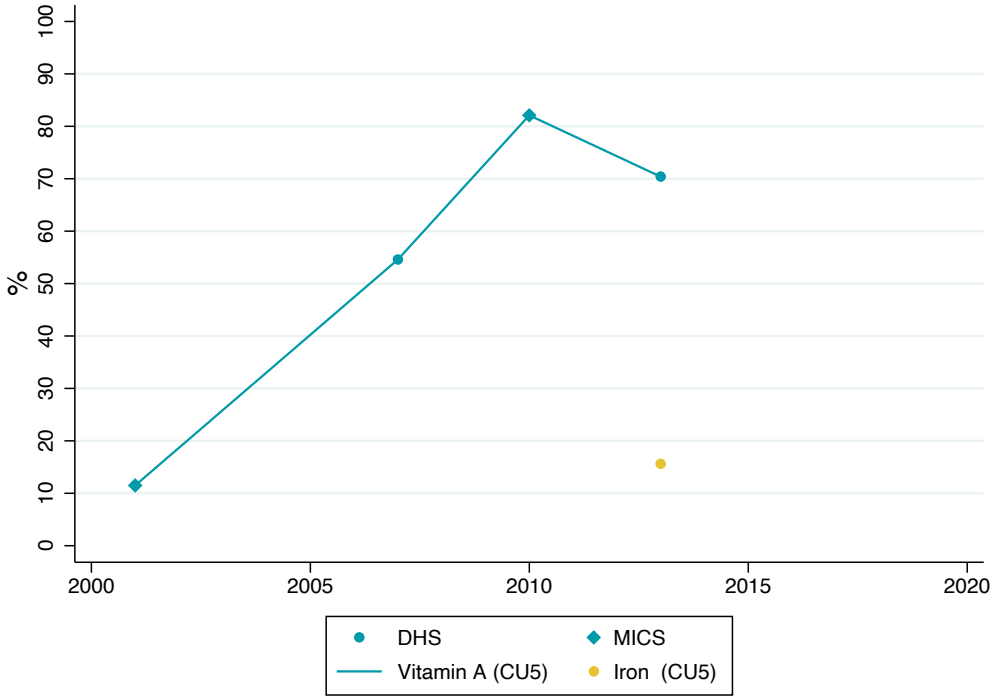
Vitamin A Supplementation, Iron Supplementation, and Multiple Micronutrient Powders

Data on vitamin A supplementation in children 6–59 months have been reported in 4 national reports between 2001 and 2013. There was a substantial increase in the proportion of children given vitamin A supplementation from 11.5% in 2001 to 82.1% in 2010, though the proportion dropped to 70.4% in 2013 (Figure 4).

The coverage of iron supplementation in children 6–59 months was only 15.6% in 2013 and was only reported once **(**Figure 6.4**)**.

Multiple micronutrient powder (MNP) use in children 6–23 months was not reported in any of the included national reports **(**Figure 6.4**)**.

Figure 6.4. Nutrient supplementation in the DRC from 2001–2013

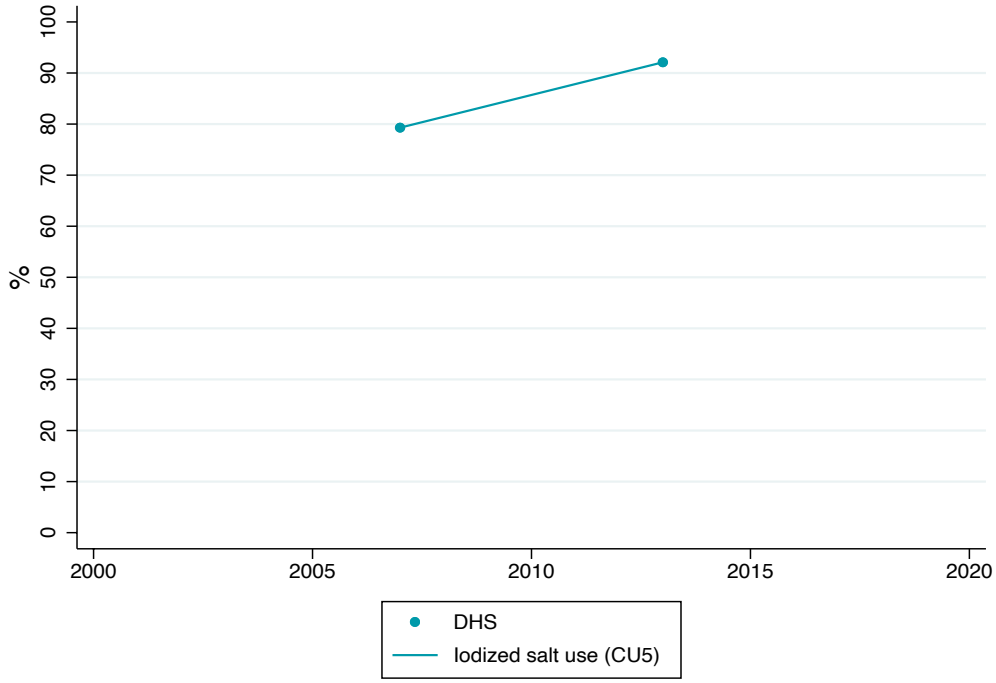


Iron-Fortified Foods and Iodized Salt Use

Data on the consumption of iron-fortified foods by children 6–23 months were not reported.

Data on iodized salt use in households with children under 5 years has increased from 79.3% in 2007 to 92.1% in 2013, reflecting a 12.8 percentage points increase over this 6–year period (Figure 6.5).

Figure 6.5. Fortified foods in the DRC from 2007–2013



Influencing factors of supplementation and fortification:

Policies and initiatives which support supplementation and fortification have been put in place in the DRC. For example, in December 2014, the National Nutrition Programme, in partnership with UNICEF, introduced multiple micronutrient powder as a food supplement for children aged 6 to 23 months to prevent the negative impact of chronic malnutrition (Mukunda et al. 2017). Interview and literature findings point to the increased consumption of iodine and the marked decrease in goiter prevalence due to enforcing a national policy of iodizing salt (Ministere de La Sante Publique 2011). Interview participants explained that early adoption of iodine contributed to positive nutrition results at the population level.

> *"We are among the countries where the salt that have been fortified, iodized salt…we are among the first countries to have been able to obtain such a policy. And here our availability of iodized salt is over 80%...and you know that we were at a rate of goiter of 24% and today the most recent survey we are not even at more that 5% of goiter. This is thanks to the fortification of salt, iodized salt."*
>
> ***— Informant interview in DRC, Government official***

On the other hand, challenges at the policy level in enforcing vitamin A mass supplementation campaigns have been documented (Ministere de La Sante Publique 2011). Regional differences may also be ascribed to insecurities, such as in places like Kivu, where implementation/coverage is increasingly difficult. One government official indicated that reduced funding may also have been a contributor.

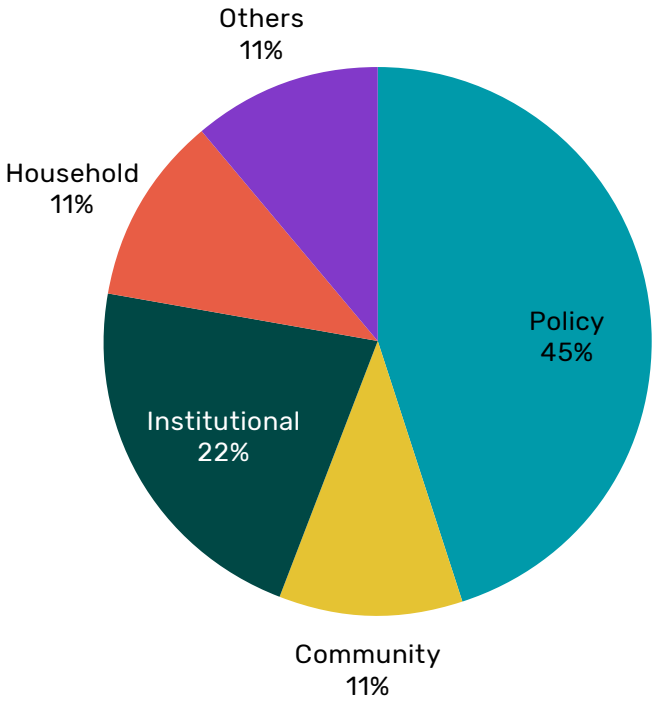
> *"The vitamin A was done through campaigns…door to door. That means that providers that were trained would go door to door to administer vitamin A, but I think that recently, the budget has started to reduce."*
>
> ***-Informant interview in DRC, Government official***

In the DRC, iron supplements are provided to pregnant and lactating women but not to children, generally. MNP home fortification programming has begun but not at the national level.

PARTICIPANT RECOMMENDATIONS

Several recommendations to improve complementary feeding in DRC were suggested by the interviewees. Figure 6.6 below illustrates the types of recommendations identified by level of influence. Most recommendations to improve complementary feeding in the DRC were at the policy (45%) and insti- tutional (22%) levels.

Figure 6.6. Recommendations to address complementary feeding by level of influence in the DRC



Below is a description of the top recommendations:

- **At the policy level**, participants explained that financing and budgeting are important for ensuring resources are available to support nutrition programs nationwide.
- **At the institutional level,** participants recommended harnessing the health system and its many touch points as opportunities to integrate nutrition counselling, nutrition monitoring, and other activities. Ensuring this type of integrated approach requires adequate training of health workers, at minimum.
- At the community level, interviewees highlighted the need for community-wide SBCC for nutrition sensitization, as well as joint efforts to ensureadequate WASH environments (e.g. improved handwashing, systems of water conservation to drink clean water, adequate sanitation systems).
- Finally, participants discussed the importance of joint engagement among government, development partners, and community members to improve young child diets both in the short and long term.

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CHAPTER 7

GHANA

Complementary feeding trends, determinants, and recommendations in Ghana

EXECUTIVE SUMMARY

Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1** year has been universally practiced (94.7%) between 1988–2014 with the a proportion of 94.6% in 2014. The proportion of children who continued to be breastfed at 2 years was lower on average (52.9%) and followed a non-linear trend. The most recent reported proportion was 50.1% in 2014.
- **Introduction of solid, semi-solid and soft foods** in children 6–8 months has increased from ~57.0% between 2000–2006 to 74.9% in 2008 and remained steady above 70% since 2008. The rate in 2014 was 73.1%. **Minimum meal frequency** was achieved in 43.3% in 2014 with an average of 48.8% between 2008-2014 of the children 6–23 months. **Minimum dietary diversity** and **minimum acceptable diet** both showed an alarmingly decreasing trend from 2011 to 2014 and were only achieved in 28.1% and 13.3% of children 6–23 months in 2014.
- Intake of **vitamin A-rich foods** and **iron-rich foods** in children 6–23 months decreased between 2008–2014 from 80.7% to 67.0% and 74.5% to 58.8%, respectively.
- The most current coverage of **vitamin A supplementation** in children 6–59 months was 65.2% in 2014, which has increased from 55–60% in 2006–2008. Between 2008–2014, the proportion of **iron supplementation** in children 6–59 months was low with the most recent proportion of 24.4% in 2014. Iodized salt use in households with children under five was 63.4% in 2014. No data were available for multiple micronutrient powder use or consumption of iron-fortified foods in children.

DATA AVAILABILITY FOR GHANA

Quantitative data

Complementary feeding practice data used in this Ghana chapter were extracted from 8 national reports between 1988–2014, including 6 DHS, and 2 MICS reports.

Literature review

Both grey and peer-reviewed literature focused on Ghana were included; 21 grey literature reports and 16 peer-reviewed articles were included.

Qualitative interviews

Interviews were conducted with 4 informants representing government, NGOs, and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO 2020 information obtained from Ghana National Nutrition Policy 2013).

Infant and Young Child Feeding (IYCF):

- There is an IYCF policy which promotes exclusive breastfeeding up to 6 months of age, with complementary feeding introduced from 6 months to 2 years of age (WBTi 2008).
- A national plan of action has been developed with IYCF policy, but it is not well funded (Government of Ghana 2016).

Breastfeeding recognition:

- Ghana currently has an IYCF policy in place, according to World Breastfeeding Trends Initiative (WBTi) Report (WBTi 2008).
- There is an established national breastfeeding committee (WBTi 2008).
- Since 2000, Ghana has enacted legislation or other legal measures encompassing the full provisions of the International Code (World Health Organization & UNICEF & IBFAN 2018).
- Baby friendly hospital initiatives (BFHI) have been implemented (this started in 1993). BFHI have ten steps, all of which have been integrated into Ghana's national quality standards, policies, strategies, and plans. Currently, 36% of facilities are designated baby friendly hospitals; of note, 0% of facilities were designated as such in the last 5 years (WHO 2017).

Complementary feeding policies:

- Currently, the government promotes complementary feeding (HANCI-Africa 2017). Specifically, there is a community infant and young child feeding counselling package that was developed for health workers to help counsel mothers and other caregivers about infant and young child feeding. The package has been adapted to the local context and encourages the use of local foods (UNICEF 2013).

Fortification policies:

- Current fortification policies are universal yet do not specifically target complementary feeding practices (Food Fortification Initiative 2019).
- The National Food Fortification Alliance (NFFA), constituted in 2003, designed the Food Fortification Project to fortify wheat flour and commercial vegetable oil to address the high levels of anemia and vitamin A deficiency in the country (Nyumuah 2012)
- Mandatory iron fortification of wheat flour was implemented in 2006 (Global fortification 2020). Meanwhile salt fortification was made mandatory in 1996 (Nyumuah 2012).

Summary of women/maternal rights in Ghana:

- National legislation obliges private sector employers of women in the country to give at least 14 weeks paid maternity leave (WBTi 2008).
  - Female workers are entitled to 12 weeks (84 days) of maternity leave with full pay. The pregnant worker has to provide a medical certificate issued by a medical practitioner or midwife, indicating the expected date of her confinement.
  - The maternity leave can be extended by two additional weeks in case of caesarean delivery/abnormal birth or twin (or more) births. Extended leaves are granted in case of illness due to pregnancy or confinement, certified by the medical practitioner. The maximum limit of extended leave is not mentioned in the law.
- National legislation is currently in place for paid breastfeeding breaks during work hours (WBTi 2008).
  - A nursing mother is entitled to interrupt her work for 1 hour during her working hours to nurse her baby (Official Gazette 2003).
- Worksite accommodations for breastfeeding are not required at this time (WBTi 2008).
- No national legislation is currently in place regarding equality of women's access to agricultural land (HANCI-Africa 2017).
- National legislation is currently in place for paid breastfeeding breaks during work hours (WBTi 2008).

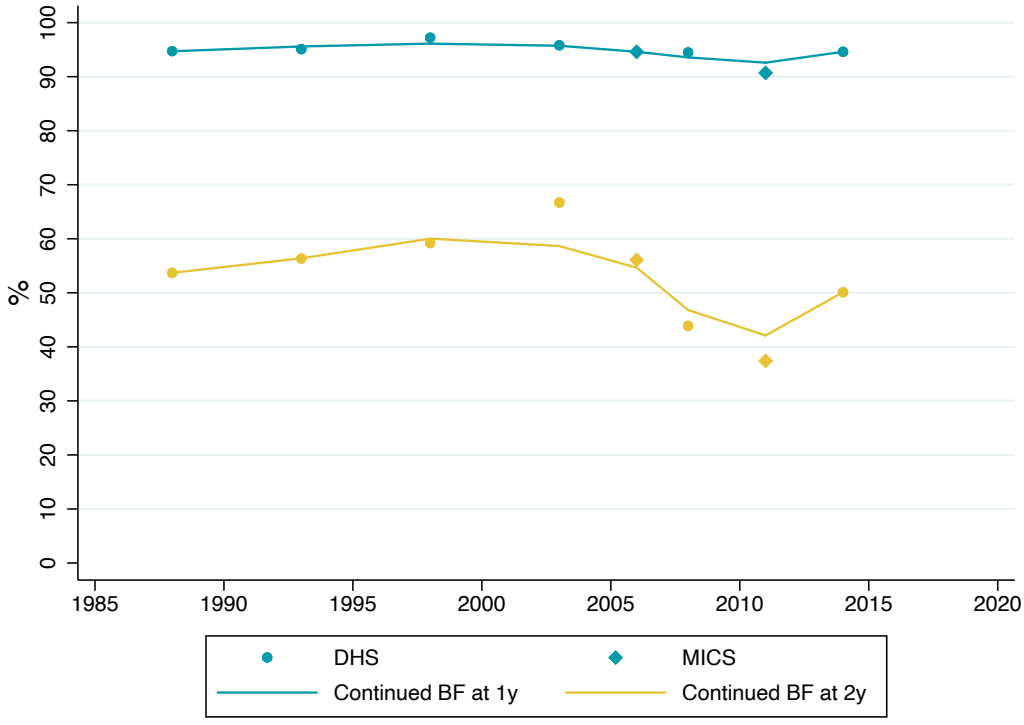
Public spending frameworks and initiatives:

- The Ghanaian government allocated approximately 4.45% of its GDP for health expenditure in 2016, a decrease from approximately 6.09% in 2015 (World Bank 2016). Only a sectoral budget for nutrition exists, no national separate nutrition budget exists specifically (HANCI-Africa 2017).
- The National Development Planning Commission (NDPC) has initiated the establishment of a tracking system for nutrition budget requests, allocations, expenditures and its source of funding (Scaling-Up Nutrition 2019).
- Ghana has been a member of the Codex Alimentarius since 1966 (FAO & WHO 2020). The Codex Alimentarius is a collection of internationally adopted food standards aimed at protecting consumers' health and ensuring fair food trade practices.

CONTINUED BREASTFEEDING

Data availability and trends: Data on continued breastfeeding practices were reported between 1988–2014 in 6 DHS reports (1988, 1993, 1998, 2003, 2008, 2014) and 2 MICS reports (2006, 2011). Over the past 26 years, continued breastfeeding at 1 year of age has been practiced steadily in a mean proportion of 94.7% of children between 12–15 months. As far as those who continued to be breastfed at 2 years of age, the proportion is lower, at 52.9%, but the trend has been non-linear. The proportion increased from 53.7% in 1988 to 66.7% in 2003; it then dropped to 37.4% in 2011, and returned to 50.1% in 2014, the most recent year reported (Figure 7.1).

Figure 7.1. Continued breastfeeding at 1 year and at 2 years in Ghana from 1988–2014



Influencing factors of continued breastfeeding

Ghana appears to have a policy environment conducive to continued breastfeeding practices. They have established a national breastfeeding committee and implemented the Baby Friendly Hospital Initiative (BFHI); 36% of facilities in Ghana are designated as "Baby-Friendly" hospitals (IBFAN 2018). There are multiple publications which report on breastfeeding in Ghana but nearly all of them focus on exclusive breastfeeding during the first 6 months of life. These studies indicate that higher education of mothers and their partners results in higher exclusive breastfeeding practices (Nkrumah 2017). In a focused ethnography study in urban Ghana, caregivers with children 6 to 24 months were interviewed and some women emphasized that they placed a high value on breastfeeding and breastmilk and did not see cereals as alternatives for breastmilk. They also had clear views about the importance of continued breastfeeding after complementary foods were introduced (Pelto 2013). That being said, cultural beliefs seem to play a role in the lack of continuation of breastfeeding beyond one year.

While there are provisions in the Labor Act to support breastfeeding, reports indicate that they are not adequate to support mothers who wish to continue exclusive breastfeeding once returning to work after maternity leave. Anecdotal evidence in Ghana also shows that women in certain occupations and/or professions are not permitted to be at work with their babies (Nkrumah 2017). Working mothers in Ghana also report very little privacy to breastfeed as well as feeling judged when doing so. Additionally, they repot that long working hours, lack of support networks, and emotional factors all contribute to lack of breastfeeding and lead them to provide breastmilk substitutes and early introduction of weaning foods (Dun-Dery 2016). While these studies have been focused on exclusive breastfeeding, factors that impact breastfeeding in the first 6 months of life are likely to continue beyond that.

Competing demands on the mother are also barriers to continued breastfeeding beyond 1 year of age. Findings indicate that many working mothers in both the formal and informal sectors were reported to stop breastfeeding beyond 1 year.

COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

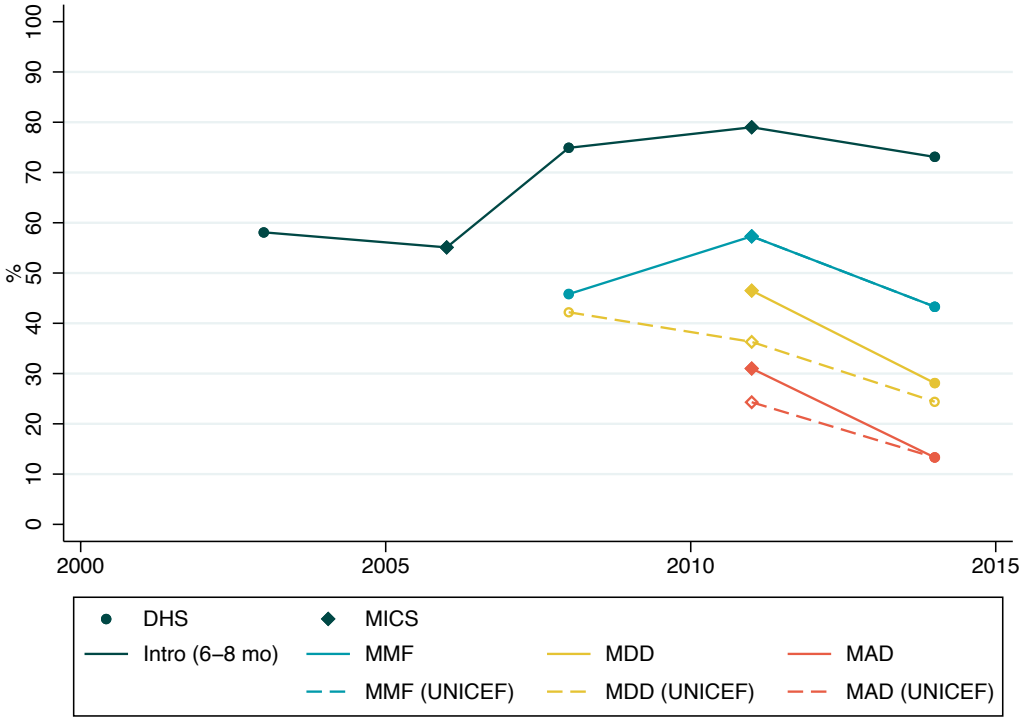
Data availability and trends:

Intro: Data on the introduction of solid, semi-solid and soft foods in children 6–8 months have been reported between 2003 and 2014 and the proportion has increased from ~57.0% between 2000–2006 to 74.9% in 2008, reflecting a greater than 16 percentage point increase. Since 2008, the proportion has been relatively stable, remaining above 70% (Figure 2).

MMF, MDD, MAD: Data on minimum meal frequency (MMF) were reported in 2008, 2011, and 2014 and the mean proportion of children 6–23 months meeting MMF was 48.8%.

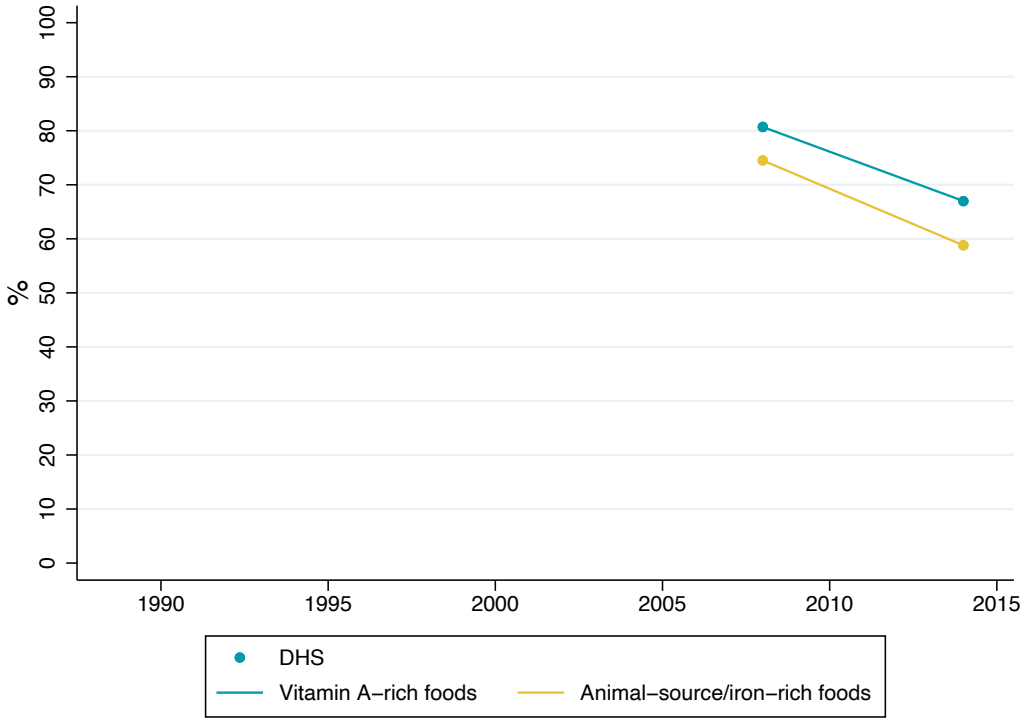
Data on both minimum dietary diversity (MDD) and minimum acceptable diet (MAD) have been reported in 2011 and 2014, showing an alarming decreasing trend in both indicators. Between 2011 and 2014, MDD decreased from 46.5% to 28.1% and, accordingly, MAD decreased from 31.0% to 13.3%. The UNICEF-revised MDD and MAD were lower than the WHO 2010-defined indicators and the decreasing trends were less steep (Figure 7.2).

Figure 7.2. Key complementary feeding practice trends in Ghana from 2003–2014



Nutrient-rich foods: The intakes of vitamin A-rich foods and animal source/iron-rich foods were reported in 2008 DHS and 2014 DHS. Both proportions have decreased from 2008 to 2014, from 80.7% to 67.0% and 74.5% to 58.8%, respectively.

Figure 7.3. Trends of nutrient-rich foods consumption in Ghana from 2008–2014



Influencing factors of complementary feeding and nutrient rich food intake

The Ghanaian government and partners are working to promote optimal complementary feeding practices. The Ghana Health Service (GHS) has been jointly working with USAID to implement LINKAGES, a national nutrition Behavior Change Commission (BCC) program to promote early initiation of breastfeeding, exclusive breastfeeding for the first 6 months of life, and timely and adequate complementary feeding (Issaka 2015). The program started by working with organizations and radio stations in nine districts situation in the three northern administrative regions. It then expanded its network of partners and extended activities to 22 out of 24 districts in the three regions. By 2003, the project covered all 24 districts in the three regions and had fourteen participating partners.

At the policy level, the most commonly mentioned facilitating factor of complementary feeding in Ghana is the strong political support for IYCF programming across different sectors, including the healthcare, food and agricultural systems. Policies to improve complementary feeding practices include implementation of an individual counseling program and fortification programs focusing on both fortified crops and specialized nutritious foods. This finding was corroborated by the literature, in which the salt iodization policies, Micronutrient Task Force and the National Nutrition Policy were described as important facilitating factors to improved complementary feeding (Government of Ghana 2016; USAID & SPRING 2017; IGN 2014). Inconsistent monitoring and regulation of fortified foods was a significant barrier at the political level described in both the interviews and reviewed literature.

At the community level, participants explained that traditional feeding practices contributed to low dietary diversity. Traditional foods for children include starchy foods like maize porridge. A qualitative study in caregivers with children ages 6 to 23 months found that mothers offered regular family foods such as starchy roots and plantains, fufu and soup, ampesi and vegetable stew, and grains such as porridges (Egyir 2016). Food proscriptions against animal protein and eggs further limited food given to children. Additionally, unequal distribution of health services, resulting in challenges to healthcare access were reported as community level barriers. For example, services for malnourished children were not available at the community level, only at the district and regional levels. Our risk factor analysis also reviewed that community-level access to health care and services was significantly associated with introduction of complementary foods (Table 7.1). Similar themes of access were found in the literature (University of Ghana & GroundWork & University of Wisconsin-Madison & KEMRI-Wellcome Trust & UNICEF 2017).

> *"One of the key factors is the traditional practice. Children have always been fed, since I was a child, by giving coco. It's very hard to change that cultural practice, because I have seen intervention upon intervention being done to try and address this but the style of complimentary feeding has not changed much."*
>
> ***-Interview participant, NGO staff, Ghana***

At the institutional level, health centers promote complementary feeding through caregiver education. Informants explained that this program was successful in educating caregivers. This finding was echoed in reviewed literature. The counselling program is enhanced by a variety of teaching materials and resources for caregivers. However, there are differences in how this program is implemented across different regions. A study found that only 23% of health centers had received education materials (USAID & GAIN & GHS & PATH & IYCN 2011).

At the household level, social norms and low household income were frequently mentioned barriers to ICYF practices, particularly affecting dietary diversity, breastfeeding and timely introduction of foods. In many households, older males were prioritized over children at mealtimes, so children were left with less nutrient dense foods. Introduction of complementary foods was also reported to begin before six months, due to beliefs that breastmilk is inadequate for the child and infants require supplementary feeding to speed up their postnatal growth (Yeboah-Asiamah, 2018). According to our risk factor analysis, the breastfeeding was also related to how the child was fed in terms of meal frequency and dietary diversity. While currently breastfed children, compared to non-breastfed children, were more likely to meet MMF and MAD, they were less likely to be given sufficient kinds of foods (Table 7.1).

Food affordability was cited as a significant barrier to complementary feeding. Many informants stated that families in both rural and urban environments had difficulty affording nutritious foods and defaulted to starchy foods like porridge when feeding their children. Animal protein was particularly unaffordable to many households. Our risk factor analysis echoed the findings from the liter-

ature and interviews as we found that household wealth was associated with meeting MDD in children 6–23 months in a dose response manner (Table 7.1). In a focused ethnography study in urban Ghana, caregivers with children 6 to 24 months were interviewed and indicated that they regarded traditional cereal-based foods as the least healthy food, whereas commercial cereal-based foods, particularly the Nestle product, Cerelac, were regarded as very healthy. But the caregivers chose traditional over commercial cereal-based foods because of the price difference (Pelto 2013). Finally, paternal barriers such as lack of support from the spouse was a major concern of mothers. Some mothers reported that their spouses were irresponsible and did not provide for the family, financially, which made feeding the family difficult. The mothers reported that this resulted in having to offer less nutritious foods to their families (Egyir 2016).

At the interpersonal level, interviewees explained that counseling programs for caregivers promote effective complementary feeding practices. Health workers are trained to deliver information on nutrition and breastfeeding, with a focus on children who are malnourished or are not growing appropriately. However, low capacity of healthcare workers was a significant challenge in this program as they sometimes give the wrong information or fail to meaningfully convey this information to caregivers due to time and resource constraints.

At the individual level a prominent barrier to dietary diversity was competing demands on the mother, a barrier that was also true for continued breastfeeding beyond one year. Cooking and preparing meals were reported as significant burdens on the mother's time. When the mother has competing demands, cooking diverse and nutritious foods becomes difficult and she will usually use convenient, non-nutritious foods. Another less frequently mentioned barrier was poor understanding of nutritional disease. Caregivers would often stop bringing their children to the health center after the first-year immunizations were complete because they did not understand the importance of growth monitoring in young children.

> *"So it suggests that there's all these misperceptions that we need to address, but we don't have a good infrastructure for communicating on how to feed a child because it's not like a sickness where the child is going to die, parents are not seeing this as a serious situation…until the child reaches acute malnutrition and then they will take action. That's often what the challenge is."*
>
> ***-Interview participant, Public Health Professor, Ghana***

In summary, strong political support was identified as an important facilitating factor, however stronger partnerships in the private and healthcare sectors are needed to effectively implement those policies. Common themes of affordability and social norms were identified as barriers to complementary feeding across different levels of influence, indicating community level factors, such as food proscriptions, and household level determinants, such as household income, played critical roles in shaping complimentary feeding practices in Ghana.

The salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 10 and Appendix Table 11, respectively.

Table 7.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6–23 months in Ghana (2014)

	INTRO	MMF	MDD	MAD
N	**234**	**1404**	**1281**	**1453**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	**1.00**
12-17		**1.32 (1.01, 1.72)**	**3.33 (2.28, 4.87)**	**2.31 (1.52, 3.51)**
18-23		**1.46 (1.09, 1.97)**	**3.31 (2.19, 5.01)**	**2.51 (1.59, 3.98)**
Vitamin A supplementation			**1.47 (1.04, 2.08)**	
Child had symptoms in the past two weeks				
Diarrhea			**0.65 (0.44, 0.97)**	
Maternal characteristics				
Education				
No education			**1.00**	
Primary			**1.63 (1.03, 2.56)**	
Secondary/ Higher			**2.09 (1.34, 3.27)**	
Breastfeeding practices				
Put child to breast <=1 hr at birth		**0.74 (0.59, 0.94)**		
Currently breastfeeding		**1.97 (1.35, 2.87)**	**0.55 (0.36, 0.84)**	**4.27 (2.17, 8.41)**
Exposure to media at least once a week				
Listening to radio			**1.44 (1.06, 1.94)**	
Paternal characteristics				
Age (years)				
15-29	**1.00**			
30-39	**3.63 (1.49, 8.86)**			
>= 40	**2.26 (0.92, 5.52)**			
Education				
No education	**1.00**			
Primary	**3.93 (1.21, 12.70)**			
Secondary/ Higher	**0.94 (0.37, 2.44)**			

Household characteristics			
Water characteristics			
Own water	**0.50 (0.26, 0.93)**		
Time to get to water source (min)			
0	**1.00**		**1.00**
1-59	**0.64 (0.43, 0.94)**		**0.60 (0.38, 0.97)**
>= 60	**0.53 (0.30, 0.94)**		**0.39 (0.15, 1.04)**
Household wealth			
1 Poorest		**1.00**	
2		**0.83 (0.53, 1.30)**	
3		**1.19 (0.69, 2.04)**	
4		**1.53 (0.84, 2.79)**	
5 Richest		**3.14 (1.56, 6.28)**	
Community characteristics			
Rank of access to health care			
1 Best access	**1.00**		
2	**0.67 (0.21, 2.14)**		
3	**0.22 (0.07, 0.72)**		
4	**0.89 (0.27, 2.97)**		
5 Worst access	**0.55 (0.16, 1.88)**		

SUPPLEMENTATION AND FORTIFICATION

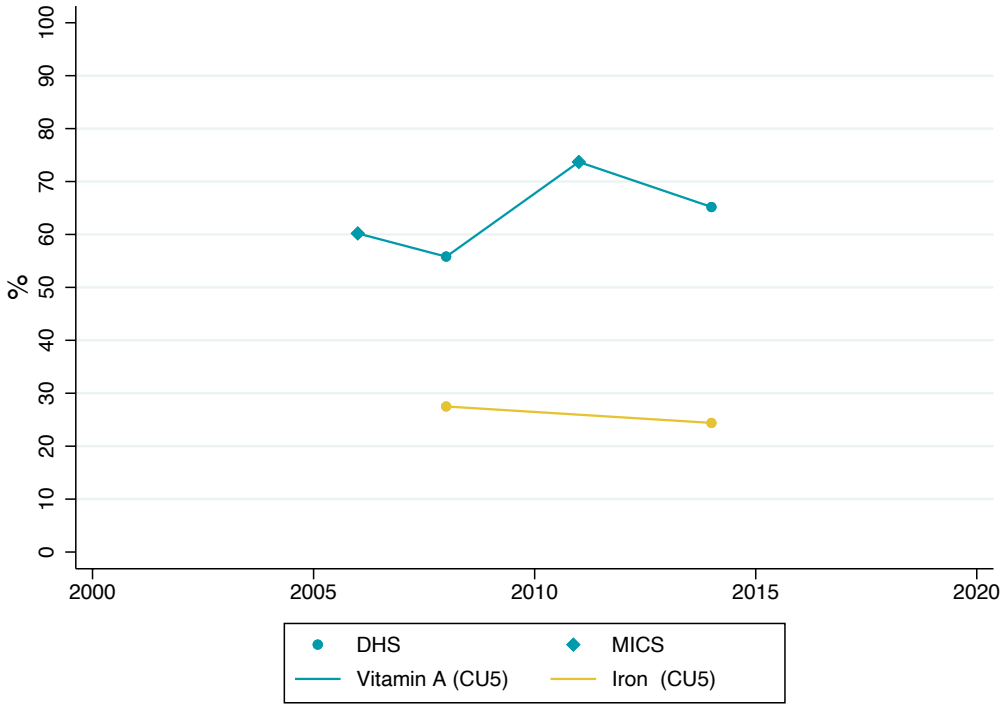
Vitamin A Supplementation, Iron Supplementation, and Multiple Micronutrient Powders

Data on vitamin A supplementation in children 6–59 months have been reported between 2006–2014. The proportion of children receiving vitamin A supplementation in the past 6 months was 55–60% in 2006–2008; this proportion increased to 73.7% in 2011 and dropped to 65.2% in 2014 (Figure 4).

Data on iron supplementation in children 6–59 months were reported in the 2008 and 2014 DHS and the proportion was 27.5% and 24.4%, respectively (Figure 7.4).

Multiple micronutrient powder (MNP) use was not reported in any national reports although the government has recently given approval for MNP to be used, according to interview informants who indicated, "…in the last three or four years the government has given approval for multiple micronutrients supplements that are used like sprinkles that can be added to food but not as an oral pharmacological dose to children."

Figure 7.4. Nutrient supplementation in Ghana in children 6–59 months from 2006–2014

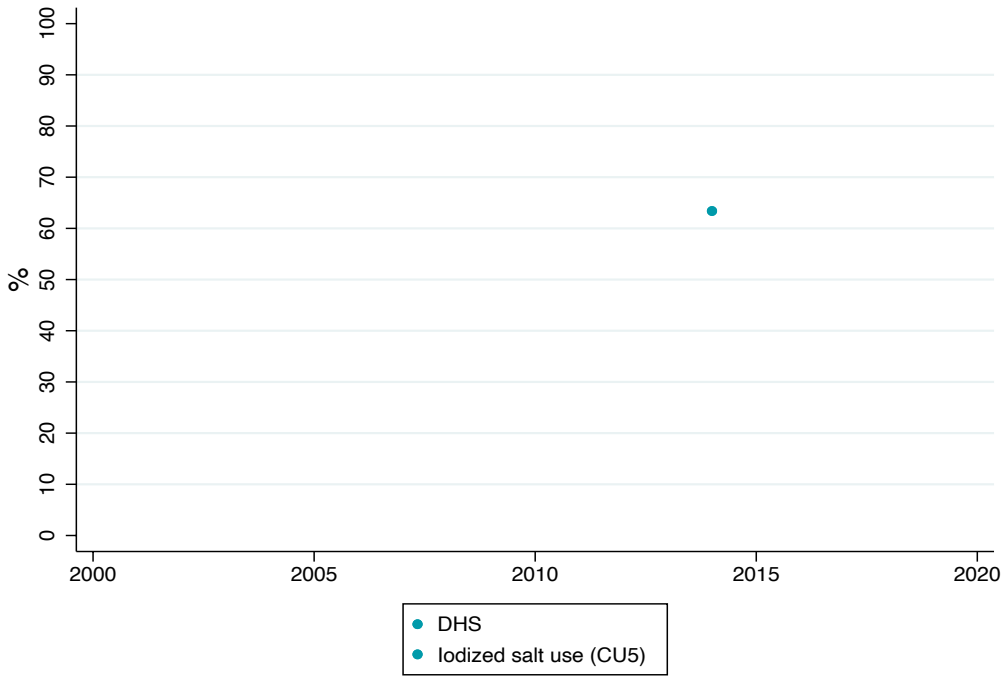


Iron-Fortified Foods and Iodized Salt Use

Data on the consumption of iron-fortified foods by children 6–23 months were not reported.

Data on iodized salt use in households with children under 5 years were reported in the 2014 DHS and the proportion was 63.4% (Figure 7.5).

Figure 7.5. Fortified foods in Ghana in 2014



Influencing factors of supplementation and fortification:

At the policy level, Ghana has universal fortification policies but they do not specifically target complementary feeding practices (Food Fortification Initiative 2019). Salt fortification was made mandatory in 1996 (Nyumuah 2012) and mandatory iron fortification of wheat flour was implemented in 2006 (Global fortification 2020). The Food Fortification Project, in particular, was designed to fortify wheat flour and commercial vegetable oil to address the high levels of anemia and vitamin A deficiency in the country (Nyumuah 2012).

At the community level, unequal distribution of health services, resulting in challenges to healthcare access were reported as barriers. For example,services for malnourished children were not available at the community level, only at the district and regional levels. Similar themes of access were found in the literature (University of Ghana & GroundWork & University of Wisconsin-Madison & KEMRI-Wellcome Trust & UNICEF 2017). Interviewees also reported differences in rates of anemia across different regions to indicate differences in iron supplementation education and availability. As far as fortified foods, a review of the literature indicates a desire to introduce them during the complementary feeding period. One example is the distribution of

KOKO Plus to infants and young children in rural communities in Ghana (Aaron 2016). Production of KOKO Plus is undertaken locally, with the major ingredients (soybean, oil, and sugar) procured from local markets while the micronutrient premix and amino acid lysine are imported. The production system is set up to facilitate the production processes that meet local and international standards as well as Ajinomoto's internal requirements, which are based on Japanese regulatory requirements (Ghosh 2014). The development of this supplement was focus on addressing the challenges of poor-quality complementary foods in Ghana (Ghosh 2018).

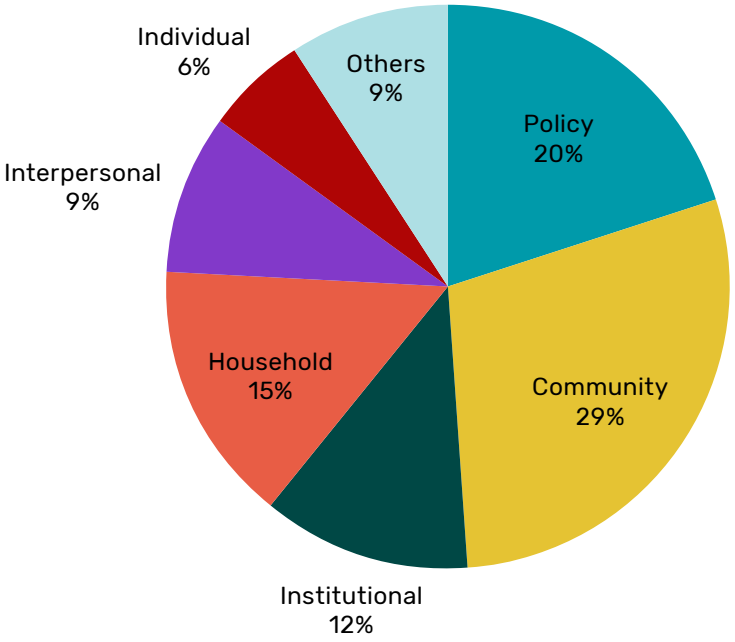
At the institutional level, the lack of coordination between the private and public sector is a barrier. For example, despite the wheat fortification mandate enacted by the government, a 2017 study found that less than 2% of flour samples were fully fortified (University of Ghana & GroundWork & University of Wisconsin-Madison & KEMRI-Wellcome Trust & UNICEF 2017). Many interview informants also stated that coordination between different nongovernmental organizations would help improve quality of interventions.

Food affordability was cited as a significant household level barrier to using fortified foods. While specialized, fortified foods, such as fortified cereals and oils, were available in both urban and rural contexts, affordability is a major barrier to their utilization. A common theme was that the cost of food is a particularly salient factor that influences caregivers' decisions about what to feed their young children (Pelto 2013).

PARTICIPANT RECOMMENDATIONS

Recommendations to improve complementary feeding in Ghana were identified through interviews and the literature. Figure 7.6 below illustrates the types of recommendations identified by level of influence. Most recommendations to improve complementary feeding in Ghana were at the community (29%) and policy (20%) levels.

Figure 7.6. Recommendations to address complementary feeding by level of influence in Ghana



Below is a description of the top recommendations:

- At the community level, participants discussed using social and behavior change strategies as a measure of targeting caregivers. In addition to targeting caregivers, other members of the community who care for children, such as husbands and elders, should also be incorporated into these interventions. There was an emphasis on utilizing technology like mobile phones to help spread these messages. In addition, technology is encouraged to be used to empower communities and to build skills and competencies of heath service worker. Engaging leaders in the community, like community leaders and community health workers, was also mentioned frequently.
- **At the policy level**, informants discussed the importance of developing an environment for children that promotes nutrition, in addition to implementation of nutrition specific approaches. Participants specifically discussed the importance of using an integrative approach within the agriculture, health and WASH systems.

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CHAPTER 8

MALI

Complementary feeding trends, determinants, and recommendations in Mali

EXECUTIVE SUMMARY

Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year and 2 years** was practiced in 90.8% and 55.2% of children in 2018, respectively, and a stable trend was observed between 1987–2018. The rate of continued breastfeeding at 2 years was 55.2% in 2018 and, over the past 30 years, it ranged from 47.9%–73.0%.
- **Introduction of solid, semi-solid and soft foods** in children 6–8 months was practiced in 45.0% of children in 2018. The rate increased from 25.6% in 2003 to over 40% from 2009–2015. **Minimum meal frequency, minimum dietary diversity and minimum acceptable diet** were achieved in 30%, 22%, and 9% of children 6–23 months, respectively. All three indicators showed a slight decrease between 2012–2015 and a slight increase between 2015–2018.
- Intake of **vitamin A-rich foods** and **iron-rich foods** in children 6–23 months has increased by ~25% from 2006 to 2012, reaching 54.6% and 48.8%, respectively, in 2012.
- **Vitamin A supplementation** in children 6–59 months was 74.6% in 2017 with the lowest and highest rates seen in 2012 (60.8%) and 2009 (98.7%), respectively. **Iron supplementation** in children 6–59 months was only reported in 2015 with a rate of 25.4%. No data are available for **multiple micronutrient powder use** in children 6–23 months, **iodized salt use** in households with children under five, or **iron-fortified food intake** in children 6–23 months.

DATA AVAILABILITY FOR MALI

Quantitative data

Complementary feeding practice data used in this Mali chapter were extracted from 9 national reports between 1987-2018, including 6 DHS, 2 MICS, and 1 NNS/SMART report.

Literature review

Both grey and peer-reviewed literature focused on the country of Mali were included; 15 grey literature reports and 6 peer-reviewed articles.

Qualitative interviews

Interviews were conducted with 2 participants representing NGOs and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO, 2020).
- Infant and Young Child Feeding (IYCF):
- Mali currently has an IYCF strategy in place, according to the World Breastfeeding Trends Initiative (WBTi) Report (WBTi 2015).
  - The IYCF policy promotes exclusive breastfeeding up to 6 months of age and appropriate complementary feeding from 6 months to 2 years of age (WBTi 2015).
  - The introduction to a diet of adequate supplement starting at 6 months has been in place since 1994 (Republic du Mali 2014).
- According to the National Infant and Young Child Feeding Strategy, there is also a national committee charged with the promotion of exclusive breastfeeding in Mali, but documentation was not available regarding details (Wuehler & Coulibaly 2011).

Breastfeeding recognition

- A national breastfeeding committee has been established and time bound nutrition targets are provided by WBTi (WBTi 2015).
- A Malian version of the International Code of Marketing of Breast-milk Substitutes has been adopted in 2006 with many provisions in its legal measure (WHO & UNICEF 2018).

Complementary feeding promotion or policies:

- Currently, the government promotes complementary feeding (HANCI-Global 2017).
  - ot the national, Mali has implemented an essential nutrition actions training module for health facility staff and community volunteers, which also focuses on complementary feeding 6–23 months (USAID & SPRING 2016).
  - At the health facility level, ENA (essential nutrition actions)/EHA (essential hygiene actions) trainings were initiated with a training of trainers (TOT) for local government officials and health facility staff. The main objective of the TOTs was to equip participants with the knowledge, skills, and tools to guide them to support ministry of health staff, health workers, and community actors on ENA/EHA. TOT provided facility staff with the technical, action-oriented nutrition knowledge and counseling skills needed to support pregnant women, mothers with children under 2 years, and other key family members in adopting optimal nutrition practices including complementary feeding practices (USAID & SPRING 2016).
  - A National Strategy for Feeding Infants and Young Children has been released in 2014, which highlights appropriate complementary feeding practices without age specifications (Republique du Mali 2014)
- Mali's National Nutrition Policy (2012–2021) focuses predominantly on malnutrition (WHO 2012). A Poverty Reduction Strategy Paper (2013) has been released, which encourages appropriate infant feeding practices though there are no details regarding complementary feeding (Republic of Mali 2013).

Fortification and supplementation policies:

- Current fortification policies are universal and do not specifically target complementary feeding practices.
- Universal mandatory wheat flour fortification with iron and folic acid have been established since 2010 (Global Fortification Data Exchange 2020).
- Universal mandatory salt iodization has been established since 1999 (Global Fortification Data Exchange 2020).
- Action plans for Vitamin A supplementation in children 6 months to 5 years of age have been established (Republic of Mali 2013).

Summary of women/maternal rights in Mali:

- National legislation is currently in place regarding paid maternity leave for 14–17 weeks (WBTi 2015).
  - In 1978, a decree was adopted to grant women 14 consecutive weeks of maternity leave following the infant's birth and legislation written in 1992 gives mothers the right to 1 hour per day at work to breastfeed during an infant or child's first 15 months of life (Wuehler & Coulibaly 2011)

- National legislation is currently in place for paid breastfeeding breaks during work hours. Worksite accommodations for breastfeeding are not required at this time (WBTi 2015).
- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global 2017).
- Current national legislation does not include women's economic rights (HANCI-Global 2017).

Public spending frameworks and initiatives:

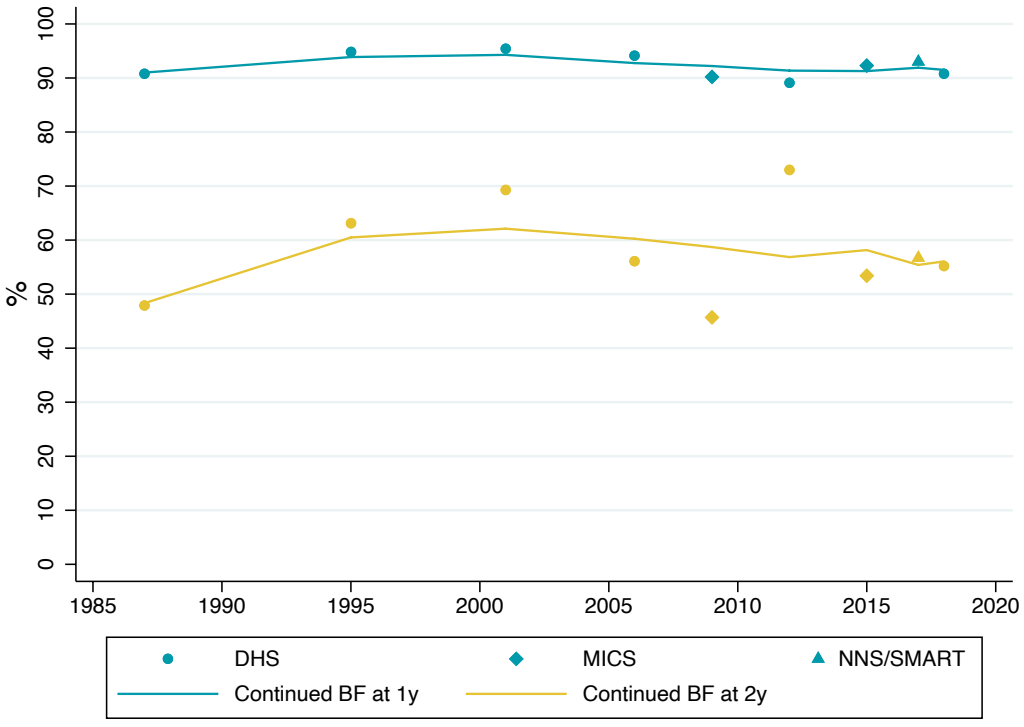
- A separate budget for nutrition exists in the national budget framework (HANCI-Global 2017).
- On a broader scale, the government allocated approximately 3.82% of its GDP for health expenditure in 2016, a decrease from approximately 4.11% in 2015 (World Bank 2016).
- Financial monitoring systems have been established but there is neither a national investment portfolio nor an organization of donors to align financial resources (SUN 2019).

CONTINUED BREASTFEEDING

Data availability and trends

Data on continued breastfeeding practices have been reported between 1987– 2018 in 6 DHS (1987, 1995, 2001, 2006, 2012, 2018), 2 MICS (2009 and 2015), and 1 NNS/SMART report (2017). Proportions reported for continued breastfeeding at 1 year ranged from 89.1% to 95.4% and the range was wider for continued breastfeeding at 2 years from 47.9% to 73.0%. In 2018, continued breastfeeding at 1 year and 2 years was practiced in 90.8% and 55.2% of children, respectively. Over the ~30 years of data, the mean proportion of children breastfed at 1 year and 2 years was 92.3% and 57.8%,respectively.

Figure 8.1. Continued breastfeeding trends at 1 year and 2 years in Mali from 1987 to 2018



Influencing factors of continued breastfeeding:

At the policy level, the adoption of the national IYCF strategy and International Code of Marketing of Breast-milk Substitutes, as well as the establishment of the national breastfeeding committee, have shown strong political commitment to the improvement of breastfeeding in infants and young children. In addition, UNICEF/ Mali perinatal program promotes exclusive breastfeeding up to six months through the Baby Friendly Hospital Initiative and promotion of breastfeeding for up to 24 months (Republique du Mali 2014). National legislation has granted women's right for paid breastfeeding breaks during work hours (WBTi 2015). Though the worksite accommodations for breastfeeding are not required, the paid breastfeeding breaks should have supported women to feed their children with more ease at work.

At the household level, our interview participant mentioned that the lack of involvement of fathers could be a barrier for breastfeeding and complementary feeding promotion.

> *"And what is really a shame is that at the national policy level, everything that is awareness, the groups, etc., the fathers are still, in my opinion, not sufficiently included."*
>
> ***-Interview participant, NGO staff, Mali***

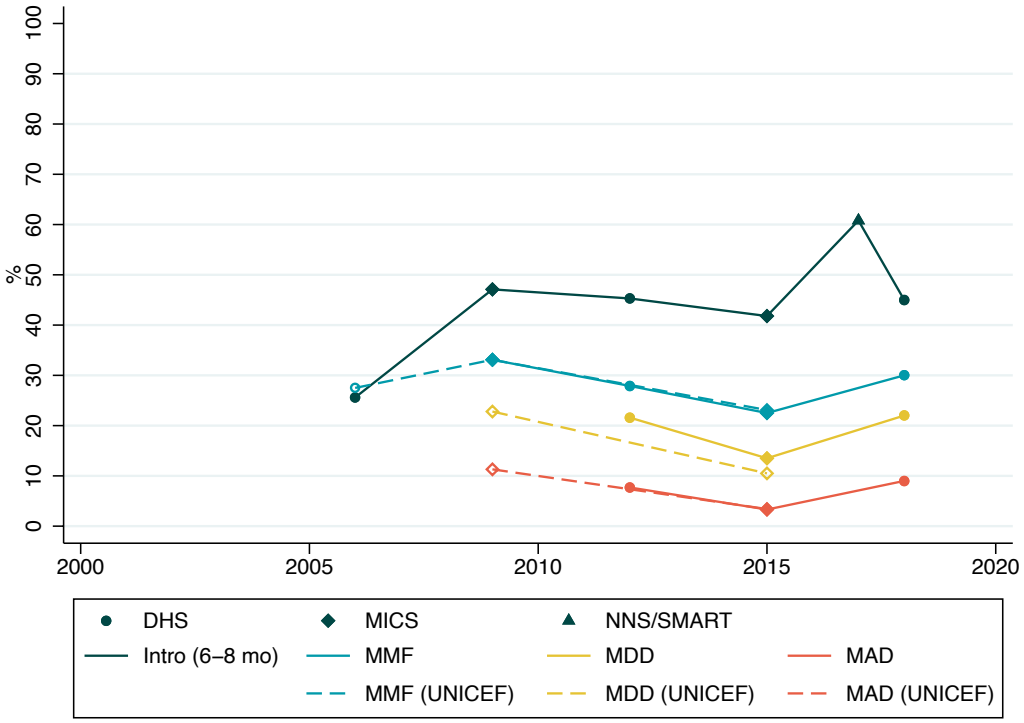
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends:

Intro: Data on the introduction of solid, semi-solid, or soft foods have been reported between 2006–2018. Only 25.6% of children 6–8 months were given complementary foods in 2006; the proportion increased to over 40% between 2009–2015. The proportion reported in 2017 was higher than the previous years reaching 60.8%. However, the proportion dropped to 45% in 2018. The difference in proportions may reflect some methodological differences among the various surveys.

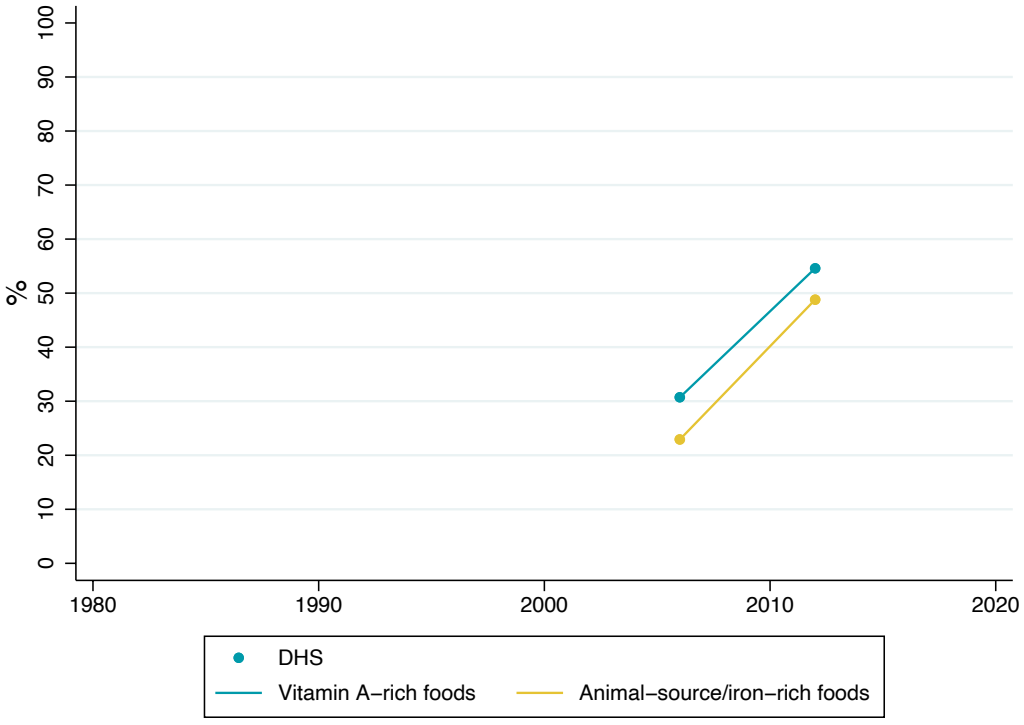
MMF, MDD, MAD: Data on minimum meal frequency (MMF) have been reported in 2009, 2012, 2015 and 2018, ranging from 22.5% to 33.1% and averaging 28.4%. Data on minimum dietary diversity (MDD) and minimum acceptable diet (MAD) have been reported in 2012, 2015, and 2018. The mean proportions for MDD and MAD were 16.7% and 7.4%, respectively. All three indicators, MMF, MDD, and MAD, showed a slight decrease between 2012–2015 and a slight increase between 2015–2018. The rates of MMF, MDD and MAD in 2018 were 30%, 22%, and 9% of children 6–23 months, respectively. UNICEF recalculated MDD and MAD were similar to those reported in the national reports.

Figure 8.2. Key complementary feeding practice trends in Mali from 2006–2018



Nutrient-rich foods: Data on the intake of vitamin A-rich foods were reported in 30.7% of children 6–23 months in 2006 and the proportion increased to 54.6% in 2012. Data on the intake of animal-source/iron-rich foods showed a similar increasing pattern and increased by ~25% between the two assessments done in 2006 and 2012. The respective proportions were 22.9% and 48.8%.

Figure 8.3. Trends of nutrient-rich foods consumption in Mali from 2006 to 2012



Influencing factors of complementary feeding and nutrient rich food intake

At the policy level, Mali's priority to fight against malnutrition is reflected in the recent National Nutrition Policy Document 2012–2021 (WHO, 2012) and, in The National Strategy for Feeding Infants and Young Children, it has been recognized that appropriate complementary feeding practices are critical for child growth and nutrition (Republique du Mali 2014). The National Nutritional Policy was adopted in 2013. This policy established both the National Nutrition Council and the Intersectional Technical Committee for Nutrition. During the literature search, more policy details about breastfeeding promotion were found compared to those about complementary feeding promotion. This may reflect an ongoing policy transition from the focus on exclusive breastfeeding to an emphasis on both breastfeeding and complementary feeding in young children. Although there have been "rules" established in Mali for complementary feeding products, as mentioned by one our interviewees, finding high-quality products in the markets remains a challenge for adequate complementary feeding.

At the institutional level, the health system has been used as a channel to promote child nutrition. Currently, women do not receive adequate information on complementary feeding at the health centers (see quote below from one interviewee). Our risk factor findings suggested that children from communities with poorer access to health care and nutritional services were less likely to meet MDD (Table 8.1). As part of the solution, the SPRING-supported communities have trained workers who promoted exclusive breastfeeding, complementary feeding, hand washing with soap, and nutrition for pregnant and lactating women (USAID & SPRING 2016).

> *"So one can say 'provide a diversified diet to you child', but we do not say concretely what foods, what type. We do not tell them how, in what moment to give the family plate/diet to the child, things like that. So there is a gap."*
>
> ***-NGO Participant, Mali***

Many donor programs and UN agencies have supported government nutrition efforts by targeting improvements in healthy behaviors through maternal, neonatal, family planning, child health, reproductive health, water and sanitation, and infectious disease interventions (USAID 2013). Another large-scale intervention mentioned by our interviewees was the radio broadcasting as a promising channel to promote complementary feeding. According to one interviewee, radio broadcasts have reached over 55,000 women explaining the importance of complementary feeding.

Mali is dependent on foreign aid, and the national economy is vulnerable to yearly and seasonal variations in rainfall and in inter- national fluctuations in the cotton market, in which Mali is one of the largest producers in Africa (Wuehler & Coulibaly 2011; USDA 2019). These uncertainties add risk to food insecurity at many different levels from national to community. The impact could influence food availability, access, and consequently, utilization in infants

and young children and some areas may be more impacted than others (Ayoya 2010). In addition to the risk of food insecurity, Mali has suffered from conflicts in recent years. Our interview participants mentioned that when there is a conflict, it appears that the social protection system has been prioritized to protect vulnerable populations, including pregnant and lactating women and children to make monetary and tangible resources available to them.

From the socio-cultural perspective, it seems that early and late introduction of complementary foods is a common practice in some parts of Mali (Ayoya et al. 2010). By 4 to 5 months of age, 8% of children in Mali have already received solid or semisolid foods while among children 6 to 9 months of age, 14% are still exclusively breastfed (Ayoya et al. 2010). When children are provided complementary foods, the food choices are largely influenced by cultural beliefs. For example, in the same study conducted in Bamako by Ayoya et al. (2010), the authors found that children ate large amounts of staple-based food with low bioavailability of micronutrients; about 3 in 10 children (27%) were given foods that were part of the regular adult diet, which are difficult for a young child to digest. The sampled children were usually fed complementary solid or semisolid foods four times a day based on the adults' meal time schedule (breakfast, lunch, afternoon meal, and dinner) rather than the children's cues and needs. Another threat to optimal feeding is the fast adoption of the processed unhealthy foods in children's diet, which seems to be more evident in urban area according to our interview participants. One participant reported that the percentage of mothers who gave their 9 to 11-month-old children chips several times a week was 33%.

> *"Everywhere, it doesn't matter in which neighbourhood, very removed, at two hours from the center of Bamako, you are going to find chips and soda. And the second thing is that these items are not expensive at the level of the store"*
>
> ***-Interview participant, NGO staff, Mali***

At the household and individual level, there are many factors cited by our interview participants, including poverty, large family size, poor access to clean water, and lack of knowledge as key barriers for caregivers to prepare complementary foods with good quality. We found paternal working status was a protective factor for their children to achieve MMF, MDD and MAD. Similarly, working mothers were more likely to feed their children with MMF and MDD, as compared to the non-working mothers **(**Table 8.1**)**. Children with employed parents may have a better financial situation at household level, and therefore, better access to food and other resources. In addition, the working mothers (especially those working in the non-agricultural sectors as seen from our analysis) may have been more empowered about when, what and how to feed their children. However, working status may be a double-edged sword that can also prevent caregivers from having the necessary time to care for their young children. For example, our interview participants mentioned food preparation and feeding are time-consuming and appear to be more challenging in urban settings, where the employment rate is higher than in rural areas. Our interviewees also mentioned that competing responsibilities, lack of purchasing

power of women, and poor food availability were additional barriers that women face. Hard choices have to be made when it comes to complementary food procurement.

> *"She cannot also have access to a complementary diet which corresponds to her needs and which is purchasable, or one she can find in a retailer."*
>
> ***-Interview participant, UN representative, Mali***

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 12 and Appendix Table 13, respectively.

Table 8.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6–23 months in Mali (2018)

	INTRO	MMF	MDD	MAD
N	**425**	**2323**	**2147**	**2265**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	**1.00**
12-17		**1.88 (1.49, 2.38)**	**3.25 (2.41, 4.39)**	**3.27 (2.10, 5.08)**
18-23		**2.03 (1.57, 2.63)**	**3.84 (2.77, 5.33)**	**2.89 (1.77, 4.71)**
Vitamin A supplementation		**1.37 (1.11, 1.69)**	**1.41 (1.09, 1.84)**	
Iron supplementation	**2.03 (1.10, 3.76)**			
Maternal characteristics				
Occupation				
Not working		**1.00**	**1.00**	
Agricultural		**1.13 (0.87, 1.45)**	**1.29 (0.94, 1.78)**	
Non-agricultural		**1.30 (1.04, 1.63)**	**1.55 (1.19, 2.02)**	
Breastfeeding practices				
Put child to breast <=1 hr at birth			**1.61 (1.19, 2.19)**	
Currently breastfeeding		**0.66 (0.51, 0.86)**		
Type of delivery assistance				
Delivered by health professional		**1.00**		**1.00**
Traditional birth attendant		**0.66 (0.45, 0.96)**		**0.35 (0.14, 0.87)**
Other		**0.97 (0.76, 1.23)**		**0.78 (0.50, 1.22)**
Exposure to media at least once a week				
Reading newspaper				
Paternal characteristics				
Occupation				
Not working		**1.00**	**1.00**	**1.00**
Agricultural		**1.88 (1.20, 2.95)**	**2.50 (1.29, 4.82)**	**2.83 (0.84, 9.53)**
Non-agricultural		**1.81 (1.16, 2.83)**	**2.55 (1.33, 4.87)**	**3.97 (1.21, 13.06)**

Household characteristics		
No. of HH members		**1.03 (1.01, 1.06)**
Water characteristics		
Time to get to water source (min)		
0	**1.00**	
1-59	**1.31 (1.05, 1.64)**	
>= 60	**0.66 (0.36, 1.19)**	
Community characteristics		
Rank of access to health care		
1 Best access		**1.00**
2		**0.90 (0.64, 1.27)**
3		**0.61 (0.42, 0.89)**
4		**0.69 (0.44, 1.06)**
5 Worst access		**0.87 (0.53, 1.42)**

SUPPLEMENTATION AND FORTIFICATION

In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

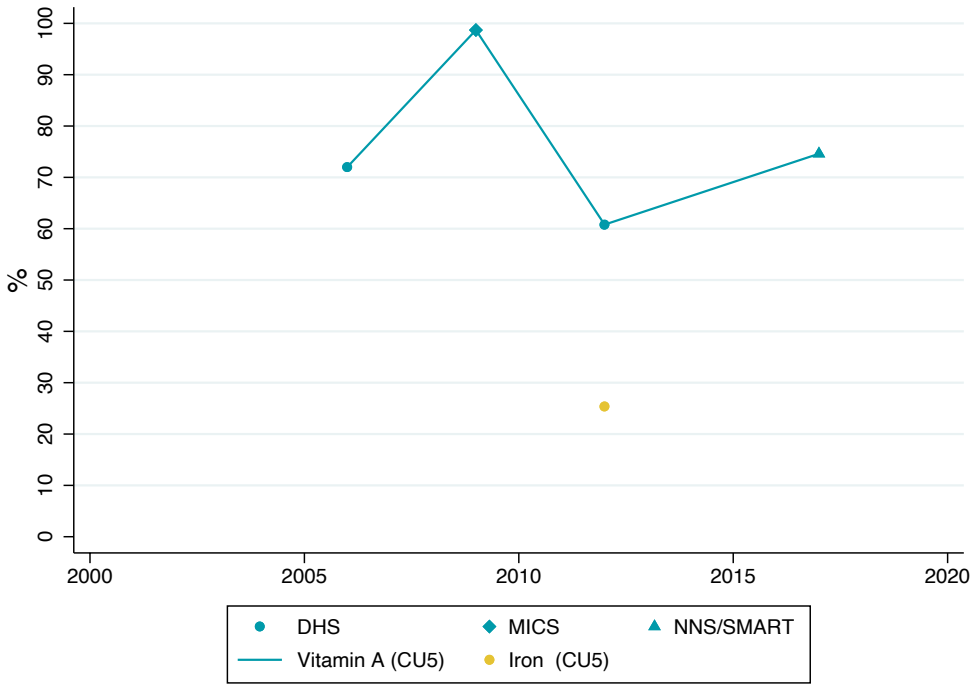
Vitamin A Supplementation, Iron Supplementation, and Multiple Micronutrient Powders

Data on vitamin A supplementation in children 6–59 months have been reported between 2006 and 2017 and showed the proportion ranged from 60.8% to 74.6% in 2006, 2012, 2016 and 2017. The MICS 2009 data indicate a proportion of 98.7%, which was much higher than all other years for which the data were available. The mean proportion including and excluding 2009 was 74.0% and 67.9%, respectively.

Data on iron supplementation in children 6–59 months were only reported in DHS 2015 and the proportion was 25.4%.

No data is available for multiple micronutrient powder use in children 6–23 months, iron-fortified food intake in children 6–23 months, or iodized salt use in households with children under 5 years.

Figure 8.4. Nutrient supplementation in Mali from 2006 to 2017



Influencing factors of supplementation:

Large-scale vitamin A supplements, coupled with National Immunization Days (NIDs), have been launched in many countries with the support of WHO, UNICEF, USAID and other development agencies. Since June 2003, "Week of Intensification of Nutrition Activities" (SIAN) has been organized every six months across the 8 administrative regions and the District of Bamako (Sangho et al. 2013). However, with the decline in intensity of NIDs, Mali has adopted the distribution of 2 doses of vitamin A, 6 months apart, during a week as an alternative strategy to perpetuate the distribution of vitamin A to children aged 6 months to 59 months and to women within 40 days after delivery. The high illiteracy rate in Malians (31%) has been a barrier to educate mothers about the SIAN program. According to the study conducted by Sangho et al. (2013), the main sources of information about SIAN program were health workers (39%) and relatives/neighbors/friends (37%) and none of the respondents learned about the organization of SIAN through posters and or banners.

Other programs that promote vitamin A supplementation among young children include the augmented Integrated Management of Childhood Illness (IMCI) program, a strategy for child survival and development at the regional level in 2002 (SASDE) and the Subsequent Child Surveillance Strategy (SSE) program at the national level (Wuehler & Coulibaly 2011). Despite the near universal coverage reported in MICS 2009, the coverage over recent years (2012–2017) ranged between 60-75%. According to our interview participants, there is still a high prevalence of vitamin A deficiency among young children. Some possible explanations for the discrepancy between programs promoting vitamin A supplementation and the continued high prevalence of vitamin A deficiency include the timing of surveys with respect to vitamin A supplementation campaigns, low dietary intakes of vitamin A-rich foods, and the drop-in retinol concentrations that occur during infection (Wuehler & Coulibaly 2011).

PARTICIPANT RECOMMENDATIONS

- At policy level: Participants discussed that the government should promote the production of locally produced foods for complementary feeding. Manyof the products on the market are imported by a few large, international companies. The government needs to increase support for domestic production. Furthermore, participants highlighted that government should improve surveillance of the nutritional and sanitation quality of complementary feeding products. Products exist in the market that are not nutritionally adequate, but the government does not have the means to prevent the sale and marketing of these products.
- At institutional level: Participants discussed that institutions must put more quality complementary feeding products on the market. Since there has been in a shift in consumption of manufactured foods, there has to be a movement to promote quality products so child nutrition is not negatively impacted. Both legislation and production-level controls may aid in ensuring safe, nutritious foods for the marketplace.
- At community level: Participants recommended that intervention should focus on fathers and raise awareness campaigns on complementary feeding. Lastly, an educational component should be included in the sale of infantile flour explaining why it is beneficial to the child.

Alimatou Goïta, 23 months, who suffers from stunting, during a follow-up with her mother. Alimatou benefits from home fortification food supplements with micronutrient powders. Despite being the breadbasket of the country, the Sikasso region has the highest rate of stunting in Mali. One out of three children is stunted. Sikasso, August 2019.

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CHAPTER 9

NIGERIA

Complementary feeding trends, determinants, and recommendations in Nigeria

EXECUTIVE SUMMARY

This chapter presents research findings around complementary feeding in Nigeria. Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year** was practiced in 84.1% children in 2018 and the trend has remained stable since 1990. **Continued breastfeeding at 2 years** was practiced in less than 30% of children in 2018, which was half of the rate observed in 1990 (46.9%).
- **Introduction of solid, semi-solid and soft foods** was practiced among 74.4% of children 6–8 months in 2018, increasing by more than 20% since 2011.
- **Minimum meal frequency, dietary diversity, and minimum acceptable diet** were achieved by 41.8%, 22.6, and 10.6% of children 6–23 months, respectively. Fluctuations were observed from year to year.
- In 2018, **vitamin A rich foods** and **iron-rich foods** were consumed by 58.9% and 41.3% children 6–23 months, respectively. Variation of the proportions occurred over time.
- **Vitamin A supplementation** was reported among 43.0% children 6-59 months in 2018. This coverage rate has varied between 2007 to 2011, then stabilized at 40% since 2013. **Iron supplementation** in children 6-59 months has been lower than 20% since 2008, with the most recent rate of 17.1% in 2018.
- **Iodized salt use** in households with children under five has doubled from 52.9% in 2008 to 96.9% in 2018. **Iron-rich and iron fortified foods** consumption was reported in 45.6% of children aged 6–23 months in 2018. No data were available for multiple micronutrient powder use in Nigeria.

DATA AVAILABILITY FOR NIGERIA

Quantitative data

Complementary feeding practice data used in this Nigeria chapter were extracted from 10 national reports between 1990-2018, including 6 DHS, 3 MICS, and 1 NNS/SMART report.

Literature review

This chapter includes analysis of secondary data sources, including 20 reports (grey literature) and 12 peer-reviewed articles.

Qualitative interviews

Interviews were conducted with 4 informants representing government, NGOs, and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution contains directive principles that may contribute to the realization of the right to adequate food (FAO, 2020)

Infant and Young Child Feeding (IYCF)

- Nigeria currently has a national Infant and Young Child Feeding (IYCF) policy in place, according to World Breastfeeding Trends Initiative (WBTi) Report. The IYCF policy promotes exclusive breastfeeding up to 6 months of age and complementary feeding from 6 months to 2 years of age (WBTi 2015)
- A national IYCF/breastfeeding committee has been established (WBTi 2015)
- Nigeria has provisions which substantially aligns with the International Code of Marketing Breast-milk Substitutes since 1998 (WHO, UNICEF, & IBFAN 2020).
- Yearly time bound nutrition targets are provided by Scaling Up Nutrition and the Global Nutrition report (HANCI-Global 2017)
- The government has introduced Maternal Newborn Child Health Week along with other interventions designed to encourage exclusive breastfeeding for the first six months of life, early initiation of breast-feeding with colostrum, timely and appropriate complementary feeding practices, and adequate micronutrient intake (particularly twice-a-year vitamin A, iron, iodine, and zinc supplementation and deworming for children above the age of 12 months) (IBFAN 2017)
- The National IYCF monitoring tools do not contain sufficient indicators to monitor Baby Friendly Hospital Initiative-related activities. As of 2015, no strategy was in place to improve the implementation of the BFHI and increase the number of Baby-Friendly facilities (IBFAN 2017)
- Nigeria has several policies and programmes specifically targeting IYCF and breastfeeding: Federal Ministry of Health-National Breastfeeding Policy, 1992; Federal Ministry of Health-National Policy on Infant and Young Child Feeding in Nigeria, 2007; National Policy on Infant and Young Child Feeding, 2011; National Strategic Plan of Action for Nutrition (2014–2019). However, the implementation of such policies and action plans has not been always successful (IBFAN 2017)

Breastfeeding recognition:

- The Baby Friendly Hospital Initiative (BFHI) commenced in 1992 and the National Breastfeeding Policy commenced in 1998 in Nigeria (Ogbo et al. 2017)
- In Nigeria, 95 of 25,000 total hospitals (both public & private) and maternity facilities offering maternity services have been designated or reassessed as "Baby Friendly" between 2010 and 2015 (0.004 %). The World Breastfeeding Trends Initiative report of 2015 explains this low figure: the main problem in maintaining the Baby-Friendly status is due to the fact that the previously designated facilities were not regularly reassessed and those that were re-assessed failed to qualify for re-designation (IBFAN 2017)

Complementary feeding policies:

- Currently, the government promotes complementary feeding (HANCI-Global 2017).
- As part of the national policy on IYCF, the government promotes a general guideline of complementary feeding. However, there are also guidelines for children in special situations including children with HIV/AIDS, low birthweight infants and children in emergency situations (Ministry of Health 2011)

Fortification policies:

- Current fortification policies are universal and do not specifically target complementary feeding practices (Global Fortification Data Exchange 2020)
- Universal wheat and maize flour fortification with iron, zinc, folic acid, B12, Niacin, Riboflavin, Thiamine, and vitamin A has been established (Food Fortification Initiative 2019)
- Universal salt iodization has been established (Global Fortification Data Exchange 2020).

Summary of women/maternal rights in Nigeria:

- National legislation is currently in place regarding paid maternity leave for 26 weeks, according to a 2015 WBTi report (WBTi 2015). In contrast, a 2019 Maternity Entitlements reports 12 weeks off with 50% pay with another act awaiting ratification for 16 weeks maternity leave with full pay and 2 hours off each day for breastfeeding (Alive and Thrive 2019).
- National legislation is currently in place for paid breastfeeding breaks during work hours. Nursery rooms are provided as worksite accommodations for breastfeeding (Alive and Thrive 2019).
- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global 2017).
- Current national legislation does not include women's economic rights (HANCI-Global 2017).

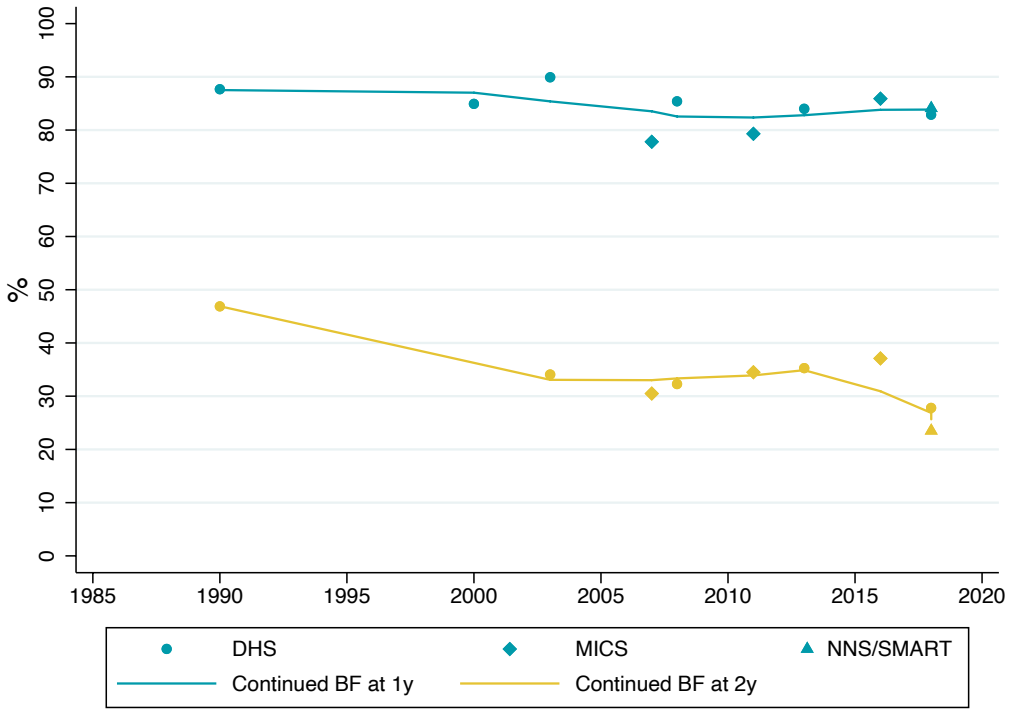
Public spending frameworks and initiatives:

- On a broader scale, the government allocated approximately 3.65% of its GDP for health expenditure in 2016, an increase from approximately 3.57% in 2015 (World Bank 2016).
- A separate budget for nutrition exists on the sectoral level (HANCI-Global 2017).
- There is currently no national investment portfolio or framework in place to mobilize nutrition funding resources in Nigeria (SUN 2019).

CONTINUED BREASTFEEDING

Data availability and trends: In 2018, Continued breastfeeding at 1 year in 84.1% of children. The rate remained stable around 80% since 1990 with a mean proportion of 84.2% between 1990-2018. In contrast, continued breastfeeding at 2 years was only practiced in 23.5% children in 2018. The rate decreased by more than 10% in the first decade from 1990 to 2003, remained stable round 35% between 2008 and 2016, and dropped under 30% in 2018. Both the 2018 DHS and the 2018 NNS/SMART report reported similar percentages: 27.8% and 23.5%, respectively (Figure 9.1).

Figure 9.1. Continued breastfeeding trends in Nigeria from 1990-2018



Influencing factors of continued breastfeeding:

Interview participants explained that continued breastfeeding promotion is now included in IYCF promotions at multiple government levels since the national 2013 ICYF policy was adopted. Prior to that, exclusive breastfeeding was a greater focus area for intervention efforts. Now, both breastfeeding and complementary feeding promotions are given similar weight/focus, according to in-country nutrition professionals familiar with the issue. Interviewees explained that continued breastfeeding drops off after complementary foods are introduced due to social norms around feeding–there is a widespread perception that breastmilk is not needed after 'family foods' are introduced.

Using community-based approaches where health workers make home visits, especially in rural Nigeria, have shown success to improve breastfeeding behaviors.

> *"So when we came in 2016 we did a mapping of the landscape of all those interventions to see what has been done and which worked, which ones didn't work…and then instead of reinventing the wheel…we continued to work with breastfeeding guidelines across all the locations because already they [health workers] are visiting homes, the result of home visits was quite successful among most communities where they have active breastfeeding guardians."*
>
> ***-Informant interview in Nigeria, NGO staff***

These types of visits provide support to mothers at the household level where social influences play a role in young child feeding such as breastfeeding. A study in southwest Nigeria found that poor social support from husbands negatively affected breastfeeding, whereas strong support from grandmothers encouraged the practice (Agunbiade & Ogunleye 2012). Breastfeeding is also influenced by important underlying factors not easily influenced by health workers visits. For instance, birth spacing and large family size make it difficult for many mothers to continually breastfeed fully until 1 or 2 years (kemi and Olurotimi 2011).

> *"There's also issues related to child spacing and the fact, for example, they have many children, so by the time the child is one or one-and-a-half the mother is pregnant again so she will stop breastfeeding because a new baby is coming, or she will stop breastfeeding because she is trying to get pregnant."*
>
> ***-Informant interview in Nigeria, NGO staff***

Also, an increasing number of mothers are joining the workforce in Nigeria, making it difficult to continually breastfeed a child under 2 years despite policies in place to support these practices.

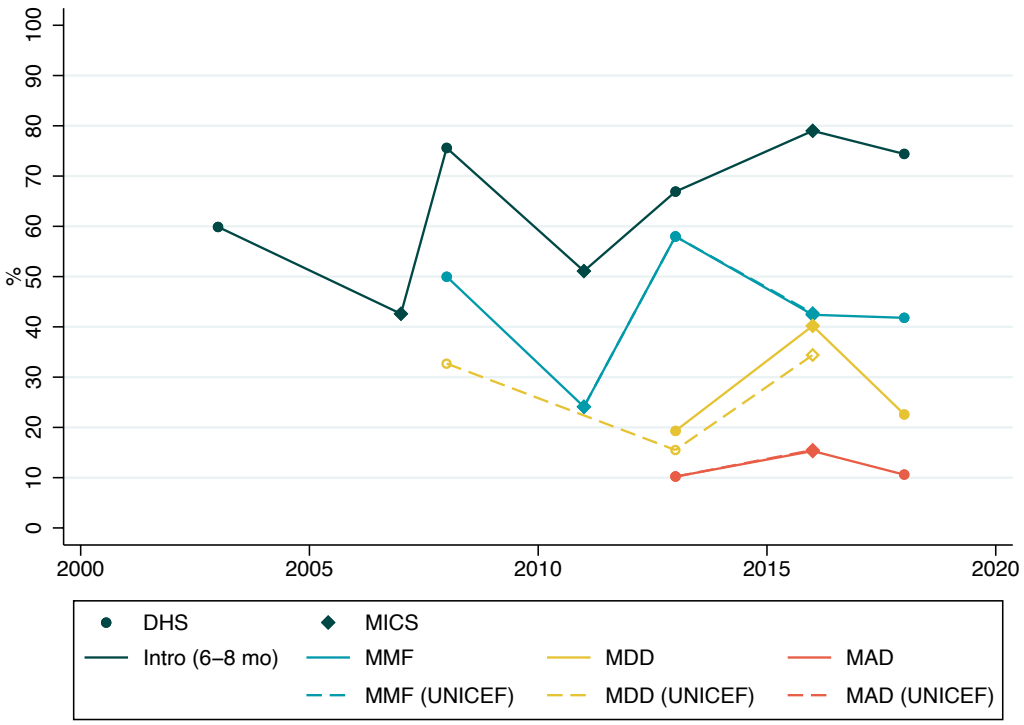
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends:

Intro: The timely introduction of solid, semi-solid, and soft foods among children aged 6–8 months has been reported between 2003–2018 in 4 DHS (2003, 2008, 2013, 2018) and 3 MICS reports (2007, 2011, 2016). This indicator varies substantially between reports from 2003 to 2011: it was highest in 2008 at 75.6% (a rise of 33% from the prior report) and dropped to 51.1% in 2011, before increasing to 74.4% in 2018. Sharp increases and declines could be due to differences in methodology between MICS and DHS reports. On average, 64.2% of children aged 6–8 months have timely introduction to complementary foods in Nigeria.

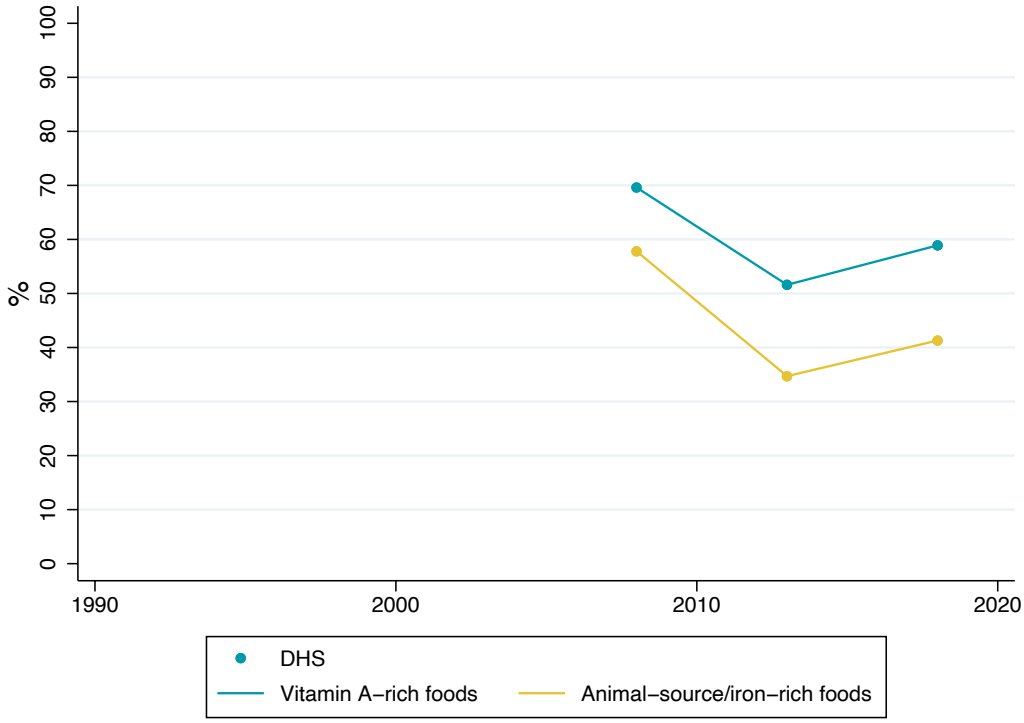
MMF, MDD, MAD: MMF was reported in 3 DHS (2008, 2013, 2018) and 2 MICS-reports (2011, 2016). MDD and MAD were reported in two DHS reports (2013, 2018) and one MICS report (2016). MDD was recalculated by UNICEF in 2008, 2013, and 2016 and the figures were slightly lower than those calculated in the national reports (32,7%, 15.5%, and 34.4%, respectively). In 2018, MMF, MDD and MAD were practiced in 41.8%, 22.6, and 10.6% of children 6-23 months. The trends for all three indicators are highly variable throughout the years where data were available, which could be partially due to the differences in the sample, survey methodology, and quality of data. MMF in Nigeria was highest in 2013 when the proportion increased from 24.1% to 58.0%; in 2018 was just 41.8%. Both MDD and MAD decreased since 2016 reporting. MDD dropped more sharply, from 40.2% in the 2016 MICS to 22.6% in the 2018 DHS. Similarly, MAD decreased from 15.3% in the 2016 MICS to 10.6% in the 2018 DHS (Figure 9.2).

Figure 9.2. Key complementary feeding practices trends in Nigeria from 1990-2018



Nutrient-rich foods: Consumption of nutrient-rich foods was reported in three rounds of DHS reports in 2008, 2013, and 2018. From 2008 to 2013, the proportion of children aged 6–23 months who took vitamin-A rich foods decreased from 69.6% to 51.6% and the proportion of animal-source/iron-rich food intake decreased from 57.8% to 34.7%. However, both proportions increased in 2018 by 7.3% to 58.9% and by 6.6% to 41.3%, respectively. (Figure 9.3).

Figure 9.3. Trends of nutrient-rich foods consumption in Nigeria from 2008-2018



Influencing factors of complementary feeding and nutrient rich food intake

At the policy level, participants explained that national nutrition policies focusing on promoting breastfeeding and timely introduction of foods, training health workers to counsel caregivers, and promoting micronutrient supplementation and fortification were the most important factors positively contributing to complementary feeding. However, increased political will focusing on the complementary feeding period is needed, explained interviewed informants. Historically, attention was largely focused on breastfeeding practices thanks to the Baby Friendly Hospital Initiative in 1990. Only recently has the attention shifted from breastfeeding to complementary feeding in Nigeria, as research indicates the gains of successful breastfeeding seem to be negated when complementary feeding is inappropriately carried out (Ogunlesi et al. 2014).

Nigeria has an enabling environment primed for complementary feeding promotion. Government frameworks are in place to support complementary feeding, for instance the Nigeria National Policy on Food and Nutrition and the National Policy on Infant and Young Child Feeding Practices (Ministry of Budget and National Planning 2016; Federal Ministry of Health 2010). These

national frameworks have facilitated investment into actionable programs including home-based care packages for training health workers around feeding, as well as national vitamin A supplementation and mandatory fortification of oil (vitamin A), sugar (vitamin A), and salt (iodine). Additionally, in recent years, UNICEF has supported the Federal Ministry of Health to develop important strategies to improve infant and young child diets, including the development of a national SBCC strategy around MNP promotion (Federal Ministry of Health 2017). These policies have created an environment where complementary feeding packages have been rolled out

> *"There have been constant efforts since I would say 2013, there has been quite a lot of focus on IYCF so there has been the adaptation of the IYCF package that many states have rolled out… support groups and there has been training of health workers. I think overall there has been a shift and people are aware… of course we're talking about 200 million people so the overall population is not yet there, but there has been a significant change in the communities where many of us have been working…"*
>
> ***-Informant interview in Nigeria, NGO staff***

At that community level, traditional cultural practices around young child feeding influence young child diets in Nigeria. Formative research in Adamawa and Kebbi states described important socio-cultural drivers of young child diets in 2015, including intra-household food allocation, food proscriptions (taboos), and social norms around feeding (Kodish, 2015). Outside of major cities such as Lagos and Abuja, the most vulnerable communities have agricultural livelihoods requiring high demands and prone to seasonal effects on food availability.

> *"Many households resort to coping mechanisms, such as limiting meal quantities and frequency, further limiting their already scarce dietary intake. Additionally, depending on the agricultural cycle, workload requirements may be higher than they are during the time of year when food is plentiful—increasing the need for food in the context of scarcity and high prices. Given this season of especially strained income, to consume enough calories, households may reduce spending on health and caregiving needs."*
>
> ***-USAID & SPRING 2018***

At the institutional level, participants reported that advocacy projects focusing on improving awareness and knowledge of appropriate infant and young child feeding practices was an important booster. These advocacy projects include a national breastfeeding week. One participant mentioned a nutrition service desk, which aimed to provide nutrition counselling for caregivers, however the information and support for this service is not consistent–an implementation challenge. Many programs exist in Nigeria to improve health and nutrition of young children. For instance, the Community Integrated Management of Childhood illness (CIMCI) programme employed the use of community-based counsellors to address child health and nutritional challenges of children under 5 years of age. Caregivers who were not educated by CIMCI began complementary feeding too early while those who did receive the counseling generally had a much better start time for complementary feeding

(Ogundele & Ogundele 2015). This type of service integrated with the health system may serve as a model for other programs aiming to use similar modalities to improve young child diets in Nigeria.

Informants described the limited food affordability and traditional gender norms to be two major barriers impacting complementary feeding at the household level. While food is largely available in Nigeria, many households cannot afford enough nutritious food to achieve minimum meal frequency and adequate dietary diversity (Okoye & Ngwu & Tanyi 2015). Our risk factor analysis also identified the positive relationship between household wealth and odds of meeting MDD, but not MMF, after considering other individual and community level factors (Table 9.1). Large family size contributes to this challenge. Food affordability was mentioned in the reviewed literature as a primary barrier to optimal young child diets: many families limit intake or meal frequency to cope with low income. Although this was mentioned in the literature, this relationship was not apparent in our risk factor analysis possibly because we controlled for other individual and community level factors when conducting our analyses. Animal sources were said to be particularly inaccessible to poorer households. Also, young children from lower social classes tend to be more vulnerable to nutritional illness risk in one Nigerian community (Ubesie et al. 2012).

Social norms further constrain young child diets. Traditionally, meat or other nutritious foods may be reserved for the male head of household who also makes decisions on how household money is spent and how food is allocated among household members, sometimes at the expense of the young child (Kodish 2015; Gomna & Rana 2007). A qualitative study in rural Enugu state found that while the cost of nutritious food is a barrier for caregivers, male household members ascribed mothers' laziness and illiteracy to not feeding children properly, a finding highlighting underlying gender norms (Okoye & Ngwu & Tanyi 2015).

Nigeria has great cultural diversity both within and between states. Despite such differences in language and ethnicity, Nigerian culture is highly communal where social influences play a role in most aspects of life, including young child feeding. At the interpersonal level, informants explained that the influence of elders could be a barrier to achieving timely introduction of foods and dietary diversity in some communities. For instance, caregivers who have pressure from an elder may give foods as early as 1 to 2 months if encouraged to do so despite knowledge around exclusive feeding until 6 months of age. Mothers are also influenced by community health workers who play important roles counseling caregivers on breastfeeding and complementary feeding throughout Nigeria. Recent interventions to improve young child diets have included key household influencers, including fathers and leaders.

> *The role of fathers, the father had to be a significant factor in determining the child care because he provides and also provides the instruction so WIND project created a specific intervention to involve fathers, to involve religious leaders, to create a counseling system at community level where this influences can be involved. They also created a platform through village square meeting that will bring fathers through a demonstration to see actually the complex significant role in addressing the malnutrition situation in their communities"*
>
> ***-Informant interview in Nigeria, NGO Officer***

Such interventions provide social support/influence for optimal feeding practices as well as education-based approaches targeting individual level knowledge and skills. Informants explained that insufficient caregiver knowledge around appropriate feeding was the most significant barrier to meeting complementary feeding indicators. Caregivers introduce food too early, stop breastfeeding too early, and do not feed children a diverse diet, due to lack of knowledge in many cases, explained interviewees. A less frequently mentioned barrier was limited understanding of nutrition-related disease, specifically micronutrient deficiency, as many caregivers may believe that monotonous diets based on staple foods is adequate for young child health.

In Nigeria, caregiver education programs typically provide information on a variety of different topics such as strategies to enhance homestead production, or by using cooking demonstrations to build caregiver skills and self-efficacy. The interventions typically have focused on using locally available foods for optimizing young child diets. One participant explained that while counselling interventions have shown promise on a small scale, there are significant financial and logistical challenges to scaling up this type of intervention.

> *Well the challenge is that in most of these interventions… all of these interventions are not actually implemented at scale. And [it's] because of funding so it's really difficult to say [whether they are] effective or it's not effective. By and large, these are actually high impact interventions but you are not going to scale them all because of funding [shortages]."*
>
> ***-Informant interview in Nigeria, NGO officer***

Similarly, with interventions using specialized nutritious foods, implementation questions persist. While the efficacy of micronutrient powders (MNP) has been shown to improve micronutrient intakes and nutritional status of young children, the most effective delivery channels and cost-effective approaches for scalable implementation based on the local health systems and socioeconomic contexts are not yet clear in Nigeria (Korenromp et al. 2015). More investment in community-based programs was suggested by interview partici- pants moving forward.

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 16 and Table Appendix 17, respectively.

Table 9.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6-23 mo in Nigeria (2018)

	INTRO	MMF	MDD	MAD
N	**1043**	**7991**	**5304**	**5345**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	
12-17		**0.80 (0.72, 0.89)**	**2.15 (1.82, 2.55)**	
18-23		**0.91 (0.80, 1.04)**	**2.36 (1.94, 2.89)**	
Perceived birth weight				
Average		**1.00**	**1.00**	
Larger than average /very large		**0.86 (0.75, 0.98)**	**0.93 (0.75, 1.14)**	
Very small/ smaller than average		**0.95 (0.86, 1.05)**	**1.19 (1.03, 1.37)**	
Vitamin A supplementation	**1.37 (0.97, 1.93)**	**1.17 (1.06, 1.29)**	**1.17 (1.06, 1.29)**	**1.32 (1.06, 1.63)**
Iron supplementation			**1.64 (1.37, 1.94)**	
Child had symptoms in the past two weeks				
Cough		**1.29 (1.15, 1.44)**	**1.21 (1.03, 1.41)**	
Maternal characteristics				
Education				
No education			**1.00**	
Primary			**1.22 (0.97, 1.55)**	
Secondary/ Higher			**1.34 (1.06, 1.69)**	
Occupation				
Not working				
Agricultural				
Non-agricultural			**1.44 (1.20, 1.72)**	
Breastfeeding practices				
Put child to breast <=1 hr at birth		**0.82 (0.74, 0.89)**		
Currently breastfeeding		**1.38 (1.21, 1.57)**	**0.61 (0.51, 0.72)**	
Type of delivery assistance				
Delivered by health professional			**1.00**	**1.00**
Traditional birth attendant			**1.60 (1.29, 1.99)**	**1.41 (1.04, 1.89)**
Other			**0.98 (0.81, 1.19)**	**0.82 (0.63, 1.08)**
Exposure to media at least once a week				
Reading newspaper			**1.51 (1.08, 2.11)**	
Paternal characteristics				
Education				
No education		**1.00**	**1.00**	
Primary		**0.94 (0.81, 1.10)**	**0.93 (0.73, 1.19)**	
Secondary/ Higher		**1.18 (1.04, 1.34)**	**1.29 (1.04, 1.62)**	

Household characteristics			
Place of residence		**0.79 (0.67, 0.92)**	**0.79 (0.63, 0.99)**
Household wealth			
1 Poorest	**1.00**	**1.00**	**1.00**
2	**0.89 (0.77, 1.02)**	**1.10 (0.88, 1.37)**	**0.74 (0.54, 1.01)**
3	**0.82 (0.71, 0.96)**	**1.03 (0.81, 1.31)**	**0.62 (0.44, 0.88)**
4	**0.79 (0.67, 0.93)**	**1.01 (0.76, 1.33)**	**0.66 (0.45, 0.98)**
5 Richest	**1.02 (0.85, 1.23)**	**1.51 (1.10, 2.08)**	**0.95 (0.62, 1.47)**
Community characteristics			
Rank of access to health care			
1 Best access		**1.00**	**1.00**
2		**1.34 (1.08, 1.67)**	**1.44 (1.06, 1.96)**
3		**1.33 (1.05, 1.68)**	**1.79 (1.30, 2.48)**
4		**1.01 (0.78, 1.33)**	**1.55 (1.06, 2.26)**
5 Worst access		**1.19 (0.86, 1.64)**	**1.25 (0.78, 2.00)**

SUPPLEMENTATION AND FORTIFICATION

In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

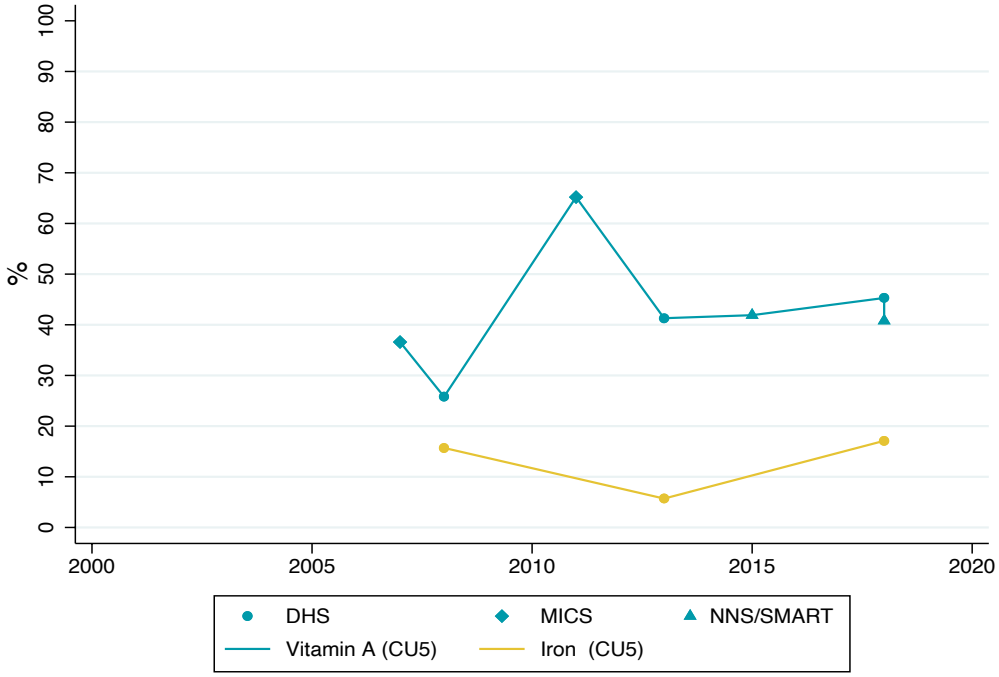
Vitamin A, Multiple Micronutrients, and Iron Supplementation

Vitamin A supplementation: among children 6-59 months has been reported between 2007–2018 in 7 national reports. This includes 3 DHS (2008, 2013, 2018), 2 MICS (2007, 2011), and 1 NNS/SMART report (2018). VAS in children 6-59 months increased most substantially from 2008 to 2011, from 25.8% to 65.2%. However, VAS in children 6-59 months decreased to 41.3% in 2013. From 2013–2018, the trend has been stable around 40%. In 2018, the coverage was 40.8% and 45.3% from NNS/SMAR and DHS, respectively, with an average of 43.0%.

Iron Supplementation: among children 6-59 months has been reported between 2008-2018 in 3 national DHS reports (2008, 2013, 2018). 2013 had the lowest proportion of children 6-59 months receiving iron supplementation (5.7%). Across the years where data were available, the mean proportion of children 6-59 months receiving iron supplements is 12.8%.

Multiple micronutrient powder (MNP): No national MNP data were available for analysis in Nigeria.

Figure 9.4. Nutrient supplementation in Nigeria from 2003–2018

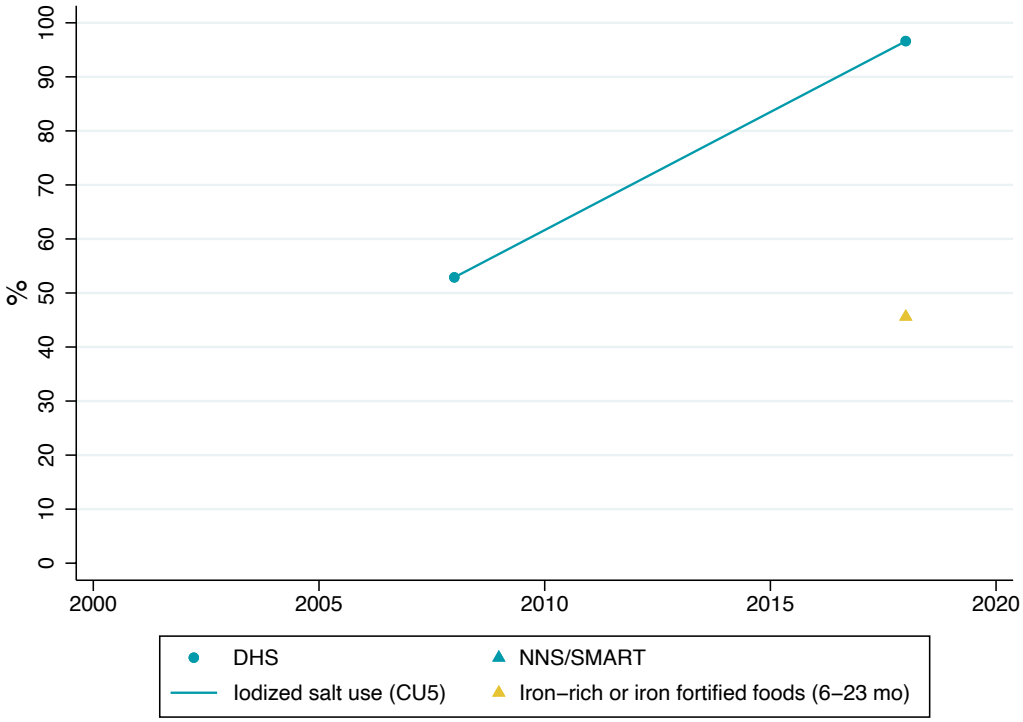


Iodized salt use and Iron-fortified foods

Iodized salt use: Iodized salt use was reported among households with children under 5 years in the 2008 DHS and 2018 DHS reports. Over 10 years, the proportion of iodized salt increased sharply from 52.9% to 96.6%. (Figure 9.5).

Iron-fortified foods: Iron-fortified foods were only reported in the 2018 NNS/ SMART report. The proportion of children aged 6–23 months receiving iron-fortified foods was 45.6%.

Figure 9.5. Iodized salt and Iron-fortified foods in Nigeria from 2008–2018



PARTICIPANT RECOMMENDATIONS

Recommendations to improve complementary feeding in Nigeria were identified through interviews. Below is a list of the top recommendations for improving diets during the complementary feeding period made by participants who were interviewed in Nigeria:

To change community-level norms and improve individual knowledge and attitudes, social and behavior change communications (SBCC) to promote complementary feeding and improve nutrition-related behaviors was a suggested intervention approach in Nigeria–using varied channels of communication, including both counselling and mass media, to reach more segments of the large population size of Nigeria with nutritional support. There needs to be a shift from the provision of information to adopting approach that are likely to change social norms.

To address strong interpersonal influences, use resources to better train health workers who are important influencers of caregivers and key figures in

the Nigerian health system. Investment in both pre-service (e.g. curriculum during school) and in-service (e.g. re-trainings) trainings for health workers was recommended. Similarly, improved engagement of fathers in child feeding is needed, thus training and intervention strategies to involve men was recommended.

At the individual and household levels, there should be a change from the usual focus on counselling to also include the food component. That can be achieved by making sure counseling and behavior change intervention are linked to livelihood and social protection intervention.

To overcome basic factors such as underlying poverty, multi-sectoral approaches were recommended for improving young child health and nutrition. For instance, investment in increasing employment opportunities for women was recommended to increase household purchasing power and improve affordability of nutritious foods. Also, participants recommended utilizing social protection platforms such as School Meals to further support young child health and nutrition.

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CHAPTER 10

NIGER

Complementary feeding trends, determinants, and recommendations in Niger

EXECUTIVE SUMMARY

This chapter presents research findings around complementary feeding in Niger. Our country-level trend analysis of complementary feeding practices revealed that:

- Continued breastfeeding at 1year and 2 years was practiced in 96.6% and 47.2% of children, respectively, in 2018. While continued breastfeeding at 1 year has been stable in the past 20 years, continued breastfeeding at 2 years has decreased from 64.1% in 1992 to 47.2% in 2018.
- Introduction of solid, semi-solid and soft foods in children 6-8 months increased from 56.0%–61.9% in 2000 -2012 to 84.4% in 2018.
- Minimum meal frequency, minimum dietary diversity, and minimum acceptable diet were only reported in 2012 and 2018. The rate was 77.9%, 14.2% and 10.9%, respectively in 2018.
- Vitamin A rich foods and iron-rich foods were consumed by only 37.2% and 16.8%, respectively, of children 6–23 months in 2012. Limited data reported on these two indicators suggested an increasing trend of vitamin A foods intake between 2006 to 2012. However, the intake of iron-rich foods decreased between 1998–2012.
- Vitamin A supplementation was reported in 37.6% children 6-59 months in 2018, decreasing from 2006–2018. Iron supplementation in children 6-59 months was only reported in 2012 and the rate was 12.3%.
- Iodized salt use in households with children under five years increased by 10% from 2006 to 2012, reaching a rate of 59.2%. No data were available for the consumption of iron-fortified foods and multiple micronutrient powder use in children 6–23 months.

DATA AVAILABILITY FOR NIGER

Quantitative data

Complementary feeding practice data used in this Senegal chapter were extracted from 12 national reports between 1986–2018, including 10 DHS, 1 MICS, and 1 joint MICS-DHS report.

Literature review

Both grey (20 reports) and peer-reviewed literature (14 articles) from Niger were included in this chapter analysis.

Qualitative interviews

Interviews were conducted with 4 informants representing government, NGOs, and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO 2020).

Infant and Young Child Feeding (IYCF):

- An IYCF/Breastfeeding policy has been established which emphasizes the promotion of exclusive breastfeeding up to six months, and complementary feeding from 6 months –2 years (IBFAN 2018; WFP 2018).
- General time-bound nutrition goals have been established by Scaling Up Nutrition but they do not specify goals for complementary feeding (SUN 2019).

Breastfeeding recognition

- Niger has enacted some provisions of the international code of Marketing Breast-milk Substitutes since 1998 (WHO, UNICEF, & IBFAN 2020).
- Niger celebrates the World Breastfeeding Week every year. Information, Education and Communication (IEC) activities have been in place since 1973 (IBFAN 2018).
- The Baby Friendly Hospital Initiative (BFHI) has been implemented in Niger since 1992; 36.1% of hospitals in Niger received the "Baby-Friendly" label (IBFAN 2018)

Complementary feeding promotion or policies:

- The government of Niger promotes complementary feeding practices (HANCI-Africa, 2017).
- The ministry of public health created a national recipe on complementary foods for young children. This is used to provide health workers and/or managers of nutrition programs with a tool to help them with improving the nutritional status of children in Niger (Republic du Niger 2019).
- A National Nutrition Security Policy (2016–2025) is established and recommends special attention to nutrition in the first two years of life, with emphasis on breastfeeding and complementary feeding (Republique du Niger 2016.

Fortification policies:

- Current fortification policies are universal yet do not specifically target complementary feeding practices (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).
- Mandatory universal wheat flour fortification with iron folic acid is national (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).
- Mandatory universal salt iodization is national (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).this plan was made during a donor roundtable organized in September 2016. The government contributes up to 15% of the overall cost (Global nutrition report 2020).

Fortification policies:

- Current fortification policies are universal yet do not specifically target complementary feeding practices (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).
- Mandatory universal wheat flour fortification with iron folic acid is national (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).
- Mandatory universal salt iodization is national (Global Fortification Data Exchange,2020; Food Fortification Initiative,2019).

Summary of women/maternal rights in Niger:

- Nationally, paid maternity leave is provided to women for 14 weeks (ILO 2014, IBFAN 2018).
- Mothers are entitled to lactation breaks for up to one hour per day. Workplace accommodations for breastfeeding are not guaranteed and was emphasized as a point of improvement by a 2018 International Baby Food Action Network (IBFAN)report (IBFAN 2018).
- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global 2017).
- National legislation exists promoting women's economic rights, though it is not currently in practice (HANCI-Global 2017).

Public spending frameworks and initiatives:

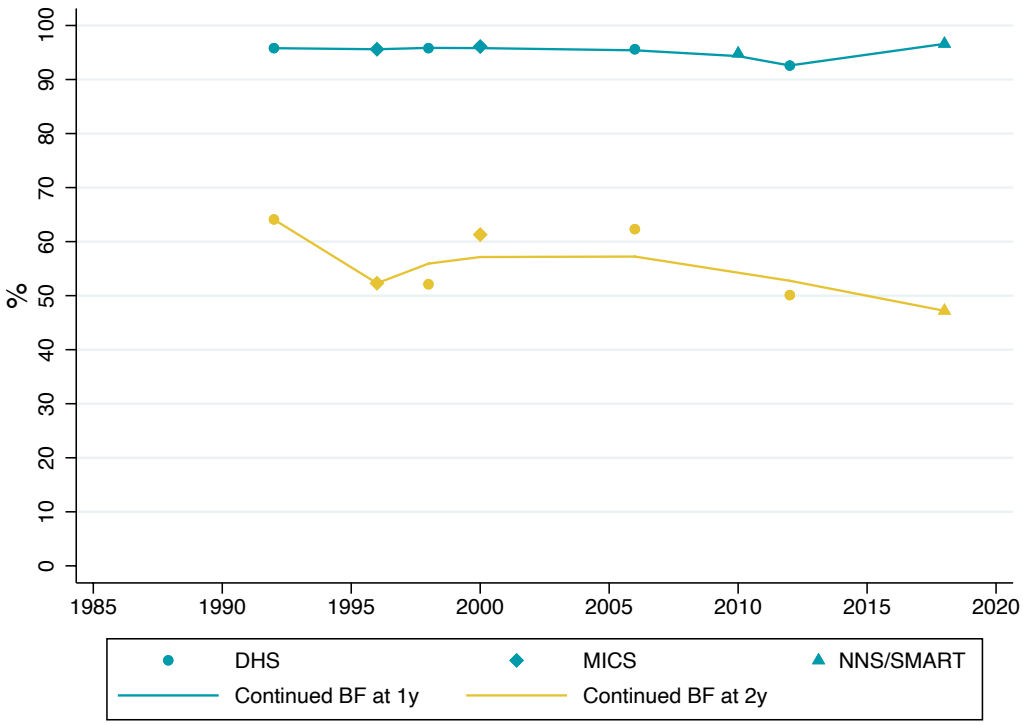
- The Niger government allocated approximately 6.23% of its GDP for health expenditure in 2016, a decrease from approximately 7.09% in 2015 (World Bank,2016). A separate budget for nutrition exists in the national budget framework (HANCI-Global 2017).
- Niger made a financial commitment at the London 2013 Nutrition for Growth Summit to increase the national budget (500 million CFA francs) to include a variety of nutrition interventions, in addition to the purchase of therapeutic food (Global Nutrition Report,2019).
- Niger's Ministry of Public Health committed 5,532,045,005 CFA (US$10 million) from 2017–2021. However, as of 2020 there has not been a response on progress (Global Nutrition Report,2019).
- Niger has implemented a National information Platform for Nutrition to monitor the implementation of nutrition actions. The establishment of a budget system has been emphasized by a recent Scaling Up Nutrition report (SUN 2019)

CONTINUED BREASTFEEDING

Data availability and trends:

Continued breastfeeding practices have been reported between 1992–2018 in 4 DHS (1992, 1998, 2006, 2012), 2 MICS (1996, 2000), and 2 NNS/SMART reports (2010, 2018). However, the 2010 NNS/SMART report reported only continued breastfeeding at 1 year and not continued breastfeeding at 2 years. Proportions reported for continued breastfeeding at 1 year ranged from 92.6% to 96.7%. The range was wider for continued breastfeeding at 2 years from 47.2% (2018) to 64.1% (1992) and there was a decreasing trend observed between 2000–2018. Over 20 years, the mean proportion of children breastfed at 1 year and 2 years was 95.4% and 55.6%, respectively (Figure 10.1).

Figure 10.1. Continued breastfeeding trends in Niger from 1992–2018



Influencing factors of continued breastfeeding:

Niger has a policy environment conducive to continued breastfeeding practices. Niger celebrates the World Breastfeeding Week every year. Information, Education and Communication (IEC) activities have been in place since 1973 (IBFAN, 2018). Also, the Baby Friendly Hospital Initiative (BFHI) has been implemented in Niger since 1992; 36.1% of hospitals in Niger received the "Baby-Friendly" label (IBFAN, 2018). National policies, strategies, and/or plans of action promote all three key breastfeeding practices (timely introduction of breastfeeding in the first hour after birth, exclusive breastfeeding to 6 months, and continued breastfeeding with complementary foods to at least 24 months.) In addition, surveys by IBFAN indicate that many provisions of the International Code for Marketing of Breast-milk Substitutes have been ratified and the full

Code is under consideration in Niger (Wuehler & Biga, 2011). Throughout Niger, health workers and midwives in rural health posts, as well as community volunteers (workers) in villages, promote, educate and counsel women and families on the benefits of breastmilk (UNICEF, 2019).

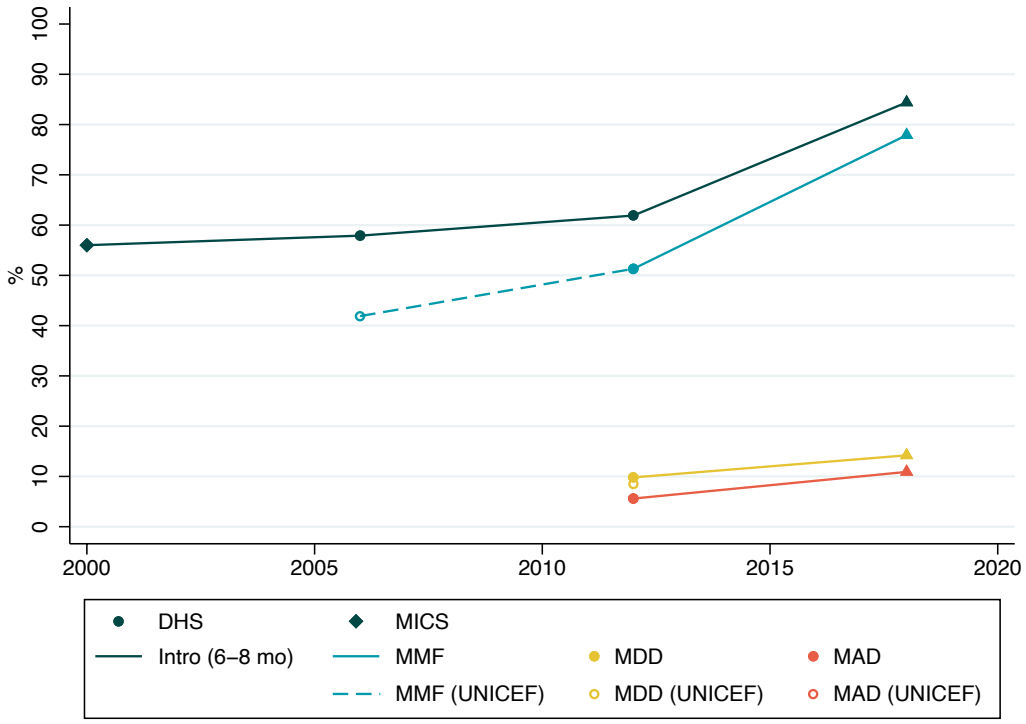
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends

Intro: Data on the introduction of solid, semi-solid, or soft foods was reported between 2000–2018. In 2000, 56.0% of children 6–8 months were given complementary foods and the proportion increased slightly to 61.9% in 2012. Between 2012 and 2018, the proportion of children meeting this indicator increased to 84.4%. The mean proportion of children introduced to complementary foods was 65.1% over these 18 years.

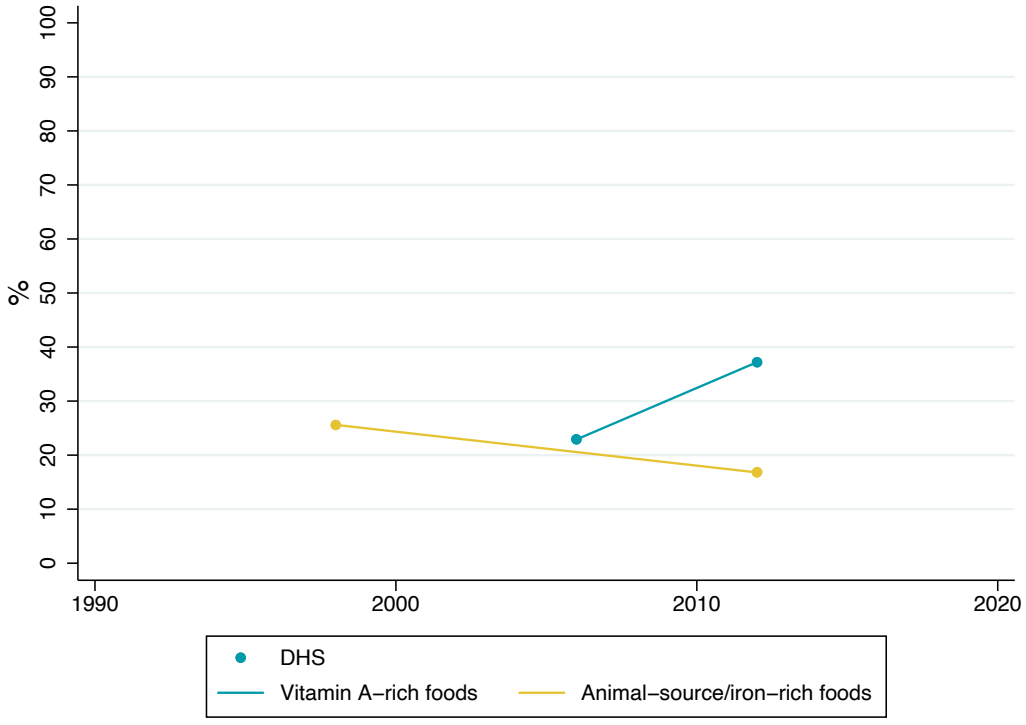
MMF, MDD, MAD: Data on minimum meal frequency (MMF), minimum dietary diversity (MDD), and minimum acceptable diet (MAD) were reported in the 2012 DHS: MMF (51.3%), MDD (9.8%), and MAD (5.6%), and 2018 SMART: MMF (77.9%), MDD (14.2%), and MAD (10.9%), respectively (Figure 10.2). The figure below shows substantial improvement in MMF and slight improvement in MDD and MAD between 2012 and 2018.

Figure 10.2. Continued breastfeeding trends in Niger from 1992–2018



Nutrient-rich foods: Data on intake of vitamin A-rich foods was reported among children aged 6–23 months in 2006 (22.9%) and in 2012 (37.2%). The intake of animal-source/iron-rich foods decreased from 25.6% to 16.8% between the 1998 and 2012 DHS reports. No data were reported for the intake of iron-fortified foods (Figure 10.3).

Figure 10.3. Trends of nutrient-rich foods consumption in Niger from 2010–2017



Influencing factors of complementary feeding and nutrient rich food intake

Niger is a country that faces environmental challenges, including shocks and hazards that impact food security annually. In 2005–2006 and 2008–2009 crop failures proved devastating, affecting several million people who subsequently faced severe food insecurity (Bliss et al., 2018). More recently, the national Government of Niger declared a food crisis in May 2012, based on drought and famine early warning system projections of poor crop and fodder production due to insufficient rainfall. High food prices were seen as a key contributing factor to the crisis (Bliss, 2018). To address these types of environmental impacts on food and nutrition security, government and partners have worked to create a stronger policy framework that is resilient in the face of such challenges.

For instance, at the policy level, Niger has several important policies in place supporting the quality of young child diets. The Policy on Nutritional Security, which focuses on supporting local food production, coupled with the National Nutrition Security Policy (2016–2025), which is focused on nutrition during the first two years of life, are part of an enabling environment for young child nutrition in Niger (Republique du Niger, 2016). Additionally, fortification policies

are in place to ensure national availability of fortified foods like wheat flour and salt (Global Fortification Data Exchange, 2020; Food Fortification Initiative, 2019). National level programs, including for example, the National Clean Villages program and La Campagne Agricole D'hivernage campaign have been launched at national levels to ensure food and hygiene security as well (Ministère De L'agriculture et de L'élevage Secrétariat General, 2017). Interviews suggested that while the policy environment of Niger is stronger than other similar contexts, challenges to ensure optimal young child diets still remain.

At the community level, food availability is still not guaranteed for more vulnerable households throughout the year. Levels of local production have been inadequate for the increasing population density of Niger, explained interview participants. Environmental challenges (e.g. drought) have great effects on agricultural production in this context, contributing to already sub-optimal diet quality for children (USAID, 2019).

Longstanding social norms play a strong role in the health and nutrition practices of Nigeriens. In particular, gender roles have a big effect on feeding. For example, husbands are typically heads of households in charge of family finances. The mothers do not have the same decision power in choosing to buy adequate food for their children.

> *"…the status and the regard of the woman inside the community is really important. Because the woman who is in charge of the child, of the feeding of the child, does not have decision-making power. Because it is the husband who decides… or another more powerful woman whose husband decides…so she, she has to nourish the family, but does not have decision-making power. So having mentioned this woman here, as long as she doesn't make the decisions, she cannot improve the diet of her child because the decisions are not hers."*
>
> ***-Interview participant, Niger***

Both interview informants and supporting literature discussed other cultural practices such as food taboos–cultural rules that prevent the feeding of nutritious foods (e.g. fruits, eggs, other animal sources, etc.) during the first 1,000 days. Strict religious practices, including fasting during Ramadan, may also impact nutritious diets during key stages of development for both women and children (SPRING 2016).

Some studies examined how gender, social, and cultural norms influence health and nutrition-related practices. In Maradi, Niger, when given unconditional cash transfers, men managed the distributed money even when women were the ones receiving the cash distributions. Cash transfers were also used for traditional gifts and ceremonies reflective of traditional social and cultural norms of cooperation, sharing and solidarity. Despite cultural influences in this study, the cash transfer increased nutritional resources for households during lean periods and diversified the diets (Scott et al., 2017). Community-wide, interview participants emphasized that strong cultural norms also influence early childbearing and high pregnancy rates that underlie this nutrition situation.

At the institutional level, interview participants explained that collaboration among government, NGOs, and other stakeholders support nutrition through efforts to improve local food production in the face of drought, implement education campaigns focused on young child nutrition, and provide subsidies for nutritious food products.

28 September 2010, a mother washes her hands before cooking her child meal in her courtyard Boubon Village, 30Kms from Niamey the capital of Niger. The promotion of key family practices such as hand washing with hands decrease the risk of major childhood diseases associated with malnutrition, poor hygiene and sanitation practices exacerbated by the lack of potable water sources.

> *GRET accompanies national management of nutrition and partners with techniques in the formulation, production, marketing and the pro¬motion of infant flours adapted to nutritional needs children from 6 to 24 months, in addition to breast milk. In 2018, they sup¬ported the installation of three fortified infant flour production units in Keita, Tahoua and Maine Soroa, and strengthen six existing ones…awareness messag¬es recommended practices in terms of nutrition are also diffuse"*
>
> ***-Literature review, GRET 2014, Niger***

Other interventions have found success by promoting complementary feeding through the health system. We have identified that the community-level access to health care and nutrition services is a strong factor of Intro and MMF suggesting the potential of community-level interventions.

An integrated community case management program, focused on improving child health, reported that 44.1% of children ages 6 to 23 months in intervention areas were receiving complementary foods compared to 26.2% of children in the comparison areas. In this study, the intervention communities were exposed to integrated community case management programming to treat childhood illnesses, which included multi-channel social and behavioral change communication (SBCC) promoting positive health and nutrition behaviors (Sharkey et al., 2014).

At the household level, access to nutritious foods was identified by interview participants as a continual challenge in Niger. The primary reason for lack of food access was affordability. Our risk factor analysis revealed that household wealth was positively associated with the odds of meeting MMF, MDD and MAD (Table 9.1). Many households struggle to meet the basic financial needs of their families and thus their ability to purchase nutritious foods for all household members including young children.

> *There is, anyway, this question of accessibility in another context having understood that it is the foods that are not provided at every moment and everywhere, it's that their rarity is that it is relatively expensive compared to revenue of the households at this big variety. In any case, when you look, in any case, it's one of the big barriers."*
>
> ***-Interview participant, Niger***

Nutritious food access is difficult when the majority of households in Niger live in poverty; Niger ranks second to last on the Human Development Index (UNDP, 2019). To help entire households overcome health and nutrition-related barriers, UNICEF and the French Red Cross supported the government by implementing a strategy of promoting 8 key family practices (KFP) in 75 villages in the Tanout and Magaria departments of Zinder region (Ardei et al., 2012). Multi-channel SBCC was used to encourage the adoption of these 8 practices including awareness-raising sessions, cooking demonstrations, radio broadcasts, and home visitations (Ardei et al., 2012).

Factors influencing young child nutrition practices at the interpersonal level were important considering the interdependent and communal nature of Nigerien communities. Interview participants explained the importance of health workers who influence the health and nutrition practices of caregivers in Niger. Also, husbands, who are traditionally heads of households, are key influencers on maternal and child health and nutrition practices such as complementary feeding. In a study where ready-to-use supplementary food (RUSF) was provided as a preventative malnutrition approach in Niger, mothers reported that behavioral nudges/reminders came from awareness campaigns and social pressures from other adult family members living in the household were influential in product usage (Wuehler & Biga, 2011).

Some intervention efforts in Niger have sought to tap into interpersonal influences for positive change. For instance, the 'Husband Schools' (HS) initiative was launched in 2008 which sought to involve men in the promotion of nutrition and reproductive health in positive behavior changes (UNFPA 2014). In this initiative, model husbands organized group discussions with their peers on best practices related to infant and young child feeding practices, nutrition of pregnant women, breastfeeding, family planning, and hygiene and health issues (Idrissa, Kandagou & Mamane, 2018).

Individually, caregivers in Niger have many competing demands. Agricultural livelihoods require heavy workloads that take time away from the home where young children need care and food. Individual levels of low literacy and nutrition knowledge contribute to sub-optimal complementary feeding practices as well (SPRING 2016). Compare to mothers with no education, mothers with some education tended to feed their children more appropriately, according to our risk factor analysis (Table 10.1). However, interview informants explained that nutrition counseling, by itself, is ineffective at changing complementary feeding practices due to the many upstream, multi-level factors influencing what a young child eats. Our risk factor analysis also identified several other individual level risk factors, such younger child age (MMF, MDD, MAD), infants being perceived larger than average (MMF and MAD), and mothers who did not work (Intro, MMF, MDD, MAD) (Table 10.1), suggesting these high risk subgroups may need more tailor interventions to promote complementary feeding practices.

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 14 and Appendix Table 15, respectively.

PROMOTION OF KEY FAMILY PRACTICES IN NIGER

- **Exclusive breastfeeding**
- **Infant feeding from 6 months of age**
- **Hand washing**
- **Use of insecticide-treated mosquito nets**
- **Use of preventive and curative services**
- **Family planning**
- **Home treatment of diarrhea**
- **Recognizing danger signs**

Table 10.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6-23 mo in Niger (2012)

	INTRO	MMF	MDD	MAD
N	**606**	**2727**	**2662**	**2571**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	**1.00**
12-17		**1.42 (1.19, 1.71)**	**2.66 (1.90, 3.71)**	**2.44 (1.66, 3.57)**
18-23		**1.28 (1.04, 1.58)**	**2.38 (1.62, 3.51)**	**1.89 (1.18, 3.02)**
Perceived birth weight				
Average		**1.00**		**1.00**
Larger than average /very large		**0.66 (0.55, 0.81)**		**0.62 (0.39, 0.99)**
Very small/ smaller than average		**0.99 (0.80, 1.21)**		**1.17 (0.82, 1.66)**
Vitamin A supplementation		**1.56 (1.31, 1.85)**		
Iron supplementation		**0.68 (0.53, 0.88)**	**2.68 (1.88, 3.84)**	**2.21 (1.45, 3.36)**
Child had symptoms in the past two weeks				
Cough			**1.38 (1.01, 1.89)**	
Maternal characteristics				
Education				
No education		**1.00**		**1.00**
Primary		**1.34 (1.02, 1.76)**		**0.92 (0.56, 1.52)**
Secondary/ Higher		**1.18 (0.81, 1.71)**		**1.84 (1.04, 3.24)**
Occupation				
Not working	**1.00**	**1.00**	**1.00**	**1.00**
Agricultural	**3.23 (1.04, 10.07)**	**1.71 (1.08, 2.72)**	**2.99 (1.52, 5.87)**	**3.32 (1.60, 6.88)**
Non-agricultural	**1.71 (1.12, 2.62)**	**1.17 (0.96, 1.42)**	**1.58 (1.18, 2.11)**	**1.25 (0.88, 1.78)**
Breastfeeding practices				
Put child to breast <=1 hr at birth				
Currently breastfeeding			**0.69 (0.48, 1.00)**	**1.86 (1.08, 3.20)**
Type of delivery assistance				
Delivered by health professional		**1.00**		
Traditional birth attendant		**1.21 (0.93, 1.57)**		
Other		**1.53 (1.19, 1.96)**		
Caesarean delivery	**0.31 (0.11, 0.89)**			
Timing of postnatal check-up on woman (days)				
0-1 d				**1.00**
>= 2 d				**1.15 (0.79, 1.70)**
missing/ unknown				**0.63 (0.40, 0.98)**
Timing of postnatal check-up on child (days)				
0-1 d		**1.00**		
>= 2 d		**0.56 (0.42, 0.76)**		
missing/ unknown		**0.68 (0.48, 0.96)**		

Exposure to media at least once a week				
Listening to radio		**1.32 (1.10, 1.58)**	**1.61 (1.22, 2.12)**	**1.59 (1.14, 2.21)**
Women's empowerment score		**0.93 (0.88, 0.99)**		
Paternal characteristics				
Age (years)				
15-29			**1.00**	
30-39			**1.40 (0.87, 2.26)**	
>= 40			**1.98 (1.16, 3.37)**	
Education				
No education			**1.00**	
Primary			**1.05 (0.71, 1.55)**	
Secondary/ Higher			**1.66 (1.09, 2.51)**	
Household characteristics				
Water characteristics				
Time to get to water source (min)				
0			**1.00**	
1-59			**0.65 (0.45, 0.94)**	
>= 60			**0.60 (0.37, 0.97)**	
Household wealth				
1 Poorest	**1.00**	**1.00**	**1.00**	**1.00**
2	**1.75 (1.00, 3.05)**	**1.26 (0.96, 1.65)**	**1.25 (0.67, 2.32)**	**1.26 (0.59, 2.69)**
3	**0.94 (0.54, 1.64)**	**1.17 (0.89, 1.54)**	**1.10 (0.59, 2.04)**	**1.35 (0.64, 2.82)**
4	**1.87 (1.03, 3.39)**	**1.37 (1.03, 1.82)**	**1.84 (1.02, 3.33)**	**1.73 (0.83, 3.61)**
5 Richest	**0.77 (0.41, 1.46)**	**0.73 (0.52, 1.02)**	**3.16 (1.68, 5.95)**	**2.54 (1.09, 5.91)**
Community characteristics				
Rank of access to health care				
1 Best access	**1.00**	**1.00**		
2	**0.69 (0.38, 1.24)**	**0.75 (0.57, 0.98)**		
3	**0.39 (0.21, 0.73)**	**0.70 (0.51, 0.94)**		
4	**0.52 (0.28, 0.99)**	**0.60 (0.43, 0.83)**		
5 Worst access	**0.64 (0.33, 1.24)**	**0.44 (0.30, 0.62)**		

SUPPLEMENTATION AND FORTIFICATION

In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

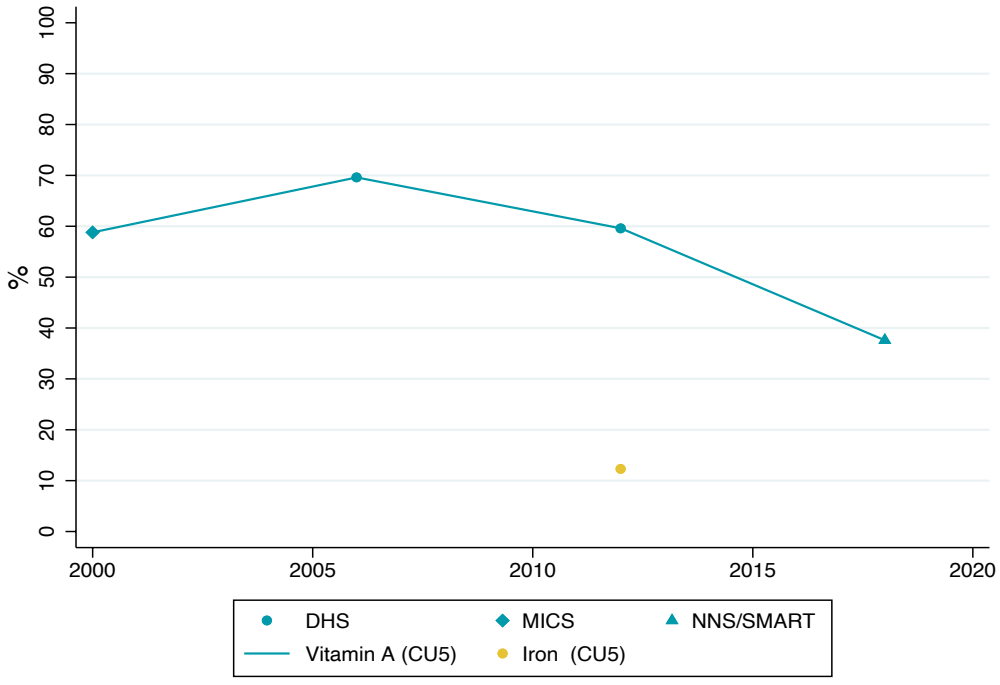
Vitamin A, Iron Supplementation, and Multiple Micronutrient Powders

Data on vitamin A supplementation in children 6-59 months have been reported between 2000 and 2018. The reported data showed the proportion ranged from 58.8% to 69.6% between 2000 and 2012. The NNS/SMART 2018 report reported a proportion of 37.6%, which was lower than the rest of the years when data were available. The disparity could be due to methodological differences between the MICS/DHS and the NNS/SMART. The mean proportion of children 6-59 months receiving vitamin A supplementation was 56.4%.

Data on iron supplementation in children 6-59 months were only reported in the 2012 DHS and the proportion was 12.3%.

Data on multiple micronutrient powder (MNP) use in children 6–23 months were not reported in any national reports although MNP is being used in targeted programming throughout the country, according to interview informants who indicated, "…we have tried with the micronutrient powders like the Sprinkles…we have tested them in certain regions."

Figure 10.4. Nutrient supplementation in Niger from 2000–2017



"…so the trend is going down because of limited funding… usually we are doing it [VA supplementation] as integrated with polio immunization…so when we are doing as integration it is okay because there's no funding problem. We can do our entire country nation-wide. But from 2018…the first round was integrated and no problem with the coverage, but the second round was a stand-alone vitamin A campaign and because of limited funding, it has been done in only four regions out of eight…that the reason why the coverage was going down."

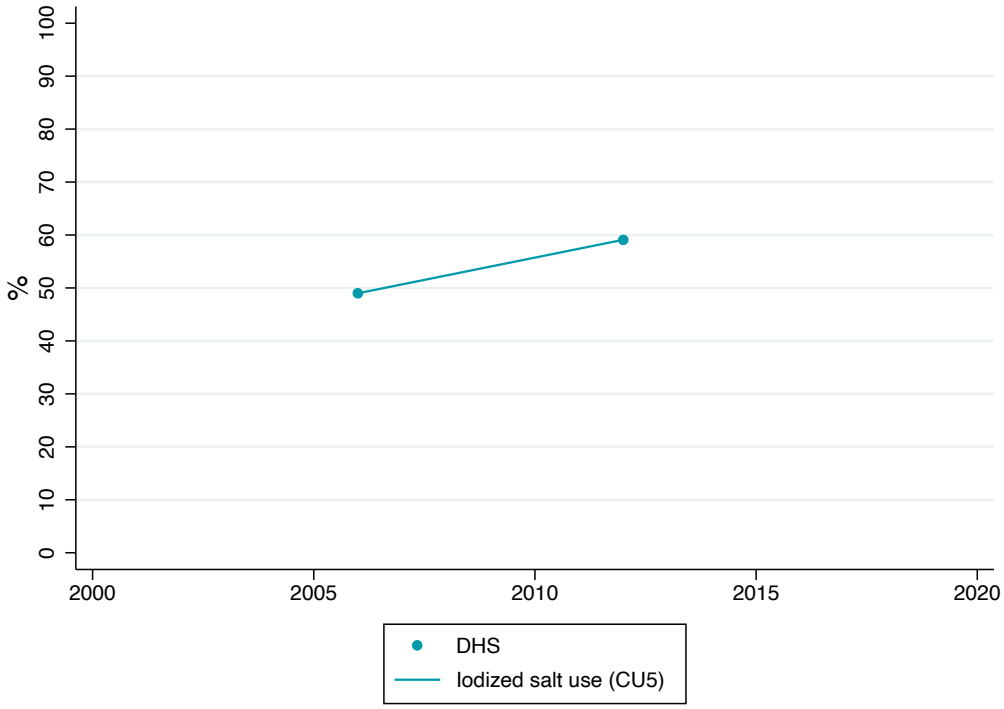
-Informant interview in Niger, UN partner

Iron-Fortified Foods and Iodized Salt Use

Data on the consumption of iron-fortified foods by children 6–23 months were not reported.

Data on iodized salt use in households with children under 5 years was reported in the DHS from 2006 and the DHS from 2012. It increased from 49.0% to 59.1% over the six years. (Figure 10.5)

Figure 10.5. Fortified foods consumption in Niger since 2000



Influencing factors of supplementation and fortification:

Niger recognizes the potential for fortification as a mechanism to improve young child diets. A government official discussed some ongoing multi-stakeholder efforts around fortification in Niger.

> *"We are in the process of conducting a national FRAT survey, Fortification Rapid Assessment Tool, combined with a recall to see, evaluate these foods as potential vehicles. So this survey is still…it's conducted by the National Statistics Institute of Niger, and the High Commission ensures the piloting. Fill the Nutrient Gap also… what are the foods produced locally, available at every moment that one can maybe combine or fortify to close this gap in terms of complementary feeding of the children."*
>
> ***-Informant interview in Niger, Government official***

The Fill the Nutrient Gap analysis, supported by WFP, is a detailed resource providing Cost of Diet modelling for young child diets, as well as detailed review of literature outlining determinants of diets in Niger (WFP, 2018). Fortified food products do play a role in diets of Nigeriens; NGOs, such as GRET are working to develop them in collaboration with partners as a strategy to improve young child diets (GRET 2017).

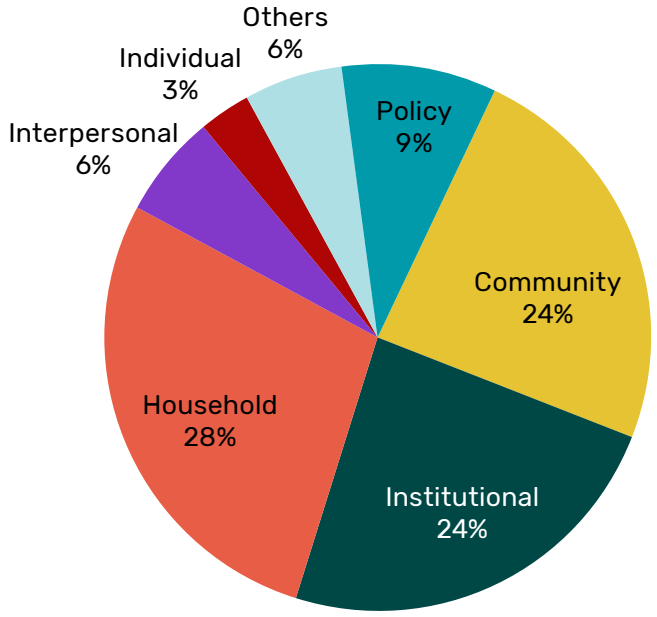
> *…the role which fortified foods can play, especially fortified infantile flours, the drinks also are heavily utilized, you know, in West Africa, a lot of the nutrition occurs through drinks. So we are proposing a drink that is easy to prepare, the mom can prepare it in few minutes, not requiring fire to drink necessarily, even if it isn't so clean, since that has gone through a boiling stage. And it is normally very well accepted in the studies of acceptability, it's a drink that is well accepted by the children."*
>
> ***-Informant interview in Niger, NGO***

In addition to newly formulated products in development, the literature points to a number of operational research studies related to supplementation as well. Formative research studies, including both acceptability and 'willingness to pay' studies prior to intervention, have been conducted with micronutrient powders and lipid-based nutrient supplements (e.g. Nutributter) for instance in Niger, showing positive community perceptions and feedback (Tripp et al., 2011).

PARTICIPANT RECOMMENDATIONS

Recommendations to improve complementary feeding in Niger were identified through interviews and selected secondary data sources. Figure 10.6 below illustrates the types of recommendations identified by level of influence. Most recommendations to improve complementary feeding in Niger were at the household (28%) and institutional and household (24%) levels.

Figure 10.6. Recommendations to address complementary feeding by level of influence in Niger



Below is a list of the top recommendations from informants interviewed in Niger and the literature:

- **At the policy level**, recommendations included creating and enforcing multi-sectoral guidelines and collaboration for institutional stakeholders Niger has an enabling policy environment for complementary feeding but agreed-upon guidelines are suggested for stakeholders to collaboratively operationalize actions that will effectively improve young child diets at household level.
- **At the institutional level,** recommendations include supporting policies that enhance local production with a goal of increasing consistent availability of fortified and diverse foods for young children diets across seasons, with particular consideration for shocks such as droughts that impact Niger. In addition, another recommendation highlighted was addressing the underlying determinants impacting young child diets, for example by harnessing the health system to improve the health and nutrition of women during pregnancy and beyond. Using such touch points (e.g. antenatal care visits) within the health system for education around complementary feeding is suggested.
- **At the community level**, recommendations included implementing community-based approaches that aim to shift social norms for positive change around cultural barriers currently limiting optimal complementary feeding.
- **At the household level**, recommendations were highlighted to improve, raise awareness and increase the food availability of local foods and locally fortified foods.

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CHAPTER 11

SENEGAL

Complementary feeding trends, determinants, and recommendations in Senegal

EXECUTIVE SUMMARY

Our country-level trend analysis of complementary feeding practices revealed that:

- **Continued breastfeeding at 1 year** has remained stable and near universal. The mean proportion was 94.8% between 1994–2016. **Continued breastfeeding at 2 years** has been practiced in only 46.4% of children on average and has shown a decreasing trend since 1997.
- **Introduction of solid, semi-solid and soft foods** in children 6–8 months has been practiced in 62.2% children on average between 2000–2017. In children 6–23 months, the proportion of meeting the **minimum meal frequency** was 35.1% on average between 2012–2017. The corresponding proportion for minimum dietary diversity was only 19.5%; and for minimum acceptable diet was the lowest at 8.5%.
- Between 2010–2017, **vitamin A rich-foods** were consumed by 57.0% of children 6–23 months. The mean proportion for iron-rich foods between 2015–2017 was 42.5%.
- **Vitamin A supplementation** in children 6- 59 months was high from 2000–2015 (78.0-88.3%) but decreased sharply between 2016–2017 to 62.7%. **Iron supplementation** in children 6–59 months was low in 2010 (12.8%) and has become strikingly low in recent years to only 1.8–2.9%. Iodized salt use in households with children under 5 years has increased since 2015 and reached 70% in 2017. No data are available for **multiple micronutrient powder use** or **iron-fortified food intake** in children 6–23 months in Senegal.

DATA AVAILABILITY FOR NIGERIA

Quantitative data

Complementary feeding practice data used in this chapter were extracted from 12 national reports between 1986–2018, including 10 DHS, 1 MICS, and 1 joint MICS-DHS report.

Literature review

Both grey and peer-reviewed literature focused on the country of Senegal were included; 17 grey literature reports and 7 peer-reviewed articles.

Qualitative interviews

Interviews were conducted with 3 informants representing. government, NGOs, and the United Nations.

NATIONAL POLICY FRAMEWORK

Explicit constitutional right to food:

- The constitution does not explicitly guarantee the right to adequate food (FAO 2020).

Infant and Young Child Feeding (IYCF):

- There is an IYCF policy since 2008, which was revised in 2014 (Ministre de la sante et l'action sociale 2014).
- There is a nutrition committee on nutrition called "comite de pilotage" from the multi-sectorial strategic plan for nutrition by CLM (Spray 2018). There is support for the development of a "Nutrition Network" (SUN 2019), a network comprised of local elected representatives for nutrition.

Breastfeeding recognition:

- Senegal has some provision of the International Code of Marketing of Breast-milk Substitutes, which has been adopted since 1994 (WHO & UNICEF 2020). Nevertheless, there is a high prevalence of promotion of breastmilk substitutes and commercially produced complementary foods (HKI 2015a).

Complementary feeding promotion or policies:

- Currently, the government promotes complementary feeding (HANCI-Global 2017).
- The Multisectoral Strategic Plan for Nutrition in Senegal (2017–2021) has been established. The plan enforces complementary feeding though age requirements are not defined (Republique du Senegal & Cellule de Lutte contre la Malnutrition 2017).
- A current National Nutrition Policy Document (2015–2025) emphasizes the importance of nutrition, especially in children under 5 years of age (Republique du Senegal & Cellule de Lutte contre la Malnutrition 2015).

Fortification policies:

- Current fortification policies are universal yet do not specifically target complementary feeding practices(Global Fortification Exchange Data 2020)
- Universal wheat flour fortification of iron and folic acid has been established (Food Fortification Initiative 2019).
- Universal salt iodization has been established (Global Fortification Data Exchange 2020).
- Universal oil fortification of vitamin A has been estab- lished (Global Fortification Data Exchange 2020.).

Summary of women/maternal rights in Senegal:

- The maternity leave is for 14 weeks: 6 before delivery and 8 after delivery. They can be extended for three weeks (ILO 2014, Ministre de la sante et l'action sociale 2014).
- National legislation is currently in place regarding equality of women's access to agricultural land, though it is not currently in practice (HANCI-Global 2017).
- Current national legislation does not include women's economic rights (HANCI-Global 2017).

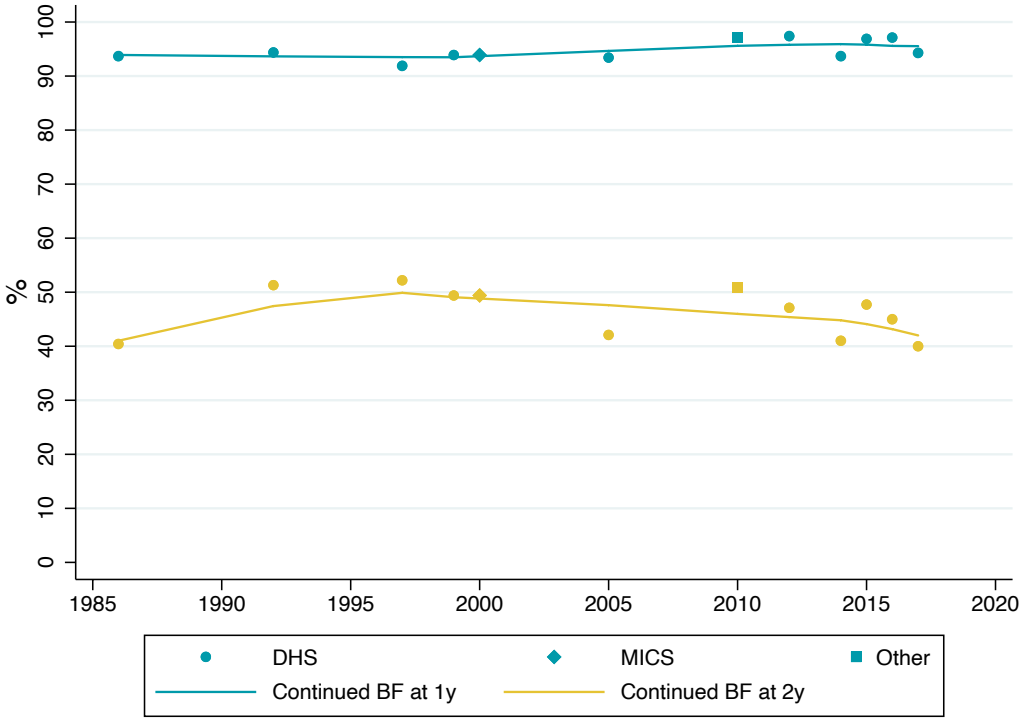
Public spending frameworks and initiatives:

- A separate budget for nutrition exists in the nationalbudget framework (HANCI-Global 2017).
- On a broader scale, the government allocated approxi- mately 5.51% of its GDP for health expenditure in 2016, a decrease from approximately 5.59% in 2015 (World Bank 2016).
- Financial monitoring mechanisms are in development for establishing funding activities and defining financial frameworks (SUN 2019).

CONTINUED BREASTFEEDING

Data availability and trends: Data on continued breastfeeding at 1 year and continued breastfeeding at 2 years have been reported in 12 national reports between 1986–2018. DHS is the predominant report, reporting statistics in every year data were available except for a MICS report in 2000 and a joint MICS-DHS report in 2010. The trend for continued breastfeeding at 1 year was stable across the years in which data were available with a mean population weighted proportion of 94.8%. The trend for continued breastfeeding at 2 years increased from 40.4% in 1986 to 52.2% in 1997 and then decreased to 40.0% in 2017; the mean proportion over the years was 46.4% (Figure 11.1).

Figure 11.1. Continued breastfeeding trends in Senegal from 1986–2018



Influencing factors of continued breastfeeding:

At the policy level, there has been strong commitment to the promotion of breastfeeding practice since the 1990s. Senegal has implemented the Inter-Ministerial Decree Establishing the Conditions of Marketing of Breast-milk Substitutes in 1994, which looks to control promotion of breastmilk substitutes in health facilities (Sweet 2016). National campaigns promoting various themes on breastfeeding have been taking place annually since 1995 (Wuehler 2011). All three key breastfeeding practices, breastfeeding initiation within one hour, exclusive breastfeeding to 6 months, and continued breastfeeding to 24 months were clearly addressed in at least one of the national nutrition policies (Wuehler 2011). The Clarification and Guidance on Inappropriate Promotion of Foods for Infants and Young Children has been developed to guide how brands can promote breastmilk substitutes to children up to 36 months (Champeny 2016). The Guidance covers the critical complementary feeding period, and if implemented adequately, could help promote continued breastfeeding at 1

year and 2 years. However, with inadequate labeling, educational materials and monitoring (WHO & UNICEF 2018), promoting breastmilk substitutes is still a practice in health facilities and in the general public. Our interview participants have pointed out that "many health workers recommend breastmilk substitutes to mothers." In the market, where the ban to breastmilk substitutes is not applied, over half the stores in Dakar had point-of-sale promotions from breastmilk substitutes (Zehner 2016) and about 40% of mothers indicated their exposure to television advertisements that promote breastmilk substitutes (Feeley 2016).

> *"No cross-promotion or brand extension to indirectly promote breastmilk substitutes via promotion of foods for infants and young children up to the age of 36 months."*
>
> ***- the Clarification and Guidance on Inappropriate Promotion of Foods for Infants and Young Children (Champeny 2016)***

> *"A history of inappropriate marketing of breast milk substitutes by the food industry has contributed to decreased breastfeeding rates in many in many parts of the world and associated increases in infant morbidity and mortality, especially in resource poor countries."*
>
> ***-ARCH 2015***

At the household/individual level, the caregivers' perceptions on how their child is eating and growing and their own physiological status largely determine when the caregivers stop breastfeeding. According to a situational analysis the following reasons for weaning their children prior to 2 years were frequently cited: 1) the child ate well from the family plate (60% of caregivers); 2) the child was 'tall and strong' (46% of caregivers); and the mother was pregnant again (35% of caregivers) (Wuehler 2011). Our interview participants also mentioned that if the child appears to be in good health, the mothers were more likely to actively stop breastfeeding before 2 years of age.

> *And even now women are very active that may be the reason for this decrease. Because women who are active do not breastfeed until two years of age. And when the child is walking well and in good health it often stops because everything is fine."*
>
> ***-Interview participant, Government representative, Senegal***

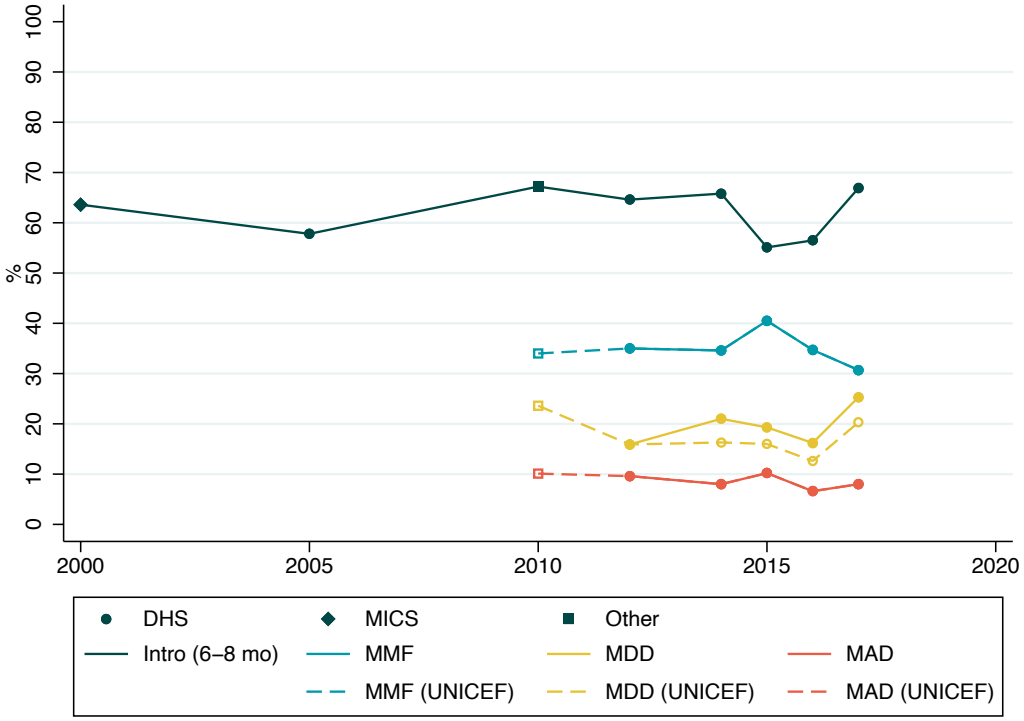
COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT RICH FOODS

Data availability and trends:

Intro: The introduction of solid, semi-solid, and soft foods in children 6–8 months has been reported between 2000–2017 in 6 DHS (2005, 2012, 2014-2017), 1 MICS (2000), and 1 MICS-DHS report (2010). The trend is steady around 60% until a 10% drop in 2015 and 2016, though the indicator recovers again in 2017. Over 17 years, the mean proportion of children from 6–8 months who were receiving complementary foods was 62.2%.

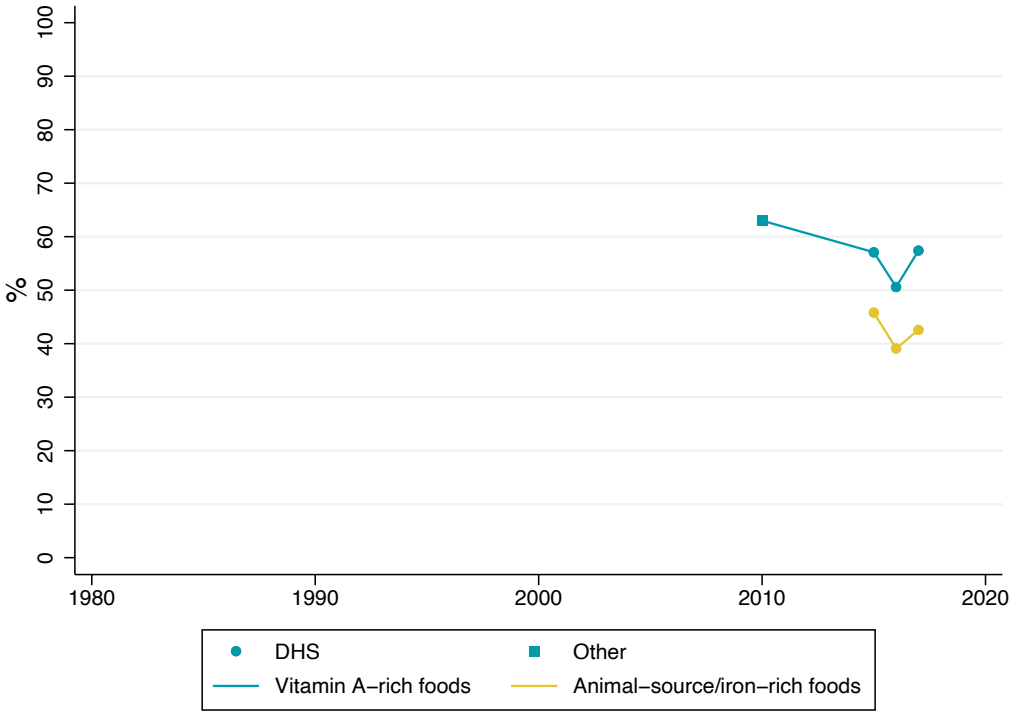
MMF, MDD, MAD: Data on minimum meal frequency (MMF), minimum dietary diversity (MDD), and minimum acceptable diet (MAD) were reported in 5 DHS reports (2012, 2014–2017). The mean population weighted proportion of children from 6–23 months receiving MMF, MDD, and MAD was 35.1%, 19.5%, and 8.5%, respectively. MMF in Senegal was the highest in 2015 when the proportion increased to 40.5%. However, it has decreased since then with the proportion dropping to 30.7% in 2017. MDD has been below 20% in 2012, 2015, and 2016 and a slight de- creasing trend from 2014–2016 was visible. Between 2016–2017, MDD rose by 9.1% to 25.3%. MDD recalculations by UNICEF between 2014–2017 were lower than the proportions in the national reports. The divergent trends in MMF and MDD seem to cancel out, resulting in a fairly flat trend of MAD stably at or below 10% from 2012–2017 (Figure 11.2).

Figure 11.2. Key complimentary feeding practices trends in Senegal from 2000–2017



Nutrient-rich foods: The proportion of children aged 6–23 months who consumed vitamin A-rich foods was reported in the 2010 MICS-DHS report and in 3 DHS reports from 2015–2017. The proportion of animal-source/iron-rich food intake was only reported in the 3 DHS reports. From 2015 to 2016, both indicators decreased. Vitamin A-rich food consumption decreased from 57.1% to 50.6% and animal/ iron-rich food consumption decreased from 45.8% to 39.1%. However, both increased in 2017 by 6.8% and 3.5%, respectively. The down-and-up trends in nutrient-rich foods were consistent with the MDD trend observed in the same years (Figure 11.3).

Figure 11.3. Trends of nutrient-rich foods consumption in Senegal from 2010–2017



Influencing factors of complementary feeding and nutrient-rich food intake

At the policy level, the importance of nutrition in children under five is well recognized in the recent National Nutrition Policy Document 2015–2025 (Republique du Senegal & Cellule de Lutte contre la Malnutrition 2015). The Multisectoral Strategic Plan for Nutrition in Senegal (2017–2021) has also been established which further shows the implementation will at the policy level (Republique du Senegal & Cellule de Lutte contre la Malnutrition 2017). There is national legislation in place to ensure proper labelling for complementary foods to support optimal infant and young child feeding practices. According to the analysis done by The Maternal, Infant and Young Child Nutrition Working Group, using the code of marketing of complementary foods should help mothers make the proper decision on child diet, if implemented properly (Sweet 2016). But the current labeling practices of commercially produced complementary foods sold in Senegal are not optimal, which is partially due to the implementation of only a few of the provisions of the International Code of Marketing of Breast-milk Substitutes (WHO & UNICEF 2018). For example, legal provisions related to complementary foods are available per the Code recommendations, however, no specific messages were identified regarding the importance of not introducing complementary foods before 6 months and timely introduction of complementary foods at 6 months (WHO & UNICEF 2018). These 'grey areas' in the legal measures and current policies have left spaces for companies to get away from the Code and may have confused customers and caregivers.

At the community/institutional level, according to our interview participants, several programs are in place that 1) provide educational counseling at the community level, with complementary feeding as one of the components, 2)

provide cooking demonstration activities to show mothers how to prepare complementary foods and administer micronutrient powder for children ages 6 to 23 months. Findings from the literature also indicated the SPRING programs that aimed to increase capacity of nutrient sensitive agriculture programs through the use of Social and Behavior Change Communication (SBCC) strategies to increase awareness of, and demand for, good nutrition-related practices and services (SPRING 2018). In terms of mass-media campaign programs, radio broadcasting about the benefits of exclusive breastfeeding and complementary feeding for children 6–24 months has been implemented in 3 of 14 regions (SPRING 2018). The campaigns may be an effective way to educate caregivers at scale about optimal complementary feeding. Our risk factor analysis also confirmed the importance of maternal exposure to media in meeting MMF, MDD, and MAD in children 6–23 months (Table 11.1). Another booster that was mentioned by our interview participants was the community healthcare worker system in Senegal; these community health care workers usually provide health and nutrition information by visiting households in their communities.

Our interview participants pointed out several barriers at the community/institutional level. First, given the limited resources at healthcare facilities, it has been hard to deliver tailored nutrition and complementary feeding information at the point of direct interaction between healthcare workers and caregivers. Second, due to the constraints in "financial or geographic accessibility," women may have to miss these healthcare appointments during prenatal and postnatal periods, where they may have been exposed to at least some nutrition knowledge. According to our analysis, the community-level indicator of health care and nutrition service accessibility is a strong factor that predicts the odds of meeting Intro and MDD in a dose-response manner (Table 11.1). Third, there is the tradition of feeding children porridges and such nutrient-scarce foods were 'heavily consumed.' There is lack of monitoring and evaluation efforts in previous and existing programs that aim to improve complementary feeding practices (Wuehler 2011). Fourth, there are sociocultural barriers coupled with socioeconomic barriers and certain food taboos that restrict adequate complementary feeding. For example, children must not be given eggs because it is believed to cause delayed speech and fruit consumption by children is believed to cause diarrhea.

At the household level, both our risk factor analysis and our interview participants, identified how household wealth is a critical factor to ensure child dietary diversity. Compared to the households from the poorest quintile (1st quintile), the richest (5th quintile) was almost 5 times more likely to achieve MDD in their children 6–24 months, even after adjusting for other individual and community level risk factors (Table 11.1). Another limitation is the lack of availability of complementary foods that were purchased or made specifically for infants and young children. The locally available products seem to be a potential solution to make complementary foods more readily available at home if trust can be built in using such products and the practice of using such products in making complementary foods become more common. There have been programs implemented in Senegal to promote dietary diversity within the home, however, the details of these programs were not found (WFP 2019).

At the individual level, caregivers have to weigh many competing concerns, including economic, social, cultural, and situational factors, to decide when, what and how to feed their children. Data from a mixed method protocol identified that the 'healthiness' of foods emerged as the primary consideration among all other concerns in caregivers' decision-making process related to feeding their infants and young children (Zobrist 2018). However, the concept of 'healthiness' may not always appropriate. For example, food items, such as biscuits, that were 'easy to feed' received high ratings by the interviewed mothers even though these snacks foods are not considered 'healthy' in terms of nutrient density and the amount of unhealthy components in them (e.g. sugar, salt, saturated fat). In the same study, cost, time for food acquisition, preparation, and feeding, beliefs and knowledge, as well as children's reaction to foods (e.g. lack of appetite or refusal to foods) were also identified within a complex web of situational factors, especially in resource-poor settings, that seriously constrained caregivers in terms of providing optimal complementary feeding to their infants and children (Zobrist 2018).

In summary, the salient barriers and boosters of complementary feeding practices that were identified from country-level participants and the literature review were summarized by level of influence (e.g. policy, community, institutional, household, interpersonal, and individual) and by systems (Health, WASH, social protection and food systems) in Appendix Table 18 and Appendix Table 19, respectively.

Table 11.1. Significant factors (OR and 95% CI) of meeting IYCF indicators in children 6–23 mo in Senegal (2017)

	INTRO	MMF	MDD	MAD
N	**577**	**2687**	**2681**	**1522**
Child characteristics				
Age (months)				
6-11		**1.00**	**1.00**	**1.00**
12-17		**1.17 (0.94, 1.46)**	**3.97 (2.87, 5.49)**	**6.58 (2.64, 16.39)**
18-23		**1.71 (1.35, 2.16)**	**6.00 (4.26, 8.43)**	**5.75 (2.32, 14.29)**
Birth order				
Firstborn	**1.00**			
Second to fourth born	**0.54 (0.34, 0.87)**			
Fifth or higher	**0.60 (0.35, 1.03)**			
Vitamin A supplementation		**1.71 (1.42, 2.06)**		**1.97 (1.07, 3.62)**
Child had symptoms in the past two weeks				
Diarrhea		**0.81 (0.67, 0.98)**		
Breastfeeding practices				
Currently breastfeeding		**0.71 (0.55, 0.91)**		
Exposure to media at least once a week				
Reading newspaper		**1.70 (1.07, 2.71)**	**1.91 (1.13, 3.23)**	
Listening to radio		**1.57 (1.31, 1.88)**	**1.28 (1.02, 1.61)**	**1.81 (1.06, 3.11)**
Women's empowerment score		**1.09 (1.02, 1.16)**		**1.23 (1.03, 1.46)**
Household characteristics				
Water characteristics				
Improved source of drinking water		**0.81 (0.67, 0.98)**	**1.34 (1.02, 1.76)**	**1.87 (1.11, 3.17)**
Household wealth				
1 Poorest	**1.00**		**1.00**	
2	**1.52 (0.94, 2.44)**		**1.12 (0.80, 1.57)**	
3	**1.82 (1.03, 3.22)**		**1.08 (0.70, 1.65)**	
4	**1.58 (0.73,3.43)**		**1.96 (1.19, 3.25)**	
5 Richest	**4.74 (1.62,13.80)**		**3.43 (1.94, 6.05)**	
Community characteristics				
Access to health care				
1 Best access	**1.00**		**1.00**	
2	**0.53 (0.25, 1.12)**		**0.66 (0.47, 0.94)**	
3	**0.48 (0.23, 1.02)**		**0.41 (0.28, 0.60)**	
4	**0.44 (0.20, 0.98)**		**0.41 (0.27, 0.61)**	
5 Worse access	**0.41 (0.18, 0.93)**		**0.22 (0.14, 0.36)**	

SUPPLEMENTATION AND FORTIFICATION

In this section, the current status and trend of micronutrition supplementation and use of fortified foods in children are first presented based on the available data. The potential factors that were identified through literature review and qualitative research are discussed with the goal to explain the trend in data and to identify data and research gaps. There are several intervention trials completed to test the efficacy and effectiveness of supplementation and fortification interventions during complementary feeding period. The findings from peer-reviewed intervention studies are summarized in Appendix 20.

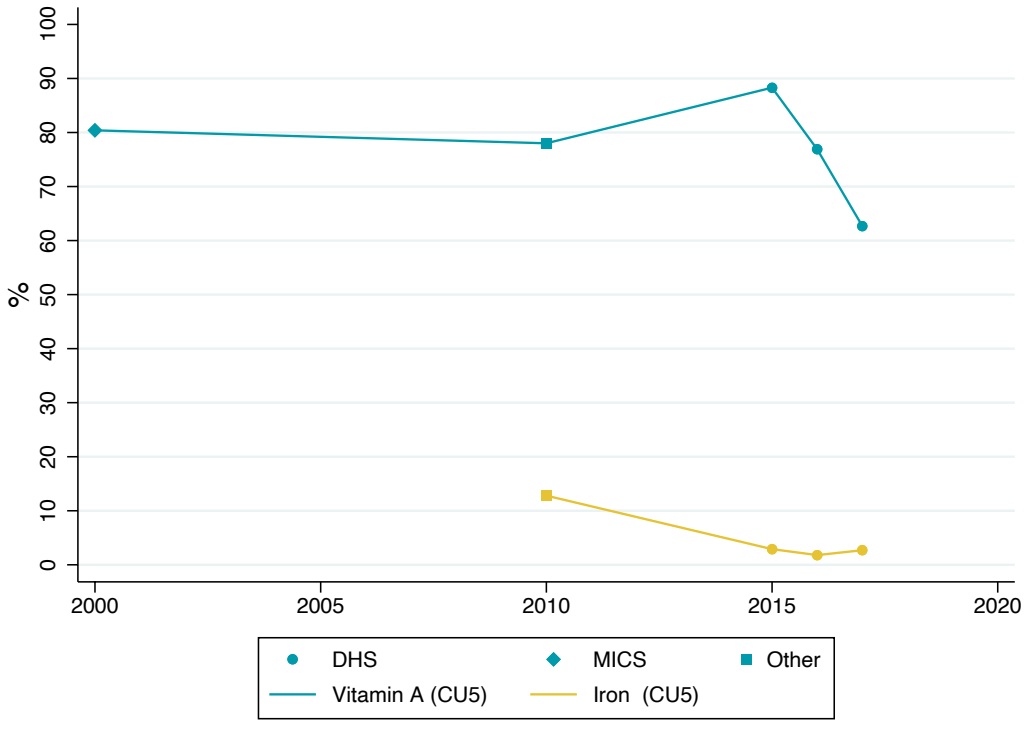
Vitamin A Supplementation, Iron Supplementation, and Multiple Micronutrient Powders

Vitamin A supplementation: Data on vitamin A supplementation in children 6- 59 months has been reported between 2000–2017 in 5 national reports. This includes 3 DHS (2015–2017), 1 MICS (2000), and 1 MICS-DHS report (2010). The vitamin A supplementation rate in children 6–59 months decreased sharply by 25.6% in 2 years, from 88.3% in 2015 to 62.7% in 2017 (Figure 11.4).

Iron supplementation: Data on iron supplementation among children 6–59 months has been reported between 2010–2017 in 3 national DHS reports (2015–2017) and the 2010 MICS-DHS report. The proportion of children 6–59 months receiving iron supplementation was low and exhibited a decreasing trend from 12.8% in 2010 to only 1.8–2.9% in 2015–2017 (Figure 11.4).

MMP: Data on multiple micronutrients powder (MMP) use was not reported in any of the national reports.

Figure 11.4. Nutrient supplementation in children 6- 59 months in Senegal from 2000–2017

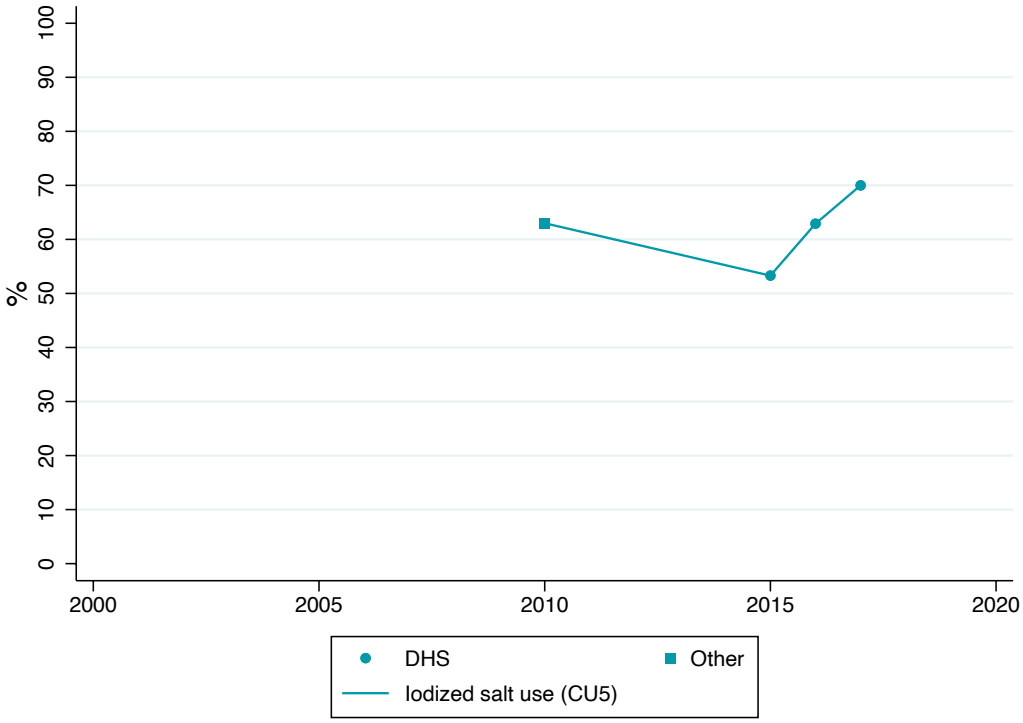


Iron-Fortified Foods and Iodized Salt Use

Data on the consumption of iron-fortified foods by children 6–23 months was not reported.

Data on iodized salt use in households with children under 5 years was reported in the 2010 DHS and DHS reports from 2015–2017. The 2015 figure was lower than the proportion reported in 2010, 53.3% compared to 63%, but the proportion of iodized salt use in households with children under 5 years has risen since 2016 and reached 70.0% in 2017 (Figure 11.5).

Figure 11.5. Iodized salt use in households with children under 5 years in Senegal from 2010–2017



Influencing factors of supplementation and fortification

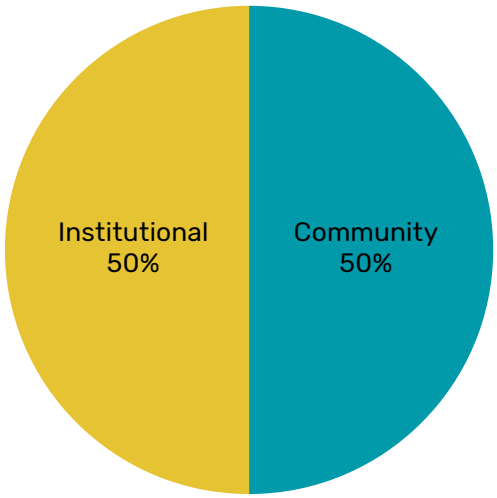
Senegal has supplementation and deworming programs to prevent anemia and iron deficiency in children and pregnant women (Wuehler 2011). Given that these programs were combined with the national vitamin A supplementation campaigns and other national and regional programs designed to reach more targeted vulnerable populations, synergistic effects are likely (Wuehler 2011). Interview participants also confirmed efforts by the Ministry of Health to scale up the delivery of vitamin A supplementation. That said, a study conducted from 2015–2016 indicated that the budget available per district for vitamin A distribution dropped significantly but it was anticipated that local health committees might step in to offset the drop in partner funding; only one of the four districts studied reported receiving these local funds (Horton 2018). This drop in funding may be at least partially responsible for the steep decline in vitamin A supplementation being provided to children between 2015–2017.

As far as fortification, the Multisectoral Strategic Plan for Nutrition in Senegal has set micronutrient fortification as one of its major strategies (Republique du Senegal & Cellule de Lutte contre la Malnutrition 2017). The Senegal government has implemented universal fortification policies for iron and folic acid fortified wheat flour (Food Fortification Initiative 2019), iodized salt, and vitamin A fortified oil (Global Fortification Data Exchange 2020). Besides the national mandatory fortification programs, our interview participants also recognized the awareness campaign for fortified products marketing as a facilitator. In addition, potassium iodate has been made available to salt producers by government initiatives as a way to improve access to iodized salt in the markets. There are also educational programs that provide iodized salt to the communities and community members and educate people on how to store it. Although the iodized salt use in children shows an increasing trend in recent years, the availability of iodized salt may not be equal across the nation, according to our interview participants.

PARTICIPANT RECOMMENDATIONS

Several recommendations to improve complementary feeding in Senegal were identified through interviews. Figure 11.6 below illustrates the types of recommendations identified by level of influence. The interviewee recommendations to improve complementary feeding were all aimed at the institutional (50%) or community (50%) levels.

Figure 11.6. Interviewee recommendations to address complementary feeding by level of influence in Senegal



Below is a description of the top recommendations:

- At the community level, participants discussed sustainability as a key recommendation made by stakeholders for example maximizing the production of local foods that are already available for consumption.
- **At the institutional level,** participants discussed increasing the distribution of quality complementary feeding products so that more people have access to them.to improve complementary feeding were all aimed at the institutional (50%) or community (50%) levels.

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APPENDIX TABLE 1

Definitions of risk factor variables used in the country-specific analysis[1]

Child characteristics	
Age (months)	**6–11,12–17, or 18 –23**
Sex	**Female or male**
Birth order	**Firstborn, second to fourth born, or fifth or higher**
Birth interval (month)	**No previous birth, <24, or >24**
Perceived birth weight	**Size of child as reported subjectively by the respondent and categorized into smaller than average, average and larger than average**
Vitamin A supplementation	**Yes or no**
Iron supplementation	**Yes or no**
Child health	
Diarrhea	**Yes or no for any reported diarrhea in the past 2 weeks**
Fever	**Yes or no for any reported fever in the past 2 weeks**
Cough	**Yes or no for any reported cough in the past 2 weeks**
Maternal characteristics	
Age (years)	**15 –24, 25–34, or 35–49**
Smoker	**Yes or no for current smoking**
Education	**No education, primary, or secondary/higher**
Occupation	**Categorized into not working, agricultural and non-agricultural**
Currently living with husband/partner	**Yes or no**
Nutritional Status	
Short height	**Height < 145 cm**
BMI (kg/m2)	**<18.5, 18.5-24.9, or >=25**
Breastfeeding practices	
Put child to breast <=1 hr at birth	**Yes or no**
Currently breastfeeding	**Yes or no**
Utilization of reproductive health care	
Place of delivery	**Health facility or other**
Type of delivery assistance	**Delivered by health professional, traditional birth attendant, or other**
Caesarean delivery	**Yes or no**
Number of antenatal clinic visits	**None, 1–3, or >=4**
Timing of postnatal check-up on woman (days)	**0–1, >=2, or missing/unknown**
Timing of postnatal check-up on child (days)	**0–1, >=2, or missing/unknown**
Exposure to media	
Reading newspaper	**Read at least once a week, or less often**
Listening to radio	**Listened at least once a week, or less often**
Watching TV	**Watched at least once a week, or less often**
Involved in decision making on	
How man's income is used	**Yes or no**
Large household purchases	**Yes or no**

Visiting family and friends	**Yes or no**
Regarding own health care	**Yes or no**
Attitude towards domestic violence: Beating justified if	
Goes out without telling him	**Yes or no**
Neglects the children	**Yes or no**
Argues with him	**Yes or no**
Refuses to have sex with him	**Yes or no**
Burns the food	**Yes or no**
Overall attitude toward domestic violence	**High if all five above reported as no, or low if at least one above reported as yes**
Women's empowerment score	**Total number of "yes" of questions under decision making domain, plus 1 if "high" or plus 0 if "low" in overall attitude toward domestic violence**

Paternal characteristics	
Age (years)	**15–24, 25–34, or >=35**
Education	**No education, primary, or secondary/higher**
Occupation	**Categorized into not working, agricultural and non-agricultural**
Household Chacteristics	
Place of residence	**Rural or urban**
Sex of household head	**Female or male**
No. of HH members	**Total number of people living in the same household**
No. of children under 5 years	**Total number of children under 5 years living in the same household**
Types of cooking fuel	**Efficient (Electricity, LPG, natural gas, biogas) or non-efficient fuels (wood, straw/ shrubs/ grass, animal dung and other)**
Water characteristics	
Source of drinking water	**Improved or unimproved according to (World Health Organization and UNICEF, 2006)**
Location of drinking water	**In own dwelling/yard/plot or elsewhere**
Time to get to water source (min)	**0, 1–59, or >=60**
Household wealth	**Categorized into quintiles**
Community characteristics[2]	
Maternal education level	**Proportion of women within community completed primary or higher education**
Women's empowerment level	**Mean women's empowerment score within community**
Community sanitation	
Toilet condition	**Proportion of households within community using unimproved toilets**
Toilet sharing	**Proportion of households within community using shared toilets**
Community access to health care	
Child vaccination status	**Proportion of children 0–5y within community with age-appropriate vaccination**
Facility delivery	**Proportion of women within community who gave birth to their youngest child 0–5 years at health facilities**
Health professional delivery	**Proportion of women within community who have given birth to their youngest child 0–5 y assisted by health professionals**

Caesarean delivery	**Proportion of women within community who have given birth to their youngest child 0–5 y by caesarean delivery**
Utility of antenatal clinic visits	**Proportion of women within community who had at least 4 antenatal clinic visits prior to the birth of their youngest child 0–5y**
Timing of postnatal check-up on women	**Proportion of women within community who had their postnatal check-up done within one day after delivery of their youngest child now 0–5y**
Timing of postnatal check-up on children	**Proportion of youngest children 0–5y within community who had their postnatal check-up done within one day after delivery**
Child vitamin A supplementation	**Proportion of youngest children 0–5 y within community received vitamin A in the past 6 months**
Child iron supplementation	**Proportion of youngest children 0–5 y within community received iron pills, sprinkles or syrup in the past 7 days**
Maternal iron supplementation	**Proportion of women within community given or who bought iron tablets during pregnancy of their youngest children 0–5 y**
Rank of access to health care	**The summed rank of all community-level indicators created as the composite index of overall access to health care. The summed rank was categorized into quintiles.**

1. The final risk factor selection was based on data availability and in consultation with UNICEF.

2. Community characteristics were calculated at the primary sampling unit level.

APPENDIX 2–INTERVIEW GUIDES

This appendix includes the interview guides used for qualitative data collection among regional key informants and country-level informants.

Regional key informant interview guide

Introduction

Thank you for agreeing to speak to me today about health and nutrition in West and Central Africa. I would like to hear your professional opinions and explanations to help us understand the nutrition situation in this region.

1. To begin, could you please describe for me your typical day at work in your role, from the time you get to work in the morning until the time you leave in the evening.
2. Describe your primary roles and responsibilities in your current role.
    a. Probe on how long this person has been in this role
3. Could you describe what you see to be the primary challenges associated with improving young child nutrition in your professional role.

Nutrition situation

1. Could you tell me generally about the nutrition situation in the country context where you work?
2. Discuss the extent to which this nutrition situation has been changing, if at all.
    a. Probe on how the situation has changed–for better, worse, not at all
    b. Probe on the factors influencing such change

Complementary feeding

1. The level of detail you have provided in previous responses is exactly what I am looking for. Thank you. Now I want to focus on complementary feeding specifically and reflect on some of these indicators we have found based on our analysis. What are your thoughts about these numbers?
    a. Could you help explain why these indicators are optimal/sub-optimal in this context
2. Could you describe what you know about the complemnetary feeding practices in your country?
    a. Probe on person's perception of how these practices compare to those of the region as a whole
    b. Probe on the person's level of satisfaction toward the current status of complementary feeding in this context
3. Could you discuss the main barriers to improving complementary feeding in this context?
    a. Probe on persistant barriers that will be difficult to overcome
    b. Probe on low-hanging barriers that can more easily be addressed with intervention
    c. Probe on context-specific barriers in this country

4. Could you now explain the opportunities that exist for improving complementary feeding practices in this context?
    a. Probe on short-term opportunities
    b. Probe on longer-term opportunities
    c. Probe on context-specific opportunities

Interventions

1. Many interventions have been implemented with varying success across contexts. Could you describe those previous interventions to improving complementary feeding that were especially effective?
    a. Probe on reasons why it was effective for this context
    b. Probe on scalability of this intervention
2. Now, to the contrary, could you describe those previous interventions to improve complementary feeding that were especially ineffective?
    a. Probe on reasons why it was ineffective for this context
    b. Probe on key lessons learned from these ineffective efforts
3. If you could have all the resources in the world to improve the nutrition of young children where you work, what would the perfect intervention be?
    a. Probe on details of this intervention
    b. Probe on types of resources suggested
    c. Probe on reality of this 'perfect intervention' being feasible
    d. Probe on real-life barriers to operationalizing such an intervention approach
4. Finally, do you have key recommendations for addressing the health and nutrition of young children in this context?
    a. Probe on what his/her organization can do/cannot do
    b. Probe on suggested roadmap for success moving forward

Thank you for your time and ideas today. Do you have any questions for me?

Country-level informant interview guide

Introduction

Thank you for agreeing to speak to me today about health and nutrition in West and Central Africa. I would like to hear your professional opinions and explanations to help us understand the nutrition situation in this region.

1. To begin, could you please describe for me your typical day at work in your role, from the time you get to work in the morning until the time you leave in the evening.
2. Describe your primary roles and responsibilities in your current role.
    a. Probe on how long this person has been in this role
3. Could you describe what you see to be the primary challenges associated with improving young child nutrition in your professional role.

Nutrition situation

1. Could you tell me generally about the nutrition situation in the country context where you work?
2. Discuss the extent to which this nutrition situation has been changing, if at all.
    a. Probe on how the situation has changed–for better, worse, not at all
    b. Probe on the factors influencing such change

Complementary feeding

1. The level of detail you have provided in previous responses is exactly what I am looking for. Thank you. Now I want to focus on complementary feeding specifically and reflect on some of these indicators we have found based on our analysis. What are your thoughts about these numbers?
    a. Could you help explain why these indicators are optimal/sub-optimal in this context
2. 6. Could you describe what you know about the complemnetary feeding practices in your country?
    a. Probe on person's perception of how these practices compare to those of the region as a whole
    b. Probe on the person's level of satisfaction toward the current status of complementary feeding in this context
3. Could you discuss the main barriers to improving complementary feeding in this context?
    a. Probe on persistant barriers that will be difficult to overcome
    b. Probe on low-hanging barriers that can more easily be addressed with intervention
    c. Probe on context-specific barriers in this country
4. Could you now explain the opportunities that exist for improving complementary feeding practices in this context?

   a. Probe on short-term opportunities
   b. Probe on longer-term opportunities
   c. Probe on context-specific opportunities

Interventions

1. Many interventions have been implemented with varying success across contexts. Could you describe those previous interventions to improving complementary feeding that were especially effective?
   a. Probe on reasons why it was effective for this context
   b. Probe on scalability of this intervention
2. Now, to the contrary, could you describe those previous interventions to improve complementary feeding that were especially ineffective?
   a. Probe on reasons why it was ineffective for this context
   b. Probe on key lessons learned from these ineffective efforts
3. If you could have all the resources in the world to improve the nutrition of young children where you work, what would the perfect intervention be?
   a. Probe on details of this intervention
   b. Probe on types of resources suggested
   c. Probe on reality of this 'perfect intervention' being feasible
   d. Probe on real-life barriers to operationalizing such an intervention approach
4. Finally, do you have key recommendations for addressing the health and nutrition of young children in this context?
   a. Probe on what his/her organization can do/cannot do
   b. Probe on suggested roadmap for success moving forward

Thank you for your time and ideas today. Do you have any questions for me?

APPENDIX TABLE 2

The availability of complementary feeding practices data in national survey reports in WCAR 2020-2018

COUNTRY	EARLIEST SURVEY YEAR	LATEST SURVEY YEAR	# OF YEARS IN BETWEEN	TOTAL # OF REPORTS
Benin	2011	2017	6	3
Burkina Faso	2010	2018	8	8
Cameroon	2011	2018	7	3
Cape Verde	N/A	N/A	N/A	0
Central African Republic	2010	2010	0	1
Chad	2010	2018	8	4
Congo	2011	2014	3	2
Cote d'Ivoire	2011	2016	5	2
DRC	2010	2013	3	2
Equatorial Guinea	2011	2011	0	1
Gabon	2012	2012	0	1
Gambia	2010	2018	8	4
Ghana	2011	2014	3	2
Guinea	2012	2018	6	3
Guinea-Bissau	2010	2014	4	2
Liberia	2010	2013	3	2
Mali	2012	2018	6	5
Mauritania	2011	2018	7	5
Niger	2010	2018	8	3
Nigeria	2011	2018	7	6
Sao Tome and Principe	2014	2014	0	1
Senegal	2010	2017	7	6
Sierra Leone	2010	2017	7	4
Togo	2010	2018	8	5
WCAR region	2010	2018	8	75

APPENDIX TABLE 3

Complementary feeding data availability by indicator in WCAR 2010-2018

		CONTINUED BREASTFEEDING				COMPLEMENTARY FEEDING AND INTAKE OF NUTRIENT-RICH FOODS										SUPPLEMENTATION				FORTIFICATION					
		Cont BF at 1y		Cont BF at 2y		Intro		MMF		MDD		MAD		VitA foods		Animal/ iron-rich foods		VitA supp		Iron supp		MN powder		Iodized salt		Iron fortified foods	
COUNTRY	# OF REPORTS	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Benin	3	3	100.0	3	100.0	3	100.0	3	100.0	3	100.0	3	100.0	2	66.7	2	66.7	1	33.3	0	0.0	1	33.3	2	66.7	0	0.0
Burkina Faso	8	8	100.0	1	12.5	8	100.0	1	12.5	1	12.5	1	12.5	1	12.5	1	12.5	4	50.0	1	12.5	0	0.0	1	12.5	0	0.0
Cameroon	3	3	100.0	2	66.7	2	66.7	1	33.3	2	66.7	1	33.3	1	33.3	1	33.3	1	33.3	1	33.3	0	0.0	1	33.3	0	0.0
Cape Verde	0																										
Central African Republic	1	1	100.0	1	100.0	1	100.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Chad	4	4	100.0	4	100.0	3	75.0	2	50.0	1	25.0	1	25.0	1	25.0	1	25.0	4	100.0	1	25.0	0	0.0	1	25.0	1	25.0
Congo	2	2	100.0	2	100.0	2	100.0	1	50.0	2	100.0	1	50.0	1	50.0	1	50.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0
Cote d'Ivoire	2	2	100.0	2	100.0	2	100.0	2	100.0	2	100.0	2	100.0	1	50.0	1	50.0	1	50.0	1	50.0	0	0.0	1	50.0	0	0.0
DRC	2	2	100.0	2	100.0	2	100.0	2	100.0	1	50.0	1	50.0	1	50.0	1	50.0	2	100.0	1	50.0	0	0.0	1	50.0	0	0.0
Equatorial Guinea	1	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0
Gabon	1	1	100.0	1	100.0	1	100.0	0	0.0	1	100.0	0	0.0	1	100.0	1	100.0	1	100.0	0	0.0	0	0.0	1	100.0	0	0.0
Gambia	4	3	75.0	3	75.0	3	75.0	2	50.0	1	25.0	1	25.0	1	25.0	1	25.0	3	75.0	1	25.0	0	0.0	1	25.0	0	0.0
Ghana	2	2	100.0	2	100.0	2	100.0	2	100.0	2	100.0	2	100.0	1	50.0	1	50.0	2	100.0	1	50.0	0	0.0	1	50.0	0	0.0
Guinea	3	3	100.0	3	100.0	3	100.0	3	100.0	3	100.0	3	100.0	2	66.7	2	66.7	2	66.7	2	66.7	1	33.3	2	66.7	0	0.0
Guinea-Bissau	2	2	100.0	2	100.0	2	100.0	2	100.0	1	50.0	1	50.0	0	0.0	0	0.0	1	50.0	0	0.0	0	0.0	0	0.0	0	0.0
Liberia	2	2	100.0	2	100.0	1	50.0	1	50.0	1	50.0	1	50.0	1	50.0	1	50.0	1	50.0	1	50.0	0	0.0	1	50.0	0	0.0
Mali	5	5	100.0	4	80.0	5	100.0	3	60.0	3	60.0	3	60.0	1	20.0	1	20.0	3	60.0	1	20.0	0	0.0	0	0.0	0	0.0
Mauritania	5	4	80.0	3	60.0	4	80.0	2	40.0	1	20.0	1	20.0	0	0.0	0	0.0	3	60.0	0	0.0	0	0.0	0	0.0	0	0.0
Niger	3	3	100.0	2	66.7	2	66.7	1	33.3	1	33.3	1	33.3	1	33.3	1	33.3	2	66.7	1	33.3	0	0.0	1	33.3	0	0.0
Nigeria	6	5	83.3	5	83.3	4	66.7	4	66.7	3	50.0	3	50.0	2	33.3	2	33.3	5	83.3	2	33.3	0	0.0	1	16.7	1	16.7
Sao Tome and Principe	1	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Senegal	6	6	100.0	6	100.0	6	100.0	5	83.3	5	83.3	5	83.3	4	66.7	3	50.0	4	66.7	4	66.7	0	0.0	4	66.7	0	0.0
Sierra Leone	4	4	100.0	3	75.0	4	100.0	3	75.0	2	50.0	2	50.0	2	50.0	2	50.0	3	75.0	1	25.0	0	0.0	1	25.0	0	0.0
Togo	5	4	80.0	3	60.0	4	80.0	3	60.0	2	40.0	2	40.0	1	20.0	1	20.0	4	80.0	1	20.0	0	0.0	2	40.0	0	0.0
WCAR region	**75**	**71**	**94.7**	**58**	**77.3**	66	88.0	46	61.3	40	53.3	37	49.3	26	34.7	25	33.3	50	66.7	20	26.7	2	2.7	22	29.3	2	2.7

This appendix includes a series of summary tables that outline complementary feeding barriers and boosters that emerged as themes from qualitative interviews and literature sources. Each focus country includes two accompanying tables summarizing the same data from different perspectives: a multi-level perspective and a systems perspective.

Summary of complementary feeding barriers and boosters in Burkina Faso

Appendix Table 4 Multi-level perspective of barriers and boosters to complementary feeding in Burkina Faso

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	Lack of access to fortified foods	Biannual supplementation campaign
	Limited funds for vitamin A supplementation due to donors	GASP-–National program for mother to mother support on IYCF
Community	Cultural beliefs	Radio broadcast use to affect behaviour change
	Early introduction of foods in rural areas	
Institutional	Prioritize awareness of diversification by partners	Help educate women on the production of fortified foods
	Lack of healthcare access	Scale up intervention programs
Household	Early introduction to family foods	No household booster
	Lack of fortified foods consumption due to access	
	Lack of animal origin foods consumption due to cost	
Interpersonal	Difficulty in withdrawing from community complementary feeding norms	Social behavioural change methods to target mothers' influencers
Individual	Perception to lack of adequate breastmilk	Educated women fed their children better
	Mothers head to work	

Appendix Table 5 Systems perspective of barriers and boosters to complementary feeding in Burkina Faso

HEALTH SYSTEM

- Awareness of nutritious messages
- Community based cooking demonstration
- Early introduction to complementary foods
  - Lack of food diversification in the household

WASH SYSTEM

- Integrating WASH practices and complementary feeding through homestead food production pilot study

SOCIAL PROTECTION SYSTEM

- Availability of resources to help vulnerable families

FOOD SYSTEM

- Piloted homestead food production
- Lack of diversified food production within regions
- Lack of fortified food products

Summary of complementary feeding barriers and boosters in Cote de Ivoire

Appendix Table 6 Multi-level perspective of barriers and boosters to complementary feeding in Cote de Ivoire

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy		• Multisectoral policy • Campaigns focused on proper use of water and local foods • Routine vitamin A supplementation and deworming by UNICEF
Community	• High availability and consumption of ready to eat foods and soda-type drinks • Low availability of quality complementary foods • Food taboos restrict optimal diets • Lack of oils with appropriate fortification level • Non-fortified vegetable oils becoming more prevalent	
Institutional	• Nutrition sector lacks presence within the healthcare system • Health systems lack prevention promotion • Fortified foods mislabelled to show more nutrients than they contain • Production challenges surrounding fortified foods • Health workers not trained to advise in HIV context	• Services provided to caregivers of malnourished children • National recipe guide based on locally available food developed by FANTA in collaboration with ministry of health • Weekly cooking demonstrations for preparation of nutrient-dense, complementary foods
Household	• Problems surrounding food allocation within the household • Poverty within the household	
Interpersonal	• Lack of knowledge among health workers	
Individual	• Lack of knowledge of mothers on complementary feeding	

Appendix Table 7 Systems perspective of barriers and boosters to complementary feeding in Cote de Ivoire

HEALTH SYSTEM

Barriers:

- Lack of knowledge of mother on adequate complementary feeding practices
- Health works not trained to advise in HIV context
  - Nutrition sector lacks presence in health system

Boosters:

- Complementary feeding practices focused on nutrition
- Routine vitamin A supplementation and deworming by UNICEF
- Caregivers of malnourished children receiving counselling
- Nutrition counselling package which provides health workers visual aids to enhance feeding communication

WASH SYSTEM

SOCIAL PROTECTION SYSTEM

Barriers:

- Lack of knowledge among social workers to provide complementary feeding information

FOOD SYSTEM

Barriers:

- Lack of optimal complementary foods
- Transition from traditional diet to a diet high in sugar
- High availability of unhealthy foods
- Lack of knowledge from mother on how to incorporate local food into children's diet
- Control and quality of complementary feeding products
- Lack of vegetable oils with proper fortification level
- Fortified foods mislabelled to show more nutrients than they contain
- Production challenges for fortified foods; loss of vitamin A during storage
- Non-fortified vegetable oils becoming prevalent

Boosters:

- New models for improved fortified foods
- More markets have fortified flour available

Summary of complementary feeding barriers and boosters in the Democratic Republic of Congo (DRC)

Appendix Table 8 Multi-level perspective of barriers and boosters to complementary feeding in DRC

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	• Limited investment in Vitamin A Supplementation	• Breastfeeding promotion efforts • Salt Iodising Policy
Community	• Lack of nutritious food availability • Traditional Practices • Limited community-level knowledge	• Staple food availability throughout seasons
Institutional	• Insufficient Nutritional Info • Coverage • Poor Healthcare Services	• Cooking demonstrations–SBCC efforts • Healthcare programs
Household	• Lack of affordability • Non nutritious food preparation practices	
Interpersonal		
Individual	• Mother's time constraints • Lack of caregiver knowledge	

Appendix Table 9 Systems perspective of barriers and boosters to complementary feeding in DRC

HEALTH SYSTEM

Barriers:
- Limited access for all households
- Limited integration of nutrition into health system

Boosters:
- Health Centres: healthcare and education provided through health system

WASH SYSTEM

Barriers:
- Lack of clean water availability

Boosters:
- Hygiene promotion in the communities

SOCIAL PROTECTION SYSTEM

FOOD SYSTEM

Barriers:
- Lack of knowledge about nutritious complementary foods
- Lack of nutritious food affordability

Boosters:
- Staple food availability throughout seasons

Summary of complementary feeding barriers and boosters in Ghana

Appendix Table 10 Multi-level perspective of barriers and boosters to complementary feeding in Ghana

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	• Regulation of fortified foods	• Nutrition specific policies • Salt iodization program
Community	• Social norms • Healthcare access	• Availability of fortified foods
Institutional	• Coordination challenges between public and private sectors	• Implementation of caregiver counseling programs at health centers
Household	• Low household income • Gender norms	
Interpersonal	• Low capacity of healthcare workers	• Caregiver counselling programs
Individual	• Competing demands • Perception of nutritional disease	

Appendix Table 11 Systems perspective of barriers and boosters to complementary feeding in Ghana

HEALTH SYSTEM **Barriers:** • Competing demands on caregivers, quality of healthcare services **Boosters:** • Caregiver education and counselling	**WASH SYSTEM** **Barriers:** • Early introduction of water **Boosters:** • Caregiver counselling in hygiene
SOCIAL PROTECTION SYSTEM **Barriers:** • Implementation challenges in programming	**FOOD SYSTEM** **Barriers:** • Increase in processed food consumption, low uptake of fortified foods

Summary of complementary feeding barriers and boosters in Mali

Appendix Table 12 Multi-level perspective of barriers and boosters to complementary feeding in Mali

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	• "Awareness" at national policy level does not include fathers sufficiently • Quality issues with complementary feeding products	• Monetary transfer programs for pregnant and breastfeeding mothers • Mali/UNICEF's perinatal program • Establishment of the National Nutrition Policy
Community	• Lack of availability of complementary food • Shift from traditional diet • Demand for imported products • Community environmental barriers	• Radio broadcasts promoting complementary feeding • Community-level interventions such as SPRING
Institutional	• Limited family-based health promotion within healthcare settings • Institutions' difficulty selling and promoting products targeted at a specific age group.	• Production and commercialization of products • Collaboration between research organizations • Mali/USAID's Health Strategy for 2013-2018 seeking to promote healthy behaviors • Fortified agricultural products • Distribution of complementary foods to zones experiencing conflict
Household	• Lack of affordable nutritious food • Wide availability of unhealthy foods. • Mothers lack of purchasing power • Number of children within the household • Various responsibilities of mothers • Women in rural areas experiencing poverty.	
Interpersonal	• Women not receiving adequate information on complementary feeding.	
Individual	• Lack of knowledge surrounding complementary feeding • Preference for "easy to prepare" foods	

Appendix Table 13 Systems perspective of barriers and boosters to complementary feeding in Mali

HEALTH SYSTEM

Barriers:
- Lack of information given to women at health centers
- Fathers not included in health advice relating to complementary feeding

Boosters:
- Caregiver education and counselling

WASH SYSTEM

Barriers:
- Lack of access to clean water leading to unhealthy foods
- Children losing nourishment due to clean water issues

Boosters:
- USAID/ Mali's Health Strategy for 2013-2018 had with intervention focused on water and sanitation
- SPRING-supported communities which had a focus on hand-washing with soap

SOCIAL PROTECTION SYSTEM

Barriers:
- Women lacking purchasing power
- Competing demands due to increasing role of women in workforce
- Social protection programs insensitive to nutrition

Boosters:
- Monetary transfer programs for pregnant and breast-feeding women
- Distribution of food to zones experiencing conflict

FOOD SYSTEM

Barriers:
- Lack of optimal, purchasable foods
- Transition from traditional diets
- Reluctance of marketers to sell new products
- Lack of availability of nutritious foods
- High availability of unhealthy foods
- Feeding of child affected by poverty

Boosters:
- Mali identified as having high per capita consumption of locally produced rice
- Programming promotion of optimal food preparation practices

Summary of complementary feeding barriers and boosters in Niger

Appendix Table 14 Multi-level perspective of barriers and boosters to complementary feeding in Niger

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy		• Policy of Nutritional Security (PSN) • National Nutrition Security Policy (2016–2025) • Enabling policy environment for young child diets at national level • Fortified Food Availability Policies • National Clean Villages Program
Community	• Lack of consistent food availability throughout year • Environmental challenges such as drought limiting food production • Longstanding social norms around feeding (e.g. food taboos around some young child foods) • Gender norms not favouring women's autonomy • High levels of poverty	
Institutional		• Collaboration among development partners in country • Education campaigns and subsidizing foods • Promoting complementary feeding through the health system (integrated community case management program) • Multi-channel SBCC programming
Household	• Lack of nutritious food access due to affordability	
Interpersonal	• Strong influences from in-laws, heads of households, neighbors on feeding practices	• Husband Schools Initiative to engage fathers/husbands in behavior change
Individual	• Insufficient caregiver knowledge • Competing demands	

Appendix Table 15 Systems perspective of barriers and boosters to complementary feeding in Niger

HEALTH SYSTEM

Boosters:

- Promoting complementary feeding through the health system (integrated community case management program)
- Husband Schools Initiative to engage fathers/husbands in behavior change

WASH SYSTEM

Barriers:

- Limited access to clean water

Boosters:

- National Clean Villages Program

SOCIAL PROTECTION SYSTEM

Barriers:

- Gender norms not favouring women's autonomy
- High levels of poverty

FOOD SYSTEM

Barriers:

- Lack of consistent food availability throughout year
- Environmental challenges such as drought limiting food production
- Longstanding social norms around feeding (e.g. food taboos around some young child foods)
- Lack of nutritious food access due to affordability

Boosters:

- Policy of Nutritional Security (PSN)
- National Nutrition Security Policy (2016–2025)
- •Enabling policy environment for young child diets at national level
- Fortified Food Availability Policies

Summary of complementary feeding barriers and boosters in Nigeria

Appendix Table 16 Multi-level perspective of barriers and boosters to complementary feeding in Nigeria

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	• Lack of health system follow up	• National nutrition policies
Community	• Cultural Beliefs • Lack of knowledge	• Community Counselling Services
Institutional	• Inconsistent resources for implementation	• Advocacy for complementary feeding practices
Household	• Lack of nutritious food affordability • Gender Norms	
Interpersonal	• Influence of Elders • Food Taboos	
Individual	• Lack of caregiver knowledge	

Appendix Table 17 Systems perspective of barriers and boosters to complementary feeding in Nigeria

HEALTH SYSTEM **Boosters:** • National policies supporting nutrition • Counselling programming for caregivers **Barriers:** • Poor understanding of disease	**WASH SYSTEM** **Barriers:** • Lack of potable water • Open defecation near water sources
SOCIAL PROTECTION SYSTEM • None discussed	**FOOD SYSTEM** **Barriers:** • Food affordability **Boosters:** • National fortification program

Summary of complementary feeding barriers and boosters in Senegal

Appendix Table 18 Multi-level perspective of barriers and boosters to complementary feeding in Senegal

LEVELS OF INFLUENCE	SALIENT BARRIERS*	BOOSTERS
Policy	• Inappropriate breast milk substitute labelling by the food industry	• Innocenti Declaration, Protection, Promotion and support of breastfeeding in 1990, education mothers on the importance of breastfeeding • Maternity leave regulation gave cash and secured jobs from mothers on maternity leave • International code of Marketing of Breastmilk substitutes in 1981 controlled breastmilk substitutes • Government supporting capacity building of salt producers toward fortification
Community	• Traditional porridges/feeding lacks nutrients • Lack of iodized salt in certain areas • Food taboos prevent adequate complementary feeding • Lack of availability of nutritious foods	• Community Counselling Services
Institutional	• Inconsistent resources • Short-lived interventions–not scaled up • Majority of complementary foods are imported	• Large scale food fortification programs • Radio programs and other SBCC providing information on the importance of complementary foods • Integrated programming across sectors • Ministry of Health vitamin A supplementation programming
Household	• Lack of nutritious food affordability	
Interpersonal		
Individual	• Lack of caregiver knowledge • Competing demands of caregivers	

Appendix Table 19 Systems perspective of barriers and boosters to complementary feeding in Senegal

HEALTH SYSTEM

Boosters:

- Home visits of community care workers
- Health care workers from ministry of health using integrated approaches
- Pregnant mothers receive package of health services
- Ministry of Health scaling up VAS programs

Barriers:

- Financial and geographic constraints to accessing health services
- Lack of resources within healthcare system makes health advice difficult

WASH SYSTEM

Barriers:

- Water points are located 2-3 hours away from some households; traveling time strains child care

SOCIAL PROTECTION SYSTEM

Boosters:

- Maternity leave regulation gave cash and secured jobs from mothers on maternity leave

FOOD SYSTEM

Barriers:

- Lack of availability of fortified foods
- Majority of complementary foods are imported
- Lack of household purchasing power for foods
- Small scale salt producers not having capacity for fortification
- Inappropriate breast milk substitute labelling

Boosters:

- Increasing prevalence of complementary foods made with local products
- Fortification of infantile flours and other foods
- National program for fortification of foods
- Government supporting capacity building of salt producers toward fortification
- Better diversification of porridges to include more nutritious foods

Multiple Micronutrients Supplementation

INTERVENTION DESCRIPTION–MMS	MAIN FINDINGS
Study site: Kongoussi, a rural and poor district of Burkina Faso Intervention: Complementary foods with added multiple micronutrient supplements Study description: In total, 131 children aged 6-23 months consumed an improved gruel and received malaria and helminth prevention and treatment for 6 weeks. Children received either multiple micronutrients supplement (containing iron, zinc, vitamin A, vitamin C and iodine) with improved gruel (MMGG), or the improved gruel only (GG).	Multiple nutrient supplements added to complementary foods showed effects on improving hemoglobin concentrations compared to complementary foods only. Hemoglobin (Hb) concentration outcome: Mean Hb concentration increased from 89.2 (SD 6.5) g/L to 104.1 (SD 11.4) g/L in the GG (P<0.01), and 90.3 (SD 8.4) g/L to 107.6 (SD 14.7) g/L in the MMGG (P<0.01), respectively, corresponding to an increment of 14.8 (SD 11.8) g/L in the GG and 17.3 (SD 15.8) g/L in the MMGG. There were no significant between-group differences in mean (SD) endpoint Hb concentration (P <0.13). (Ouedraogo et al. 2010)

INTERVENTION DESCRIPTION – MMS AND IRON	MAIN FINDINGS
Study site: Kongoussi, a rural and poor district of Burkina Faso Intervention: Micronutrient supplements (zinc and iron), multiple micronutrient (MM) supplements (Vitamin A, C, D, E, K, B1, B6, and B12, Riboflavin, Folic acid, Niacin, Iron, Zinc, Copper, Iodine) Study description: A total of 299 children aged 6-23 months were randomized into an iron group, an iron and zinc group (IZ), or an MM group for 6 months	Children who received MM had higher hemoglobin concentrations compared to those with zinc or iron supplements only. Children who received MM supplements had higher anemia recovery rates compared to children with zinc or iron supplements only. Hemoglobin (Hb) concentration and anemia outcomes: The mean (SD) endpoint Hb concentration was higher in the MM group [113.2 (13.6) g/L] than in the IZ group [106.3 (15.6) g/L] and the Fe group [107.1 (12.9) g/L] (P = 0.001). Children in the MM group were 62% more likely to recover from anemia than those in the Fe group [prevalence rate ratios, PRR (95% confidence interval, CI) = 1.62 (1.22–2.15), P < 0.001]. (Ouedraogo et al. 2008)

INTERVENTION DESCRIPTION–MMP	MAIN FINDINGS
Study site: Two municipalities and forty villages in the Nioro Circle in Mali Intervention: Multiple micronutrient powder (MMP), containing 400 µg vitamin A (retinol equivalents), 150 µg folic acid, 5 µg cholecalciferol (vitamin D3), 90 µg iodine, 17 µg Se, 0.9 µg vitamin B12, 6 mg niacin, 10 mg Fe, 4.1 mg Zn, 0•56 mg Cu, 0.5 mg thiamin, 0.5 mg riboflavin, 30 mg vitamin C, 0.5 mg vitamin B6 and 5 mg vitamin E. Study description: In the control group (n = 326), children aged 6–23 months received no supplement. In intervention group (n = 396), children received a daily dose of MNP for 3 months. In both groups, mothers received group education on child complementary feeding.	MNP intervention showed a significant improvement in Hb concentration and reduced the rate of severe anemia. The intervention had no impact on children growth. Anthropometric outcome: Supplementation had no significant effect on growth (anthropometric measurements). The mean weight gain was similar in the intervention and control groups (0.76 and 0.74 kg, respectively), as was the MUAC gain (3.4 and 3.8 mm, respectively). Hemoglobin and anemia prevalence outcomes: Overall prevalence of anemia in the sample was 90%. MNP use provided a modest but statistically significant Hb change v. no intervention (0.50 v. 0.09 g/dl, P=0•023). Prevalence of anemia was decreased (91.3–85.8% (P=0•04)) in the intervention group v. 88.1–87.5% (P=0•86) in the control group. Proportion of severe anemia was reduced by 84% (from 9.8 to 1.6%) in the intervention group but increased in the control group (from 8.5 to 10.8 %). (Somasse et al. 2018)

INTERVENTION DESCRIPTION–MMP	MAIN FINDINGS
Study site: Koforidua, in the Eastern region of Ghana Intervention: Micronutrient supplements for home fortification of complementary foods containing 6, 16, and 19 vitamins and minerals. Study description: A total of 313 Ghanaian infants were randomly assigned with home fortification of complementary foods with Sprinkles powder (SP), crushable Nutritabs (NT) tablets, or energy-dense, fat-based Nutributter (NB). A group of children not selected to receive home fortified complementary foods were considered as control group (NI). The composition of SP: beta-carotene, vitamin C, B3, folic acid, iron and zinc. The composition of NT: beta-carotene, vitamin C, folic acid, thiamine, riboflavin, vitamin B3, pantothenic acid, vitamin B6, B12, iron, zinc, calcium, potassium, copper, selenium, and iodine. The composition of NB: beta-carotene, vitamin C, folic acid, thiamine, riboflavin, vitamin B3, pantothenic acid, vitamin B6, B12, iron, zinc, calcium, potassium, copper, selenium, iodine, phosphorus, magnesium, manganese.	Energy-dense, fat-based Nutributter had positive effects on child's growth. All three micronutrient supplements for home fortified complementary foods were effective for reducing the prevalence of iron deficiency in infants and young children from 6 to 12 mo. Growth outcome: At 12 mo, the NB group had a significantly greater weight-for-age z score (WAZ) (-0.49 +/- 0.54) and length-for-age z score (LAZ) (-0.20 +/-0.54) than did the NT group (WAZ:–0.67 +/- 0.54; LAZ:–0.39 +/- 0.54) and the NT and SP groups combined (WAZ:–0.65 +/- 0.54; LAZ:–0.38 +/- 0.54); the difference with the NI group (WAZ:–0.74 +/- 1.1; LAZ:–0.40 +/- 1.0) was not significant. Anemia, iron status, and plasma zinc: At 12 mo, all 3 intervention groups had significantly higher ferritin and lower transferring receptor concentrations than did the NI control group. Mean (± SD) hemoglobin was significantly higher in NT (112 ± 14 g/L) and NB (114 ± 14 g/L) but not in SP (110 ± 14 g/L) infants than in NI infants (106 ± 14 g/L). The prevalence of iron deficiency anemia was 31% in the NI control group compared with 10% in the intervention groups combined (P < 0.0001). (Adu-Afarwuah et al. 2007, Adu-Afarwuah et al. 2008)

Micronutrient Supplementation with One or Two Micronutrients

INTERVENTION DESCRIPTION – ZINC SUPPLEMENTATION	MAIN FINDINGS
Study site: 31 rural communities within the catchment area of the governmental health clinic located in Toussiana, Burkina Faso Intervention: Zinc supplements in tablets or liquid forms Study description: Children aged 6 to 23 months (N=451) were randomly assigned to receive a dispersible tablet containing 5 mg Zn, a Zn solution containing 5 mg Zn/5 mL, or a placebo solution, daily for 3 weeks.	Zinc supplementation was significantly associated with higher zinc concentrations. Zn concentration outcome: the mean plasma Zn concentration was significantly greater in both Zn supplemented groups (tablets: 16.9 ± 13.1µg/dL, liquid: 16.6 ± 14.2 µg/dL), compared with the placebo group (0.2 ± 10.9 µg/dL; P < .001). (Wessels et al. 2012)

INTERVENTION DESCRIPTION – ZINC SUPPLEMENTATION	MAIN FINDINGS
Study site: Nouna, a rural area of Burkina Faso Intervention: Zinc supplements Study description: A total of 686 children aged 6-30 months received either a 12.5-mg zinc sulfate tablet or a placebo every day for about 6 months.	Zinc supplementation was significantly associated with improved growth status in girls only. Growth outcome: The effect of supplementation on nutritional status was not detectable in boys, but girls who received supplementation experienced a faster growth velocity in height than did control girls (P = 0.004) and a faster growth velocity for weight and height if they were wasted and not stunted at baseline (P = 0.003) (Garenne et al. 2007)

INTERVENTION DESCRIPTION–VITAMIN A AND ZINC SUPPLEMENTATION	MAIN FINDINGS
Study site: Brong Ahafo Region of Ghana Intervention: Vitamin A with zinc supplementation Study description: A total of 200 children aged 6–24 months were randomized to receive either vitamin A and 10 mg daily zinc in the intervention group or vitamin A and zinc placebo for 6 months in the control group.	Vitamin A and zinc supplements were not significantly associated with children's growth, anemia, or zinc concentrations. Arthropometric outcome: No significant difference in anthropometric indices between the intervention and control groups at baseline, endline, or 6 months later. Anemia outcome: Anemia rates were not significantly different at baseline and endline between the intervention and the control groups. Fewer children in the intervention group (23.9%) were anemic at end line compared to infants in the control (29.4%) but this was not statistically significant (p = 0.69). Zinc outcome: Plasma zinc levels were higher at endline in the intervention group compared to the control group but this was not statistically significant. (Owusu-Agyei et al. 2013)

INTERVENTION DESCRIPTION–VITAMIN A AND CALCIUM	MAIN FINDINGS
Study site: Three urban communities in Jos, Nigeria Study composition: Vitamin A, and daily calcium supplementation Study description: Each community was randomly assigned to receive vitamin A only, vitamin A plus calcium tablets, or vitamin A plus ground fish (a locally available calcium source). Vitamin A was dispensed in prefilled syringes for oral administration of 2500 U (0.1 mL) daily. Calcium carbonate was dispensed to provide 400 mg (2 chewable tablets that were crushed and mixed with the child's regular food) of elemental calcium daily. Ground fish was tested for palatability in 15 hospitalized children and was accepted by all of them. A spoon was provided to administer 10 g of ground fish daily, mixed with the child's food.	Calcium supplementation or consumption of complementary foods enriched with calcium does not affect blood lead levels. The overall compliance for this 18-month trial was found the highest in the ground fish group (65%), and the lowest in the calcium tablet group (57%). Blood lead levels: The mean (±SD) baseline lead level was 11.1 ± 7.8 µg/; 44.7% of subjects had a lead level >10 µg/dL. After 12-18 months, the mean lead level was 8.1 ± 6.3 µg/dL, with 22.6% with a level >10 µg/dL. In a multiple regression model, the decrease in blood lead level was predicted by age, baseline lead level, and time of final lead value at 12-18 months (R2 = 31%), but not by calcium supplementation (P = .98). (Keating et al., 2011)

Micronutrient-fortified foods

INTERVENTION DESCRIPTION–IRON-FORTIFIED CEREAL PORRIDGE	MAIN FINDINGS
Study site: Lower-income neighborhood of Dakar, Senegal Intervention: Iron-fortified cereal porridge, and a liquid multivitamin supplement with or without zinc Study description: 138 children aged 9–17 months were randomly assigned to receive one of the treatments for 15 d: 1) 30 g dry weight of an iron-fortified cereal porridge and a liquid multivitamin supplement without zinc (control group), 2) the same porridge and multivitamin supplement with 6 mg Zn added to the supplement (ZnSuppl group), or 3) the same porridge with added zinc to provide 6 mg Zn per 25 g dry weight of porridge and multivitamin without zinc (ZnFort group).	Daily zinc supplementation increased the plasma zinc concentration in children aged 9–17 months. Plasma zinc concentration outcome: Mean (±SD) plasma zinc concentration (µg/dL) increased by 4.7 ± 1.6 (P = 0.004) in the ZnSuppl group, which was significantly greater (P = 0.009) than the mean change in the control group (–1.0 ± 1.6; P = 0.51) and in the ZnFort group (–1.8 ± 1.7; P = 0.29). The latter 2 groups did not differ from each other (P = 0.99). (Lo et al. 2011)

INTERVENTION DESCRIPTION - IRON-FORTIFIED COMPLEMENTARY FOOD	MAIN FINDINGS
Study site: South-central Cote d'Ivoire Study composition: Iron-fortified complementary food Study description: Children aged 12-36 months were randomly assigned into one of five study groups: group 1: normal diet and intermittent preventive treatment (IPT) -placebo (n = 125); group 2: consumption of porridge, an iron- fortified complementary food (CF) with optimized composition providing 2 mg iron as NaFeEDTA and 3.8 mg iron as ferrous fumarate 6 days per week (CF-FeFum) and IPT-placebo (n = 126); group 3: IPT of malaria at 3-month intervals, using sulfadoxine-pyrimethamine and amodiaquine and no dietary intervention (n = 127); group 4: both CF-FeFum and IPT (n = 124); group 5: consumption of porridge, an iron-fortified CF with the composition currently on the Ivorian market providing 2 mg iron as NaFeEDTA and 3.8 mg iron as ferric pyrophosphate 6 days per week (CF-FePP) and IPT-placebo (n = 127)	Iron-fortified complementary foods did not affect the odds of anemia, but significantly decreased iron deficiency in children aged 12-36 months. Anemia and iron deficiency: The adjusted differences in Hb were 0.24 g/dl (95 % CI −0.10 to 0.59; P = 0.16) in children receiving IPT and −0.08 g/dl (95 % CI −0.42 to 0.26; P = 0.65) in children receiving CF-FeFum. At baseline, anaemia (Hb <11.0 g/dl) was 82.1 %. After 9 months, IPT decreased the odds of anaemia (odds ratio [OR], 0.46 [95 % CI 0.23–0.91]; P = 0.023), whereas iron-fortified CF did not (OR, 0.85 [95 % CI 0.43–1.68]; P = 0.68), although ID (plasma ferritin <30 µg/l) was decreased markedly in children receiving iron fortified CF (OR, 0.19 [95 % CI 0.09–0.40]; P < 0.001). (Glinz et al. 2015)

Food supplementation with or without micronutrients

INTERVENTION DESCRIPTION–VITAMIN A, CALCIUM, VITAMIN A AND GROUND FISH	MAIN FINDINGS
Study site: Three urban communities in Jos, Nigeria Study composition: Vitamin A, and daily calcium supplementation Study description: Each community was randomly assigned to receive vitamin A only, vitamin A plus calcium tablets, or vitamin A plus ground fish (a locally available calcium source). Vitamin A was dispensed in prefilled syringes for oral administration of 2500 U (0.1 mL) daily. Calcium carbonate was dispensed to provide 400 mg (2 chewable tablets that were crushed and mixed with the child's regular food) of elemental calcium daily. Ground fish was tested for palatability in 15 hospitalized children and was accepted by all of them. A spoon was provided to administer 10 g of ground fish daily, mixed with the child's food.	Calcium supplementation or consumption of complementary foods enriched with calcium does not affect blood lead levels. The overall compliance for this 18-month trial was found the highest in the ground fish group (65%), and the lowest in the calcium tablet group (57%). Blood lead levels: The mean (±SD) baseline lead level was 11.1 ± 7.8 µg/; 44.7% of subjects had a lead level >10 µg/dL. After 12-18 months, the mean lead level was 8.1 ± 6.3 µg/dL, with 22.6% with a level >10 µg/dL. In a multiple regression model, the decrease in blood lead level was predicted by age, baseline lead level, and time of final lead value at 12-18 months (R2 = 31%), but not by calcium supplementation (P = .98). (Keating et al., 2011)

INTERVENTION DESCRIPTION – SOY OR MILK PROTEIN SUPPLEMENT	MAIN FINDINGS
Study site: Province du Passore, northern region of Burkina Faso Intervention: Food supplementation with soy or milk protein at different quality and quantity Study description: A total of 1609 children aged 6-23 months received the intervention comprised 12 weeks of food supplementation providing 500 kcal/day as lipid-based nutrient supplement (LNS) or corn-soy blend (CSB), each containing soy isolate (SI) or dehulled soy (DS), and 0%, 20%, or 50% of protein from milk.	Intervention with food supplements with soy or milk protein showed that soy isolate lipid-based nutrient supplements improved children's weight gain. Anthropometry (weight gain) outcome: LNS compared to CSB resulted in 128 g (95% CI 67, 190; $p < 0.01$) greater weight gain if both contained SI, but there was no difference between LNS and CSB if both contained DS (mean difference 22 g; 95% CI −40, 84; $p = 0.49$) Accordingly, SI compared to DS increased weight by 89 g (95% CI 27, 150; $p = 0.005$) when combined with LNS, but not when combined with CSB. (Fabiansen et al.2017)

INTERVENTION DESCRIPTION–COMPLEMENTARY FOOD WITH ADDED MICRONUTRIENTS, RUSF	MAIN FINDINGS
Study site: 18 rural health centers from the health district located in the Western region of Burkina Faso. Intervention: Complementary foods with added micronutrients; ready-to-use supplementary food Study description: A total of 1,824 children aged 6-24 months received two types of interventions. In the first arm of child-centered counselling (CCC), trained health workers provided weekly personalized counselling to care takers. In the other two intervention arms: children received weekly either 455g corn-soy blend with added micronutrients (CSB++) or 355g locally produced soy-based ready-to-use supplementary food (RUSF).	Micronutrient added complementary foods and ready-to-use supplementary foods demonstrated a higher rate in malnutrition recovery among children with moderate acute malnutrition compared to the children with caretakers receiving counseling only. Malnutrition recovery outcome: Supplement-based treatment (CSB++ and RUSF) of moderate acute malnutrition was found to be more effective than the provision of CCC. After a 3-month intervention, the recovery rate was significantly lower with CCC (57.8%) than with CSB++ (74.5%) and RUSF (74.2%) ($P<0.0001$). Both the CSB++ and RUSF groups performed equally well. (Nikiema et al. 2014)

INTERVENTION DESCRIPTION–LOCAL CATERPILLAR-BASED CEREAL SUPPLEMENT	MAIN FINDINGS
Study site: The rural Equateur Province in the DRC Intervention: A micronutrient-rich, locally available cereal made from caterpillars (an alternative to animal-source food) Study description: Six-month-old infants (n = 227) were cluster randomized to receive either caterpillar cereal daily until 18 months of age or the usual diet.	The hemoglobin concentration improved among infants in the cereal group, and the incidence of anemia decreased. Hemoglobin and anemia outcomes: Infants in the cereal group had higher hemoglobin concentration than infants in the control group (10•7 v. 10•1 g/dl, P = 0•03) and fewer were anemic (26 v. 50 %, P = 0•006) at endline. (Bauserman et al. 2015)

INTERVENTION DESCRIPTION–MORINGA LEAVE FORTIFIED FOODS	MAIN FINDINGS
Study site: Upper Manya Krobo district of the Eastern Region of Ghana Intervention: Complementary foods fortified with Moringa oleifera leaf powder Study description: A total of 103 infants aged 8-12 months were randomly assigned to received one of three study foods: Weanimix, a cereal-legume blend formulated with Moringa (MCL-35g), Moringa oleifera leaf powder (MLP) sprinkled on infants' usual complementary foods (MS-5g) and the control food Weanimix without Moringa (CG-35g).	Complementary foods fortified with Moringa oleifera leaf powder may not improve children's growth or hemoglobin concentration but may be beneficial in improving vitamin A levels. Anthropometric and growth outcomes: Weight gain was highest for infants in the CF-35g (control) group and lowest in the MCL-35g group (0.91 vs. 0.75 kg). There was a marginally significant difference in weight gain ($p = 0.05$) between the CF-35g (control) and the MCL-35g group (Weanimix with Moringa), after controlling for baseline values and wealth index. No statistically significant difference in weight gain between infants in the control and the MS-5g (Moringa as sprinkles) arm, (0.91 vs. 0.85 kg) or the two Moringa groups (0.75 vs. 0.85 kg). Length gain between baseline and endline was greatest in the CF-35g (control) group when compared to the two other groups. The CF-35g group had significantly higher ($p = 0.03$) length gain than the MCL-35g group, but not the MS-5g group ($p = 1.00$), after controlling for baseline values and wealth index. Difference between the two Moringa groups was not statistically significant ($p = 0.08$). Anemia outcome: There were no significant differences in hemoglobin concentrations between the study groups ($p = 0.33$) after controlling for baseline values, morbidity, and wealth index. The control group (CF-35g) had the highest increase in hemoglobin, followed by the MS-5g (Moringa as Sprinkles group). The MCL-35g group had the least increase in hemoglobin levels. Vitamin A outcome: There was a marginal increase in retinol levels from baseline to endline in all three study groups; differences were not statistically significant at endline for any of the study groups. At endline the mean retinol concentration in the intervention groups MCL35g and MS-5g were slightly higher (0.63 µmol/l and 0.65 µmol/l respectively) when compared with that of the control group (0.55 µmol/l). There were also no significant differences in blood retinol levels from baseline to endline within any of the three study groups. (Boateng et al. 2018, Boateng et al. 2019)

INTERVENTION DESCRIPTION–HIBISCUS SABDARIFA LEAVES FORTIFIED FOODS	MAIN FINDINGS
Study site: Two districts in Upper East Region in Ghana Intervention: Food-to-food fortification utilizing iron-rich food sources Study description: Childbearing aged women (15–49 years, n=120) and their toddlers (6–24 months) in intervention communities consumed veo soup/meal (HSM) three times a week, that was mainly made of Hibiscus Sabdarifa leaves. The mean meal contained 1.71 mg Fe/100 g.	Food-to-food fortification with iron-rich food sources protected stunting among infants but had no beneficial effects on their iron status. Growth outcome: Of the toddlers' nutritional indicators, Z-scores for HAZ, but not WHZ, differed between the two groups when examined as a continuous variable. There was significant difference between groups for stunting at endpoint ($p = 0.024$). Compared with the control group, the number of stunted toddlers declined in the intervention group. Iron and anemia outcomes: Anemia, iron deficiency, and iron deficiency anemia prevalence did not differ significantly between intervention and control groups across time except for anemia and iron deficiency anemia in toddlers at baseline. (Kubuga et al. 2019)

Lipid-based Supplements with or without Single Micronutrients

INTERVENTION DESCRIPTION–LNS AND ZINC	MAIN FINDINGS
Study site: Rural communities of the Dande Health District in southwestern Burkina Faso Intervention: SQ-LNS with zinc Study description: A total of 3,220 children aged 9 months were randomly assigned to intervention (IC) or non-intervention (NIC) groups. Four intervention groups included: 1) SQ-LNS without zinc, placebo tablet; 2) SQ-LNS containing 5mg zinc, placebo tablet; 3) SQ-LNS containing 10mg zinc, placebo tablet; or 4) SQ-LNS without zinc and 5mg zinc tablet	Providing daily small-quantity lipid-based nutrient supplements with zinc significantly increased growth and reduced stunting and wasting prevalence in young children. Hb concentration outcome: Mean baseline Hb was 89±15 g/L, and 91.1% of the children were anemic at enrollment. At 18 months of age, mean Hb concentration increased significantly in IC compared to NIC, with no difference among the four intervention groups. This increase in Hb concentration resulted in a lower final anemia prevalence of 79.1% in IC, compared with 91.1% of children in NIC ($P<0.0001$). Growth outcome: Length at 18 months was significantly greater in IC compared to NIC (77.7±3.0 vs. 76.9±3.4 cm; $p<0.001$) and stunting prevalence was significantly lower in IC (29.3%) than NIC (39.3%; $p<0.0001$) but did not differ by intervention group within IC. Wasting prevalence was also significantly lower in IC (8.7%) than in NIC (13.5%; $p = 0.0003$). (Hess et al. 2015a)

INTERVENTION DESCRIPTION–LNS AND IODINE	MAIN FINDINGS
Study site: Rural communities of the Dande Health District in southwestern Burkina Faso Intervention: Small-quantity LNS with zinc or placebo; iodized salt Study description: A total of 284 children aged 8-9 months were randomly assigned to intervention (IC) or non-intervention (NIC) groups. IC children were randomly assigned to receive 20 g lipid-based nutrient supplements (LNS)/d containing 90 µg I with 0 or 10 mg Zn from 9 to 18 months of age, and NIC children received no SQ-LNS. All the children were exposed to iodized salt through the national salt iodization program.	In settings with high coverage of iodized salt, complementary foods with added iodine was not beneficial to iodine related biomarkers. At baseline and at 18 months, urinary iodine (UI), thyroid-stimulating hormone (TSH) and total thyroxine (T4) did not differ between cohorts. Plasma thyroglobulin (Tg) concentration was higher in the NIC v. IC at baseline, but this difference did not persist at 18 months of age. In both cohorts combined, the geometric mean of UI was 339•2 (95 % CI 298•6, 385•2) µg/l, TSH 0•8 (95 % CI 0•7, 0•8) mU/l, T4 118 (95 % CI 114, 122) nmol/l and Tg 26•0 (95 % CI 24•3, 27•7) µg/l at 18 months of age. None of the children had elevated TSH at 18 months of age. Marginally more children in NIC (8•9 %) had low T4 (<65 nmol/l) compared with the IC (1•6 %) (P = 0•052). (Hess et al. 2015b)

INTERVENTION DESCRIPTION–SQ-LNS	MAIN FINDINGS
Study site: Adjoining semi-urban communities in the Yilo Krobo and the Lower Manya Krobo districts Intervention: Small-quantity, lipid-based nutrient supplements (SQ-LNS) Study description: A total of 1320 women during gestation received standard iron and folic acid (IFA group), multiple micronutrients (MMN group), or SQ-LNS daily until delivery, and then placebo, MMNs, or SQ-LNS, respectively, for 6 mo postpartum. Infants received SQ-LNS formulated for infants from 6 to 18 mo of age.	Providing SQ-LNSs to women from pregnancy to 6 mo postpartum and to their infants from 6 to 18 mo of age may benefit children's growth. Providing SQ-LNSs to infant increased their iron status. Anthropometric and growth outcomes: At endline, overall mean length and length-for-age z score (LAZ) were 79.3 cm and −0.83, respectively, and 12% of the children were stunted (LAZ <−2). In analysis based on the intended treatment, mean ± SD length and LAZ for the LNS group (79.7 ± 2.9 cm and −0.69 ± 1.01, respectively) were significantly greater than for the IFA (79.1 ± 2.9 cm and −0.87 ± 0.99) and MMN (79.1 ± 2.9 cm and −0.91 ± 1.01) groups (P = 0.006 and P = 0.009, respectively). Differences were also significant for weight and weight-for-age z score but not head or midupper arm circumference, and the prevalence of stunting in the LNS group was 8.9%, compared with 13.7% in the IFA group and 12.9% in the MMN group (P = 0.12). In analysis based on actual supplement provided at enrollment, stunting prevalence were 8.9% compared with 15.1% and 11.5%, respectively (P = 0.045). Biomarkers and anemia outcomes: At 6 mo of age, groups did not differ in mean ± SD Hb (overall: 113 ± 9.9 g/L) or geometric mean (95% CI) zinc protoporphyrin (ZPP) [overall: 62.6 (60.6, 64.7)]. At 18 mo of age, mean ± SD Hb (overall: 112 ± 10.4 g/L) did not differ significantly between groups, whereas geometric mean (95% CI) ZPP was lower (P = 0.031) in the LNS group [53.9 (50.7, 57.3)] than the IFA [60.4 (56.7, 64.3)] but not the MMN [58.8 (55.6, 62.2)] group. Further, the LNS group, compared with the IFA and MMN groups combined, had a lower prevalence of elevated (>70) ZPP (27.5% compared with 35%; P = 0.02) and a marginally lower prevalence of anemia (38.7% compared with 44.9%; P = 0.06). These results generally remained unchanged when controlling for prespecified covariates or correcting for inflammation. (Adu-Afarwuah et al. 2016, Adu-Afarwuah et al. 2019)

INTERVENTION DESCRIPTION–SQ-LNS	MAIN FINDINGS
Study site: Bla and San, two health districts located in the Segou region of eastern Mali Intervention: Small-quantity lipid-based nutrient supplements (SQ-LNSs), containing energy, protein, lipid, linoleic acid, alpha-linolenic acid, calcium, phosphorus, potassium, magnesium, zinc, copper, iron, iodine, selenium, manganese, vitamin A, B1, B2, B6, B12, C, D, E, and K, niacin, pantothenic acid, and folic acid. Study description: A total of 1,132 children aged 6–23 months In both control and intervention arms, caregivers received behavior change communication (BCC) on nutrition, health and hygiene. In intervention arm, children also received a monthly supply of 20 g SQ-LNSs.	Intervention with SQ-LNSs was effective at reducing the acute malnutrition (AM) incidence, but it did not improve the AM prevalence. Child malnutrition outcome: The intervention led to a 29% (95% CI: 8%, 46%; p= 0.017) reduction in the incidence of a first AM episode (primary outcome) and reduced AM incidence by 31% (95% CI: 14%, 46%; p= 0.001). Over the 18 months of follow-up, the intervention resulted in a 30% (95% CI: 12%, 44%; p= 0.002) lower longitudinal AM prevalence (secondary outcome). (Huybregts et al. 2019)

INTERVENTION DESCRIPTION–LNS	MAIN FINDINGS
Study site: Madarounfa health district, Maradi region, Niger Intervention: Lipid-based nutrient supplements (LNS) Study description: A total of 2586 children aged 6 to 23 months received large-quantity LNS (LNS-LQ) or medium-quantity LNS (LNS-MQ) for 5 months. Both groups received cash transfer for the first five months.	Provision of LNS-MQ showed a greater protective effect on moderate acute malnutrition. Anthropometric and growth outcomes: Provision of LNS-LQ (reference) or LNS-MQ had, overall, similar effect on incidence of severe acute malnutrition (RR = 0.97; 95% CI: 0.67–1.40; P = 0.88), moderate acute malnutrition (RR=1.20; 95% CI: 0.97–1.48; P=0.08), severe stunting (RR=0.94; 95% CI: 0.70–1.26; P=0.69), and moderate stunting (RR=0.95; 95% CI: 0.76–1.19; P=0.67). Compared with LNS-LQ, LNS-MQ showed a greater protective effect on moderate acute malnutrition among children with good dietary adequacy: RR = 0.72; 95% CI: 0.56–0.94; P = 0.01 ; Provision of LNS-LQ might be more appropriate when food insecurity is high. (Prudhon et al., 2017)

INTERVENTION DESCRIPTION–LNS	MAIN FINDINGS
Study site: 11 villages in Madarounfa, Niger Intervention: Lipid-based nutrient supplements (LNSs) and Super Cereal Plus (SC+) Study description: A total of 1,967 children received LNS-LQs 500 kcal/d (92 g/d of Supplementary Plumpy; Nutriset) from August 2011 to December 2011, LNS-MQs 250 kcal/d (325 g/wk of Plumpy'Doz; Nutriset) from January to May 2012, and LNS-LQs again during the second lean season from June to October. Other children received SC+ 820 kcal/d (1.5 kg/wk; Michiels) during the first lean season, then SC+ 410 kcal/d (1.5 kg/2 wk), and finally SC+ 820 kcal/d again during the second lean season.	Both products yield the same beneficial effects on prevention of acute malnutrition and stunting in children aged 6–23 mo. Malnutrition outcome: No significant differences in the incidence of moderate acute malnutrition (SC+ compared with LNS: adjusted HR: 0.79; 95% CI: 0.61, 1.02) or SAM (HR: 0.84; 95% CI: 0.52, 1.34) were found. Growth outcome: No difference in the incidence of stunting (HR: 1.08; 95% CI: 0.95, 1.24) or severe stunting (HR: 0.94; 95% CI: 0.71, 1.22) over the follow-up period were found. (Sayyad-Neerkorn et al., 2015)

INTERVENTION DESCRIPTION–LNS	MAIN FINDINGS
Study site: Madarounfa health district, Maradi region, Niger Intervention: Lipid-based nutrient supplements (LNS) Study description: A total of 2586 children aged 6 to 23 months received large-quantity LNS (LNS-LQ) or medium-quantity LNS (LNS-MQ) for 5 months. Both groups received cash transfer for the first five months.	Provision of LNS-MQ showed a greater protective effect on moderate acute malnutrition. Anthropometric and growth outcomes: Provision of LNS-LQ (reference) or LNS-MQ had, overall, similar effect on incidence of severe acute malnutrition (RR = 0.97; 95% CI: 0.67–1.40; P = 0.88), moderate acute malnutrition (RR=1.20; 95% CI: 0.97–1.48; P=0.08), severe stunting (RR=0.94; 95% CI: 0.70–1.26; P=0.69), and moderate stunting (RR=0.95; 95% CI: 0.76–1.19; P=0.67). Compared with LNS-LQ, LNS-MQ showed a greater protective effect on moderate acute malnutrition among children with good dietary adequacy: RR = 0.72; 95% CI: 0.56–0.94; P = 0.01 ; Provision of LNS-LQ might be more appropriate when food insecurity is high. (Prudhon et al., 2017)

INTERVENTION DESCRIPTION – LNS	MAIN FINDINGS
Study site: 5 governmental health centers (Gomponsom, Latoden, Bagaré, Bokin, and Samba) in the Province du Passoré, Northern Region in Burkina Faso Intervention: Food supplementation with soy or milk protein at different quality and quantity Study description: A total of 1609 children aged 6-23 months received the intervention comprised 12 weeks of food supplementation providing 500 kcal/day as lipid-based nutrient supplement (LNS) or corn-soy blend (CSB), each containing soy isolate (SI) or dehulled soy (DS), and 0%, 20%, or 50% of protein from milk.	Intervention with food supplements with soy or milk protein showed that soy isolate lipid-based nutrient supplements reduced the risks of anemia. Iron biomarkers and anemia outcomes: During the 12-wk supplementation period, prevalence of anemia, low serum ferritin (SF) adjusted for inflammation (SFAI), elevated serum soluble transferrin receptor (sTfR), and iron-deficiencyanemia decreased by 16.9, 8.7, 12.6 and 10.5 percentage points. Children who received LNS compared to CSB had higher hemoglobin (2 g/L; 95% CI: 1, 4 g/L), SFAI (4.2 µg/L; 95% CI: 2.9, 5.5 µg/L), and CRP (0.8 mg/L; 95% CI: 0.4, 1.2 mg/L) and lower sTfR (–0.9 mg/L, 95% CI: –1.3, –0.6 mg/L) after the intervention. Replacing DS with SI or increasing milk content did not affect hemoglobin, SFAI, sTfR, or CRP. (Cichon et al. 2018)

INTERVENTION DESCRIPTION–RUSF	MAIN FINDINGS
Study site: Twelve community health centers in rural Mali Intervention: Ready-to-use lipid-based supplementary food (RUSF), fortified food, and a locally produced food Study description: 1264 moderately acute malnourished (MAM) children aged 6–35 months received one of four dietary supplements containing ~500 kcal/day: 1) RUSF; 2) special corn-soy blend (CSB++); 3) locally processed, fortified flour (Misola); or 4) locally milled flours plus oil, sugar, and micronutrient powder (LMF). RUSF contained peanut paste, sugar, vegetable oil, whey and soy protein isolates, maltodextrin and cocoa flavouring, and a vitamin-mineral mix. CSB++ was a specially formulated refined ceral-legume-milk blend, which contained dehulled soybean flour, maize flour, dried skimmed milk, soy, sugar, soya oil, and a micronutrient premix. Misola contained 60% millet or maize flour, 20% soy flour, 10% peanut flour, micronutrient premix, and amylase powder. LMF was a mixture of home-available foods, including millet, beans, sugar, and oil. Multiple micronutrient powder sachets were given to LMF group during the day of distribution.	RUSF was significantly associated with the improvement in length and weight gain and showed effective results in malnutrition treatment. CSB++ showed intermediate results in malnutrition treatment. Anthropometric outcome: The adjusted mean (95% CI) change in weight (kg) from baseline was greater with RUSF than with the locally processed blends and was intermediate with CSB++ [1.16 (1.08, 1.24) for RUSF, 1.04 (0.96, 1.13) for CSB++, 0.91 (0.82, 0.99) for Misola, and 0.83 (0.74, 0.92) for LMF; P, 0.001]. For length change, RUSF and CSB++ differed significantly from LMF. Malnutrition recovery outcome: Sustained recovery rates were higher with RUSF (73%) than with Misola (61%) and LMF (58%), P < 0.0001; CSB++ recovery rates (68%) did not differ from any of the other groups. (Ackatia-Armah et al. 2015)

INTERVENTION DESCRIPTION–RUSF	MAIN FINDINGS
Study site: 12 villages of Maradi, Niger Intervention: Ready-to-use supplementary foods (RUSF), ready-to-use therapeutic foods (RUTF) Study description: Children (N=1,645) aged 6 to 36 months received either a monthly distribution of RUSF (247 kcal/3 spoons/day) for 6 mo, or a monthly distribution of RUTF (500 kcal sachet/day) for 4 mo	The effectiveness of RUSF and RUTF varied with receipt of a previous nutritional intervention. The previous nutritional intervention modified the association between subsequent preventive strategy and the risk of wasting (P for interaction = 0.002) and severe wasting (P for interaction = 0.05). Growth outcome: In villages that did not receive the previous intervention, no differences were found in the incidence of wasting (adjusted HR: 1.31, 95% CI: 0.59 to 2.91) or severe wasting (adjusted HR: 1.21, 95% CI: 0.69 to 2.14) by supplementation strategy. In villages that received the previous intervention, the RUSF strategy was associated with a lower risk of wasting (adjusted HR: 0.54, 95% CI: 0.31 to 0.94) and severe wasting (adjusted HR: 0.41, 95% CI: 0.20 to 0.83) when compared to the RUTF strategy. Among those children not stunted at baseline, there were fewer stunting events associated with the RUSF strategy, compared to the RUTF strategy. After adjustment, the RUSF strategy was associated with a 19% (95% CI: 0% to 34%) reduction in the incidence of stunting. No difference in the incidence of severe stunting was found by supplementation strategy, and no interaction with the previous intervention was observed for the incidence of stunting (P for interaction = 0.36) or severe stunting (P for interaction = 0.49). (Isanaka et al., 2010)

INTERVENTION DESCRIPTION–RUTF	MAIN FINDINGS
Study site: 12 villages in Maradi, Niger Intervention: Ready-to-use therapeutic food Study description: A total of 3,533 children aged 6 to 60 months of age received a monthly distribution of one packet per day of ready-to-use- therapeutic food (500 kcal/day)	Short-term supplementation of RUTF improved children's growth and reduced the incidence of wasting. Growth ouctome: The intervention resulted in a 36% (95% CI: 17%–50%) reduction in the incidence of wasting and a 58% (95% CI: 43%–68%) reduction in the incidence of severe wasting. The adjusted effect of the intervention on weight-for-height Z score from baseline to the end of follow-up was 0.22 Z (95% CI: 0.13, 0.30). The absolute rate of wasting and severe wasting, respectively, was 0.17 events per child-year (140 wasting events / 841 child-years) and 0.03 events per child-year (29 wasting events / 943 child-years) in the intervention villages, as compared to 0.26 events per child-year (233 severe wasting events / 895 child-years) and 0.07 events per child year (71 severe wasting events / 1,029 child-years) in the non-intervention villages. (Isanaka et al., 2009)

INTERVENTION DESCRIPTION–RUTF	MAIN FINDINGS
Study site: Zinder region, South of Niger Intervention: Ready-to-use therapeutic food (RUTF) and a corn/soy-blend (CSB)-based premix Study description: Children (N=451) aged 6-59 months were individually randomized to receive either RUTF two packs daily, or, as suggested in the nutritional national protocol, a corn/soy-blend (CSB) pre-mix (1750 g of CSB, 175 ml of vegetable oil and 105 g of sugar).	Among children with moderate acute malnutrition (MAM), RUTF improved their weight gain, and increased the recovery rate of MAM. Recovery rate of MAM: Overall recovery rate was 79.1% in the RUTF group and 64.4% in the CSB pre-mix group ($p < 0.001$). Weight gain outcome: The average weight gain up to discharge was 1.08 g/kg/day higher in the RUTF group compared to the CSB pre-mix group (95% CI: 0.46–1.70). Among all children, the difference in average weight gain during the first 2 weeks of treatment was 1.86 g/kg/ day (95% CI: 1.04–2.67) in favor of the RUTF. (Nackers et al., 2010)

INTERVENTION DESCRIPTION–MICRONUTRIENT FORTIFIED SOYBEAN-MAIZE-SORGHUM RUCF	MAIN FINDINGS
Study site: South Kivu Province, DRC Intervention: Fortified soybean-maize-sorghum RUCF paste, and fortified corn soy blend (UNIMIX) Study description: 1,331 infants were randomly assigned at 6 mo of age to receive either RUCF or UNIMIX for 6 months. The RUCF used in this study consisted of extru- sion-cooked maize (Zea mais), soybeans (Glycine max), sorghum (Sorghum bicolor), milk powder, vegetable oil, sugar, and 3% micronutrient powder formulated to provide the recommended daily allowance of all micronutrients for infants aged 6– 12 mo each day. The energy density of RUCF was 22 kJ/g (5.5 kcal/g).	The acceptability of the RUCF was higher than the corn soy blend porridge, with >70% of infants consuming >75% of the RUCF served. The complaints regarding corn soy blend porridge were about the thickness of the food, and the cause of constipation. Length gain outcome: Compared to children consuming a fortified complementary food (corn soy blend porridge), children aged 6 months receiving RUCFs showed less improvement in length gain (RUCF: 5.2 ± 2.0; UNIMIX: 5.4 ± 2.0; P = 0.03). (Bisimwa et al. 2012)

INTERVENTION DESCRIPTION–RUTF AND MNP	MAIN FINDINGS
Study site: Town of Goronyo, Sokoto State, in the northwest of Nigeria Study composition: Supplementation with ready-to-use-therapeutic food (RUTF) and a micronutrient powder (MNP) Study description: Children aged 6 to 59 mo were rando- mised to one of three arms: one sachet/d of RUTF; two sachets/d of micronutrients or no supplement (control) for 14 d for 6 months	A 2-week supplementation with RUTF or MNP to ill children as part of routine primary medical care did not reduce the incidence of malnutrition. Negative nutrition outcomes: The incidence rates of negative nutrition outcomes for the RUTF, MNP, and control groups were 0.522 (95% confidence interval (95% CI), 0.442–0.617), 0.495 (0.415–0.589), and 0.566 (0.479–0.668) first events/y, respectively. The incidence rate ratio was 0.92 (95% CI, 0.74–1.15; p = 0.471) for RUTF versus control; 0.87 (0.70–1.10; p = 0.242) for MNP versus control and 1.06 (0.84–1.33, p = 0.642) for RUTF versus MNP. The average number of study illnesses for the RUTF, MNP, and control groups were 4.2 (95% CI, 4.0–4.3), 3.4 (3.2–3.6), and 3.6 (3.4–3.7). The proportion of children who died in the RUTF, MNP, and control groups were 0.8% (95% CI, 0.3–1.8), 1.8% (1.0–3.3), and 1.4% (0.7–2.8) (MNP) (van der Kam et al., 2016)

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