

# AFFORDABILITY OF NUTRITIOUS FOODS FOR COMPLEMENTARY FEEDING IN **UGANDA**

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## For more details and full sources, see the following article from which this brief is drawn:

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## Contact

Global Alliance for Improved Nutrition (GAIN)  
Rue de Varembe 7  
1002 Geneva, Switzerland  
T: +41 22 749 18 50  
E: [info@gainhealth.org](mailto:info@gainhealth.org)  
[www.gainhealth.org](http://www.gainhealth.org)

UNICEF  
Nutrition Section, Programme Division  
3 United Nations Plaza  
New York, NY 10017, USA  
E: [nutrition@unicef.org](mailto:nutrition@unicef.org)  
[www.unicef.org](http://www.unicef.org)



## KEY MESSAGES

- Several foods commonly available in Uganda are rich in nutrients lacking in young children’s diets. Several of these foods could be affordable in adequate quantities to meet half or even all of children’s vitamin A requirements from complementary feeding. These foods include liver (beef or chicken), dark green leafy vegetables, and orange-fleshed vegetables (such as carrots, pumpkin, mango, or papaya).
- Other nutrients are less affordable. About one-third of households in Uganda likely struggle to afford enough iron for young children. Pulses and dark green leafy vegetables are the most affordable sources of iron. Efforts to reduce prices and boost home production of these foods, as well as alternatives such as iron supplementation, should be considered.
- Calcium and animal-source protein are unaffordable for a smaller share of households (13-22%). Small dried fish are the lowest-cost source of both calcium and protein, and price reductions could help make this food more accessible to these lowest-resource households. Fresh milk is a similarly affordable source of protein, but other foods are more expensive.
- The most affordable foods for supplying multiple commonly lacking micronutrients are liver, small dried fish, fresh milk, and dark green leafy vegetables. Eggs, beef, and groundnuts are also considered affordable in this joint micronutrient analysis.
- In the short term, addressing child undernutrition among resource-constrained households may require providing cash or in-kind transfers or, for some nutrients, commercial fortification, point-of-use fortification, or supplementation. In the medium to long term, efforts to promote home production of nutritious foods, lower the prices of these foods, and raise incomes are crucial.

## WHY DOES AFFORDABILITY OF COMPLEMENTARY FOODS MATTER IN UGANDA?

Uganda, a low-income country, is home to 44 million people, three-quarters of whom live in rural areas.<sup>1-3</sup> Economic growth was less than 2% from 2012 to 2018, following a period of more rapid growth before 2012;<sup>3</sup> 21% of the population lives under the national poverty line.<sup>4</sup> The agriculture sector employs 72% of the workforce but accounts for only about 25% of GDP.<sup>4</sup> Uganda is estimated to produce enough food to feed its population,<sup>5</sup> yet there remains a substantial gap between the agriculture sector’s potential and its current performance.<sup>6</sup> Child undernutrition is widespread: 29% of children under age five are stunted, and 70% of children 6–23 months old do not consume an adequately diverse diet.<sup>7</sup> Anaemia among children under age five is high, at 53% nationally.<sup>7</sup> Although there have been some recent improvements in the consumption of vitamin A-rich fruits and vegetables, overall consumption of vitamin A-rich foods, nuts and legumes, and animal-source foods is low.<sup>7</sup>

Many children in the complementary feeding period—the period when infants and young children are 6–23 months old and breast milk is no longer sufficient to meet their nutritional needs—do not consume enough iron, vitamin A, calcium, and animal-source protein, and these shortfalls hinder their growth and development.<sup>8,9</sup> Unaffordability is an important barrier, among others,

to the consumption of foods rich in these important nutrients. However, the extent to which unaffordability is a barrier for specific nutrients and which foods are the most affordable sources of these nutrients are unclear. This brief summarizes the affordability of nutritious foods that could fill important nutrient gaps during the complementary feeding period and discusses implications for policy and programmes.

## METHODS

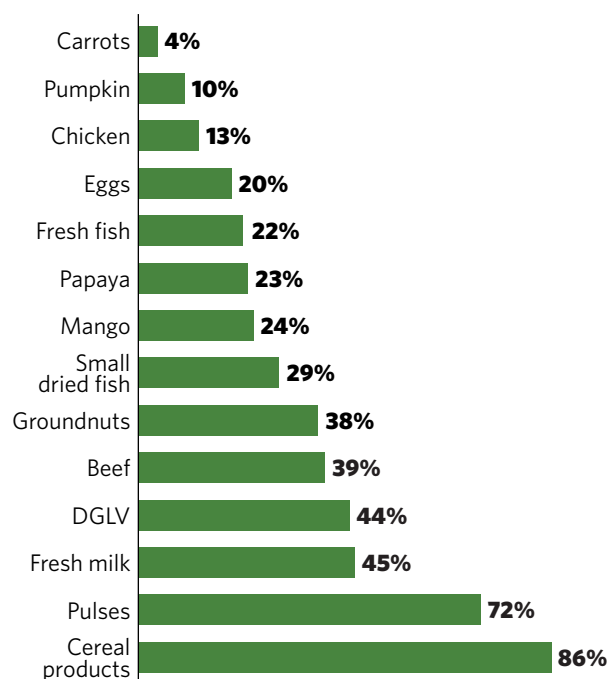
Using price and household expenditure data from the 2013–14 Living Standards Measurement Survey (LSMS),<sup>10</sup> we benchmarked the cost of foods that could meet nutrient requirements against current household food expenditures to assess affordability, using a previously developed method.<sup>11</sup> Because nutrients are generally obtained from a combination of foods, we analysed whether households could afford to meet half of the daily requirements for protein, iron, vitamin A, and calcium for their children aged 6–23 months through specific foods. These foods were chosen because of their nutrient content and availability in Uganda. For protein, only animal-source foods were used since plant-based sources of protein are generally not complete in essential amino acids critical for child growth and development.<sup>12</sup> We calculated the cost of realistic portion sizes required to meet 50% of nutrient needs from complementary foods (since nutrient requirements are met through

a combination of foods), adjusting for refuse, cooking yield, and bioavailability where applicable. To assess the relative affordability of nutrients and foods, these costs were compared with current food spending per adult equivalent (a method of adjusting for household size and composition) for each household with children aged 6–23 months surveyed. To assess absolute affordability, we established a threshold of 10% of household food spending per adult equivalent, based on previous analysis.<sup>11</sup> We also assessed foods in terms of their affordability for meeting needs for several micronutrients in combination. In this joint micronutrient analysis of six key micronutrients commonly lacking in the diets of infants and young children, we calculated which foods are most affordable at providing an average of one-third of a young child’s daily nutrient requirements from complementary foods. Finally, we compared the relative costs of energy among those foods that provide at least 100 kilocalories of energy in a 100-gram (g) portion (a threshold of 50 g was used for milk). It is important to note that this research contains several limitations, which are described in Ryckman et al. (2021).<sup>11</sup>

## HOUSEHOLD FOOD EXPENDITURE AND CONSUMPTION PATTERNS

On average, households spent 59% of their total expenditures on food. Purchases made up 54% of food expenditures (that is, the total value of food from all sources) while 46% came from home production and other sources. Households with children aged 6–23 months allocated most of their food expenditure to staples, including cereals (16% of food expenditure on average), roots and tubers (16%), and fruits (15%; mostly plantains), all of which were consumed by at least 80% of households in the two-week period covered by the survey. Expenditure on meat, fish, and eggs was also high (15% of food expenditure), with 74% of households consuming foods in this category. Most households consumed pulses (89% of households) and vegetables (98%) but allocated less than 10% of resources to these foods; 59% of households consumed nuts and seeds, and 46% consumed dairy products.

The specific foods chosen as possibilities to meet one or more nutrient requirements are shown in Figure 1, alongside cereal products for comparison. Of these, only pulses were consumed by more than half of households with children aged 6–23 months; 25–50% of households consumed milk, dark green leafy vegetables, beef, groundnuts, and/or small dried fish. The foods most commonly consumed from home production included pulses (38% of households), dark green leafy vegetables (32%), papaya (18%), mango (14%), milk (11%), and groundnuts (11%).



**FIGURE 1. Percentage of surveyed households that had consumed selected foods in the past week.** Data are from 728 households in the 2013–14 LSMS.<sup>10</sup> DGLV = dark green leafy vegetables.

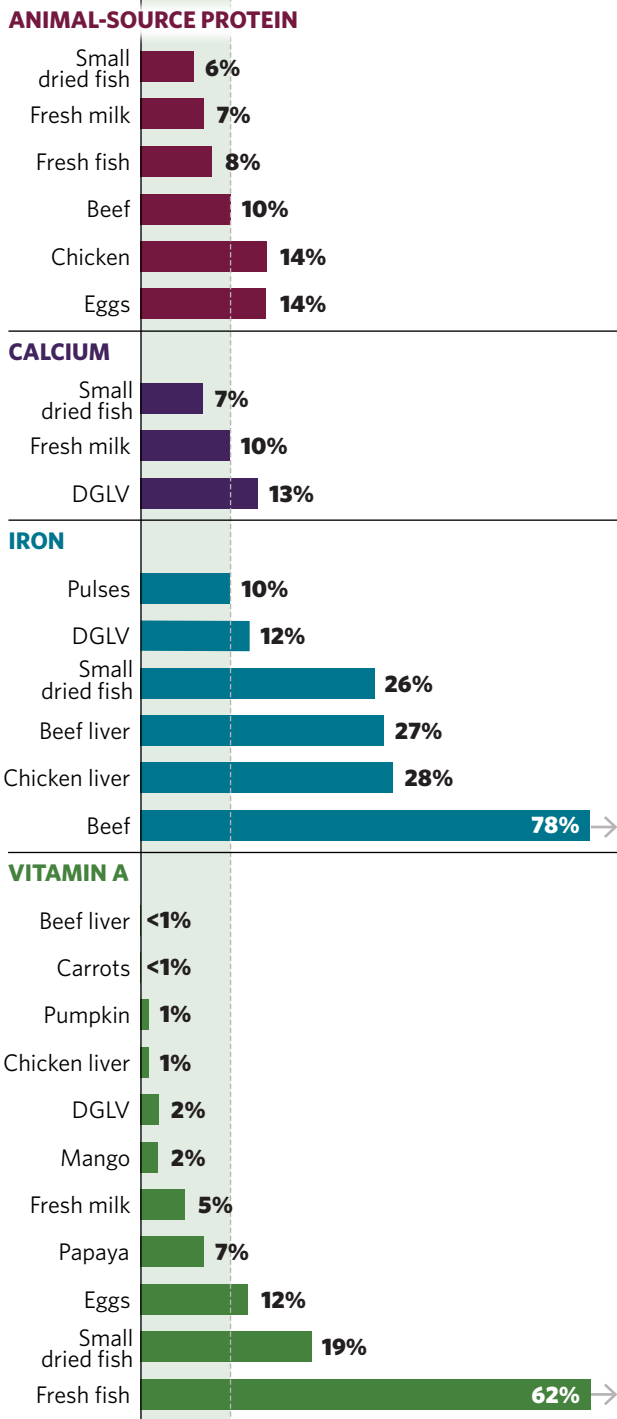
## AFFORDABILITY BY NUTRIENT

**Animal-source protein:** The lowest-cost animal sources of protein are small dried fish, which costs 6% of adjusted food expenditure on average, fresh milk (7%), and fresh fish (8%) (Figure 2). These foods cost less than 10% of adjusted food expenditure (and are thus considered affordable) for 73–87% of households (Figure 3). It is therefore estimated that 13% or more of households likely struggle to afford enough animal-source protein for children of complementary feeding age. Beef is also slightly below the 10% affordability threshold for the average household but exceeds 10% of adjusted food expenditure for more than one-third of households.

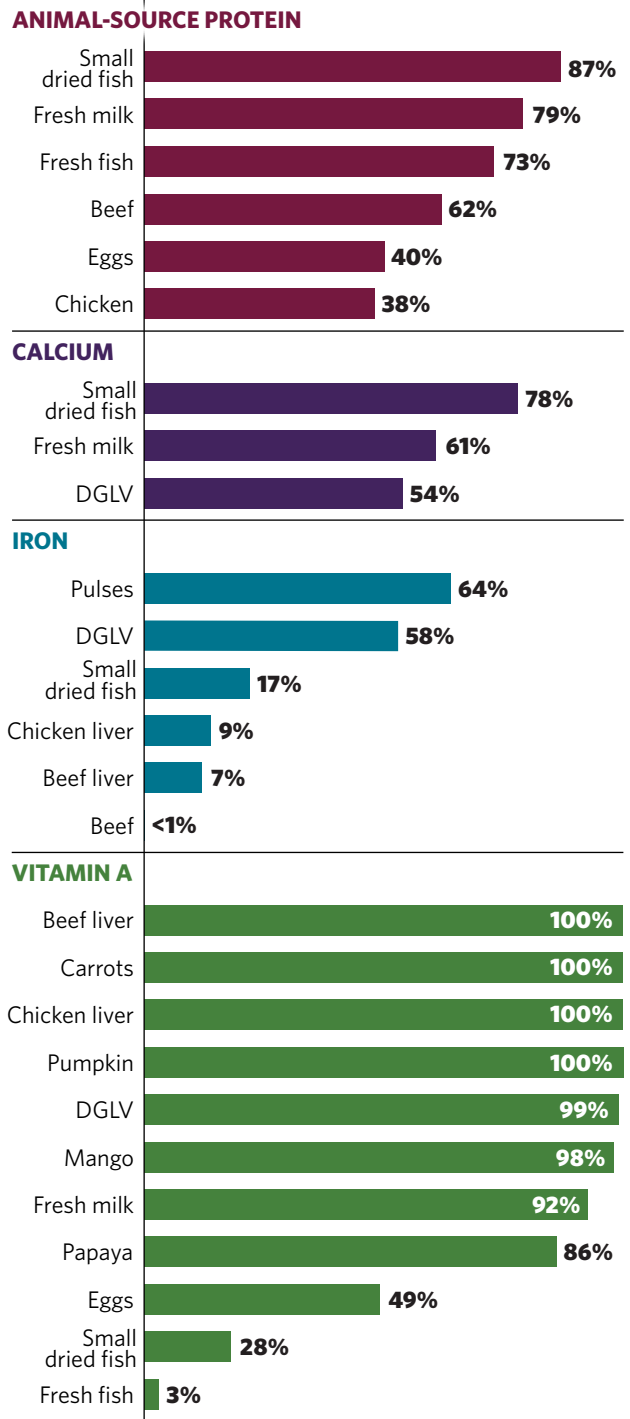
**Calcium:** Small dried fish and milk are the only foods consumed regularly by households in Uganda that could meet 50% of young children’s calcium requirements from complementary feeding for less than 10% of adjusted food expenditure for the average household. Small dried fish cost 7% of adjusted food expenditure on average but would exceed the 10% affordability threshold for 22% of households. Milk is an affordable option for 61% of households, whereas only 54% of households could afford the required portion size of dark green leafy vegetables.

**Iron:** Only pulses could fulfil half of daily iron requirements from complementary feeding for less than 10%

More affordable ← 10% → Less affordable



**FIGURE 2. Share of food expenditures per adult equivalent needed to meet half of nutrient requirements from complementary foods.** The dashed line represents the affordability threshold of 10%. Bars below the dashed line are considered affordable. Household expenditure data are from 728 households in the 2013-14 LSMS.<sup>10</sup> Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.<sup>13-19</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>11</sup> DGLV = dark green leafy vegetables.



**FIGURE 3. Percentage of households able to afford portion sizes meeting half of nutrient requirements from complementary foods.** Foods were considered affordable if their required share of food expenditures per person was below the affordability threshold of 10%. Household expenditure data are from 728 households in the 2013-14 LSMS.<sup>10</sup> Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.<sup>13-19</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>11</sup> DGLV = dark green leafy vegetables.

of adjusted food expenditure for the average household. However, pulses are right at the affordability threshold for the average household and would exceed it for 36% of households. Dark green leafy vegetables are the second most affordable source of iron, but they would be unaffordable for 42% of households. Animal sources of iron are substantially more expensive.

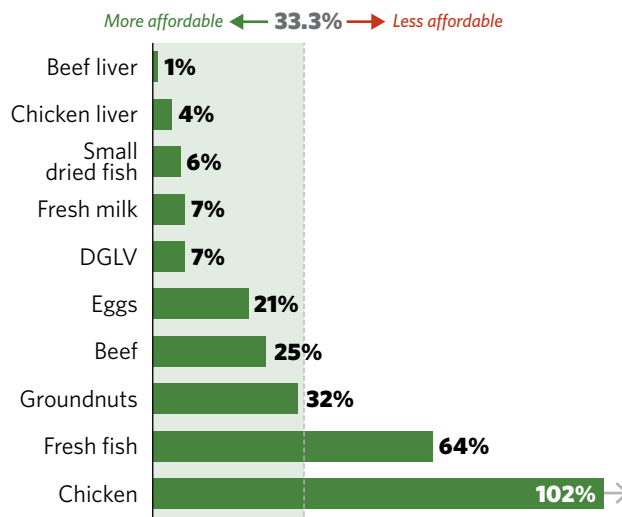
**Vitamin A:** All households with children aged 6–23 months in Uganda could purchase adequate quantities of beef liver, carrots, pumpkin, or chicken liver (and 98–99% could purchase dark green leafy vegetables and/or mango) for less than 10% of adjusted food expenditure. These foods cost an average of less than 1% to 2% of adjusted food expenditure, meaning that even portion sizes meeting 100% of vitamin A needs from complementary foods would be affordable for most households. Fresh milk and papaya cost 5% and 7% of adjusted food expenditure, on average, and would be affordable alternatives for 86–92% of households.

### AFFORDABILITY ACROSS MULTIPLE MICRONUTRIENTS

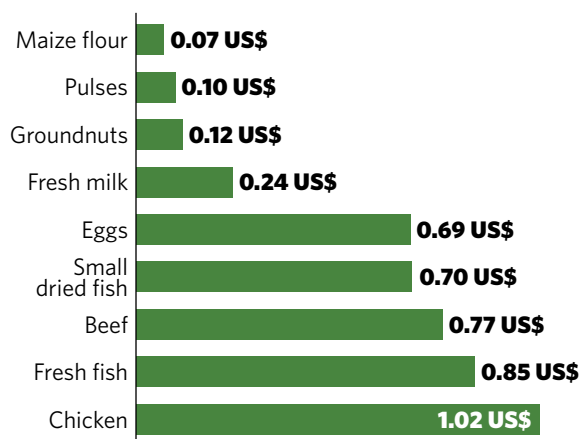
Some of the same foods identified as affordable sources of single micronutrients commonly lacking in young children’s diets in Eastern and Southern Africa are also affordable options for filling multiple micronutrient gaps in combination (Figure 4). These include liver (an affordable source of vitamin A), small dried fish (protein and calcium), milk (protein and, for some households, calcium), and dark green leafy vegetables (vitamin A, and, for some households, calcium and iron). Eggs and beef were relatively unaffordable sources of single nutrients, but like many animal-source foods, they contain enough of several micronutrients that they are more affordable when joint nutrient contributions are considered.

### DIETARY ENERGY AFFORDABILITY

When food affordability is considered based on energy contributions, plant-source foods tend to be lowest cost. Pulses and groundnuts cost only slightly more per kilocalorie than maize flour (a nutrient-poor, low-cost staple), but fresh milk, the lowest-cost animal-source food, costs twice as much as these foods (Figure 5). Other animal-source foods, including eggs, fish, beef, and chicken, cost much more per kilocalorie than plant-source foods. If households rely on lower-cost plant-source foods to feed young children, they may face difficulties in purchasing enough nutrient-dense animal-source foods while meeting children’s energy requirements.



**FIGURE 4. Share of food expenditures per person needed to provide an average of one-third of a young child’s requirements for iron, vitamin A, zinc, folate, vitamin B<sub>12</sub>, and calcium.** The affordability threshold (dashed line) was set at one-third (33.3%) of food expenditures because this analysis is based on meeting an average of one-third of requirements for six micronutrients from complementary foods. The share of daily requirements of each nutrient provided by the specified quantity of food was capped at 100%. Household expenditure data are from 728 households in the 2013–14 LSMS.<sup>10</sup> Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.<sup>13–19</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>11</sup> DGLV = dark green leafy vegetables.



**FIGURE 5. Cost of daily dietary energy requirements from complementary foods (450 kilocalories).** Price data are from the 2013–14 LSMS.<sup>10</sup> Dietary energy densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.<sup>13–19</sup> The cost of 450 kilocalories is shown because this is the average daily dietary energy requirement for a child aged 6–23 months.

## CONCLUSIONS

This analysis has shown that complementary feeding gaps in animal-source protein, iron, and calcium cannot be affordably filled by all households, particularly the lowest-spending 15–35%. These households likely rely on the cheapest available staple foods and struggle to meet energy and nutrient requirements.

Iron presents the greatest affordability barriers. The cheapest options to fill likely gaps in iron consumption, pulses and dark green leafy vegetables, are unaffordable for 36–42% of households with young children in Uganda. These foods are commonly consumed from home production (by 32–38% of households), so some households that otherwise might not be able to afford them could produce these foods themselves. Price reductions may help other households. However, given the magnitude of the affordability barriers, other alternatives such as iron supplementation may be needed.

Small dried fish are the most affordable source of both calcium and animal-source protein. However, they are unaffordable for 13–22% of households at current prices. Interventions to reduce small dried fish prices could help address nutrient gaps for these households. More research is needed on the extent to which other barriers, such as desirability or access, exist for small dried fish. Milk is also a relatively affordable source of protein (for 79% of households). However, other foods are much less affordable—more than one-quarter of households cannot afford fresh fish (protein), and almost half cannot afford milk or dark green leafy vegetables as a source of calcium. Interventions to improve the affordability of these foods may thus require further interventions.

Vitamin A gaps are unlikely to be caused by unaffordability and could instead be due to lack of access, desirability, time, convenience, or acceptability of foods for young children. Affordable sources of vitamin A include liver, dark green leafy vegetables, and orange-fleshed fruits and vegetables. All of these foods are consumed by fewer than half of households (and no data are available on liver consumption), so demand creation interventions focused on complementary feeding may be required.

Several of these same foods were among the most affordable options to fulfill multiple micronutrient requirements in combination: liver, small dried fish, milk, and dark green leafy vegetables. Eggs, beef, and groundnuts also fell below the affordability threshold in this joint micronutrient analysis.

Further analysis is needed to assess the potential for increased home production of nutritious foods, both for foods that are frequently home produced (such as pulses,

leafy greens) and for foods that are not (such as most animal-source foods), and other options such as commercial fortification, point-of-use fortification, and supplementation. In the short term, cash or in-kind transfers could also be useful for food-insecure households. In the long term, efforts to increase household incomes may be needed alongside production- and price-related interventions.

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