

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

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

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## KEY MESSAGES

- Several foods commonly available in Tanzania are rich in nutrients lacking in young children’s diets. However, the lowest-spending one-third of households struggle to afford enough of these nutritious foods to meet even 50% of the dietary requirements for iron of their children under age two. Dark green leafy vegetables and pulses are the most affordable sources of iron, and price reductions or increases in home production could help make these foods affordable for more households.
- While a dietary gap in vitamin A persists, it is not due primarily to affordability: all households can afford enough foods rich in these nutrients (liver, dark green leafy vegetables, orange-fleshed vegetables) to meet 50% or more of needs.
- Small dried/tinned fish is the most affordable food to meet requirements for calcium and protein (from animal sources), and 98% of households should be able to afford enough small dried/tinned fish at current prices. Price reductions could help for low-resource households. Other sources of protein, such as fresh fish and fresh milk, are unaffordable for a greater share of households (7-18%). Other sources of calcium are even less affordable, with more than 30% of households unable to purchase enough dark green leafy vegetables or milk at current prices.
- The most affordable foods to fill multiple micronutrient gaps in combination were liver, small dried/tinned fish, dark green leafy vegetables, and milk. Groundnuts, eggs, and beef were also affordable for many households 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, a combination of efforts to promote home production of nutritious foods, lower the prices of these foods, and raise incomes will be important to addressing nutrient gaps.

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

Tanzania is a low-income country with the sixth-largest population in Sub-Saharan Africa.<sup>1,2</sup> Poverty is widespread, with 23% of the population falling under the national poverty line.<sup>3</sup> Agricultural productivity is among the lowest in Sub-Saharan Africa, and agriculture accounts for less than 25% of GDP despite employing almost 70% of the workforce.<sup>3</sup> Most food consumed in the country is produced domestically, and most households rely on markets for purchasing at least some of their food—even rural households purchase nearly 38% of energy consumed.<sup>4</sup> Agricultural production is dominated by staple crops, predominantly maize.<sup>5</sup> Thanks to small-scale fisheries, fish is a vital and widely available food source,<sup>6</sup> and 70% of households own livestock,<sup>4</sup> yet only 30% of children 6-23 months regularly consume flesh foods.<sup>7</sup> Unaffordability is a serious obstacle to dietary diversity, with 59% of households unable to afford a nutritious diet.<sup>8</sup> Child undernutrition is widespread: 36% of children under age two are stunted, and 74% of children under age two do not consume an adequately diverse diet.<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>9,10</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

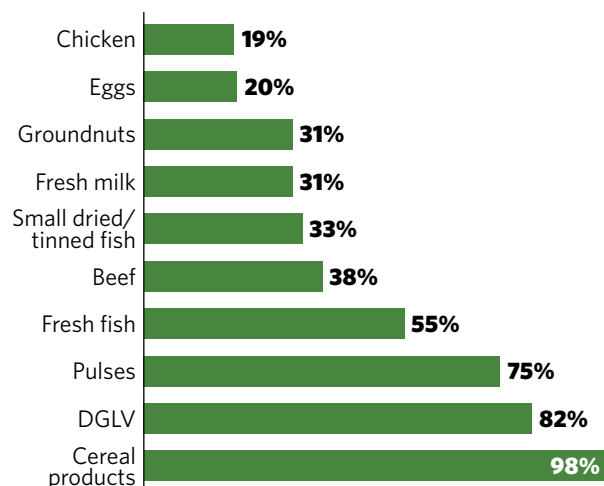
Using price and household expenditure data from the 2014-15 Tanzania Living Standards Measurement Survey (LSMS),<sup>11</sup> we benchmarked the cost of foods that could meet nutrient requirements against current household food expenditures to assess affordability, using a previously developed method.<sup>12</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 under age two through specific foods. These foods were chosen because of their nutrient content and availability in Tanzania. 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>13</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 under age two surveyed. To assess absolute affordability, we established a threshold of 10% of household food spending per adult equivalent, based on previous analysis.<sup>12</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 (kcal) 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>12</sup>

## HOUSEHOLD FOOD EXPENDITURE AND CONSUMPTION PATTERNS

On average, households spent 65% of total expenditures on food. Purchases made up about 65% of food expenditures (that is, the total value of food from all sources) while 35% came from home production and other sources. Households allocated 32% of food expenditure to cereal products on average. Although spending on meat, fish, and eggs was also high (15% of food expenditure) and these foods were consumed by 87% of households, households purchased smaller quantities of these animal-source foods than of plant-source foods owing to their relatively high prices. Other food groups accounted for less than 10% of expenditure, on average. Vegetables were consumed frequently (by 98% of households), but a far lower share of resources was allocated to them (9%). Mostly households also regularly consumed roots and tubers (70% of households), pulses (75%), and fruits (66%); 48% of households consumed nuts and seeds, and 39% consumed dairy.

Of the specific foods chosen as options to meet requirements for one or more nutrients, none were consumed as commonly as cereal products (Figure 1). Only three foods were consumed by more than half of households:



**FIGURE 1. Percentage of surveyed households that had consumed selected foods in the past week.** Data are from 1,062 households in the 2014-15 LSMS.<sup>11</sup> DGLV = dark green leafy vegetables.

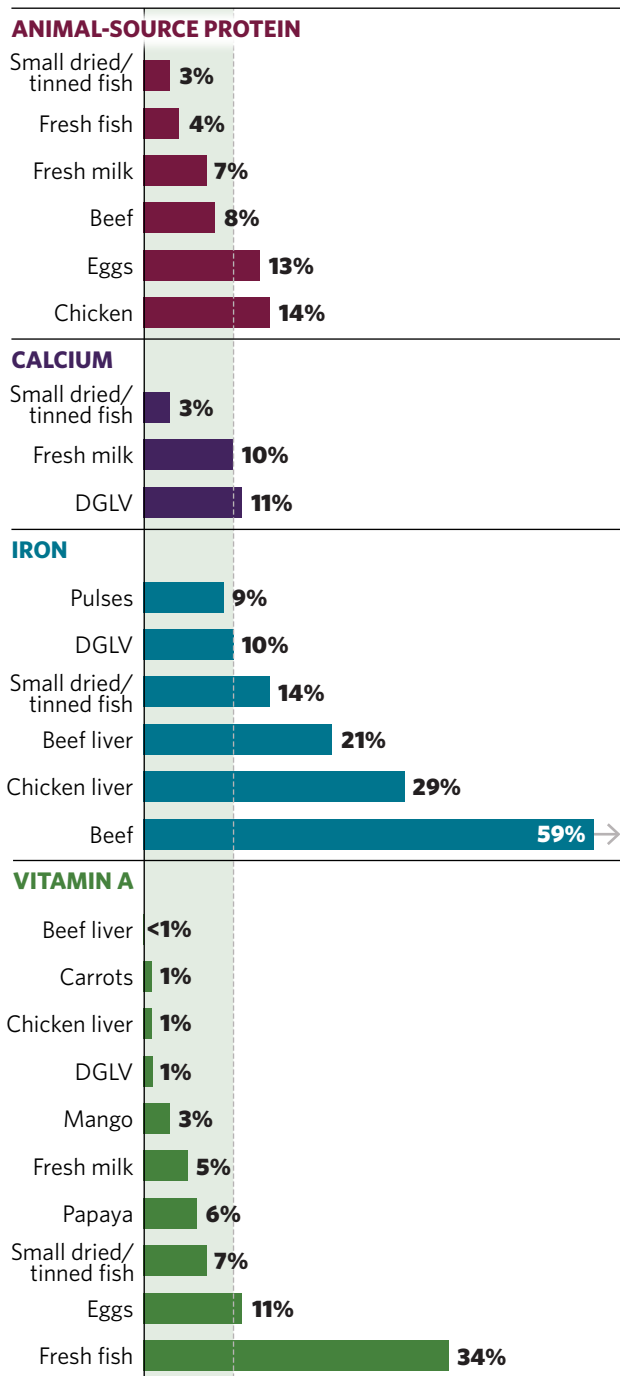
dark green leafy vegetables (82% of households), pulses (75%), and fresh fish (55%). Dark green leafy vegetables and pulses were also the foods most commonly consumed from home production (by 24% and 20% of households, respectively). In the week preceding the survey, 30–40% of households had consumed beef (38%), small dried/tinned fish (33%), milk (31%), and groundnuts (31%); 12% of households had consumed groundnuts from home production, and 9–11% of households had consumed eggs, chicken, and/or milk from home production.

## AFFORDABILITY BY NUTRIENT

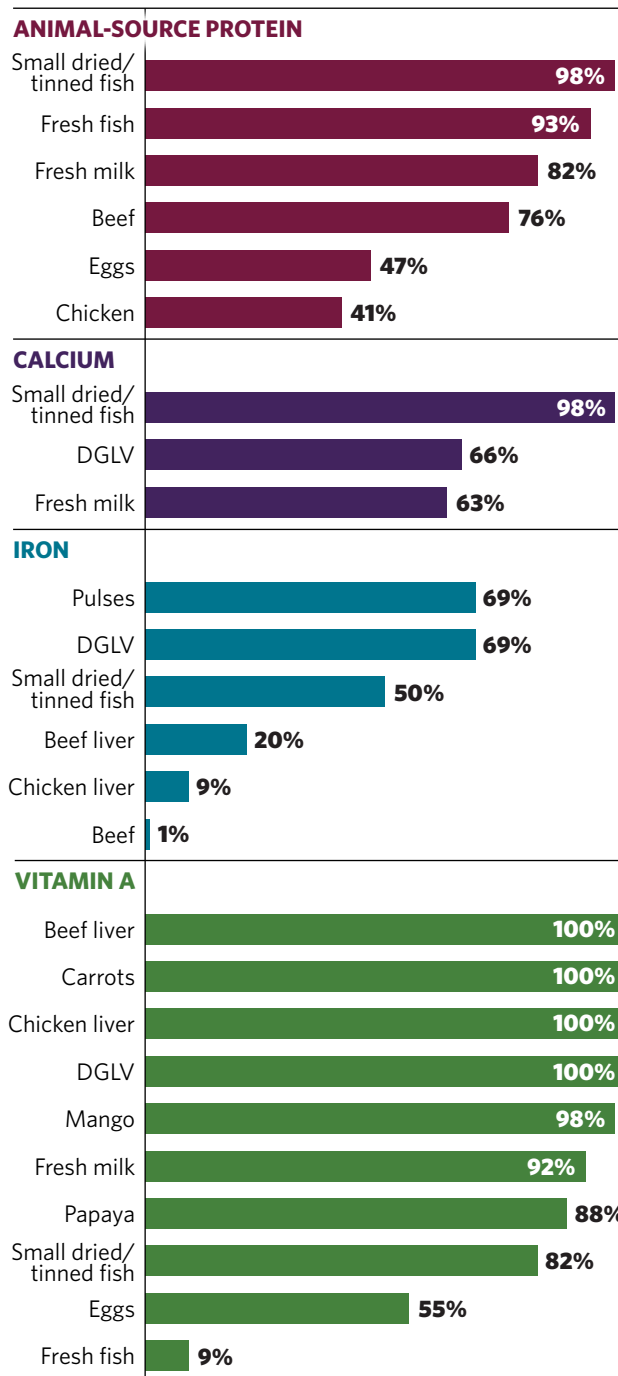
**Animal-source protein:** Four animal-source foods could meet half of young children's daily protein requirements from complementary feeding for portion sizes that cost less than 10% of adjusted food expenditure for the average household (Figure 2). These foods include small dried and/or tinned fish (3% of adjusted food expenditure on average), fresh fish (4%), milk (7%), and beef (8%). At a 10% affordability threshold, 98% of households with children under age two in Tanzania would be able to afford small dried/tinned fish, and 93% could afford fresh fish (Figure 3). Milk and beef would be affordable for 82% and 76% of households, respectively. Eggs and chicken are the least affordable sources of protein but could be affordable for slightly less than half of households.

**Calcium:** Although only three foods that are commonly consumed in Tanzania could provide adequate quantities of calcium, all three cost less than or just above the 10% affordability threshold for the average household. Small dried/tinned fish are the most affordable option, averaging 3% of adjusted food expenditure and costing 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 1,062 households in the 2014-15 LSMS.<sup>11</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>14-20</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>12</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 1,062 households in the 2014-15 LSMS.<sup>11</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>14-20</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>12</sup> DGLV = dark green leafy vegetables.

for 98% of households. Dark green leafy vegetables and milk would be affordable for only about 63–66% of households.

**Iron:** Pulses and dark green leafy vegetables could meet half of iron requirements from complementary feeding for 9–10% of adjusted food expenditure, on average. However, at current prices, about one-third of households in Tanzania would face cost barriers to purchasing adequate quantities of pulses or dark green leafy vegetables. Small dried/tinned fish is the next lowest cost option, but its cost exceeds 10% of adjusted food expenditure for half of households.

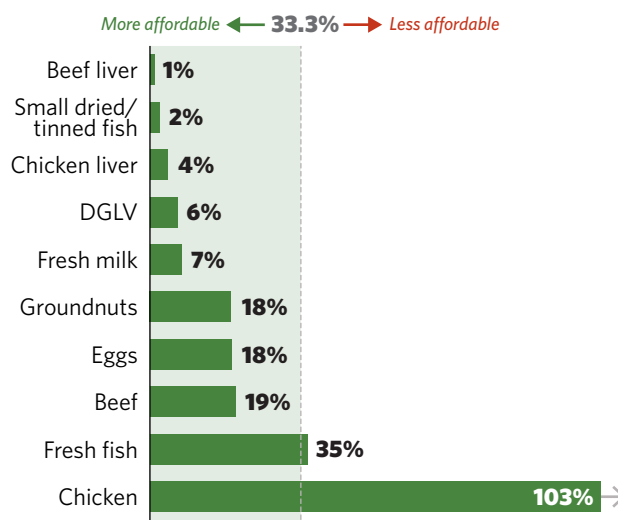
**Vitamin A:** Vitamin A could be affordable for all households in Tanzania from beef liver, carrots, chicken liver, or dark green leafy vegetables, each of which costs less than 1.5% of adjusted food expenditure for the average household. Mango, fresh milk, papaya, and small dried/tinned fish cost between 3% and 7% of adjusted food expenditure, on average, and cost less than 10% of adjusted food expenditure for 82–98% of households. Eggs could also be affordable for some households, but fresh fish is a much higher-cost option to meet vitamin A needs.

### AFFORDABILITY ACROSS MULTIPLE MICRONUTRIENTS

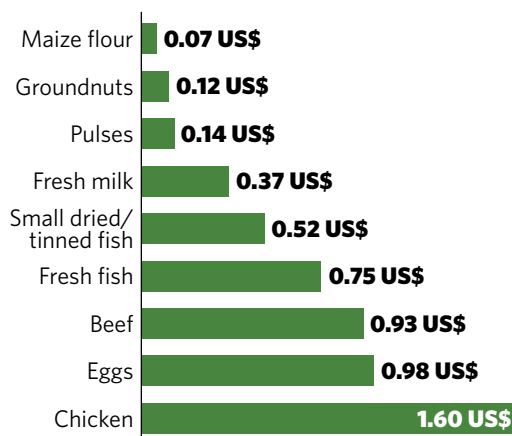
Eight out of 10 foods assessed could achieve an average of one-third of micronutrient requirements (for six micronutrients commonly lacking from young children’s diets in the region) for less than one-third of adjusted food expenditure for the average household (Figure 4). The most affordable foods in this analysis are also among the most affordable when single micronutrients are considered separately: liver (affordable source of vitamin A), small dried/tinned fish (protein, calcium), dark green leafy vegetables (iron, calcium, vitamin A), and fresh milk (calcium, protein). In general, animal-source foods tend to have higher concentrations of more nutrients than plant-source foods: only two plant-source foods (compared with eight animal-source foods) were considered in this analysis because other plant-source foods could not achieve one-third of micronutrient requirements without exceeding the 100 g portion size limit.

### DIETARY ENERGY AFFORDABILITY

When only energy density is considered, animal-source foods cost more than plant-source foods (among those plant-source foods containing at least 100 kilocalories per 100 g). Fresh milk followed by small dried/tinned fish and fresh fish are the animal-source foods with the



**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 1,062 households in the 2014–15 LSMS.<sup>11</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>14–20</sup> Nutrient requirements from complementary foods are from Ryckman et al. (2021).<sup>12</sup> DGLV = dark green leafy vegetables.



**FIGURE 5. Cost of daily dietary energy requirements from complementary foods (450 kilocalories).** Price data are from the 2014–15 LSMS.<sup>11</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>14–20</sup> The cost of 450 kilocalories is shown because this is the average daily dietary energy requirement for a child aged 6–23 months.

lowest cost per kilocalorie (Figure 5). Fresh milk costs about three times more than pulses and groundnuts and over five times more than maize flour, which is commonly consumed and highly affordable but does not provide adequate nutrients. Beef, eggs, and chicken tend to be the most expensive foods in the single and joint nutrient analysis and are also the most expensive when assessed in terms of energy density.

## CONCLUSIONS

Of the nutrients considered in this analysis, iron presents the greatest affordability barriers. About 30% of households would need to spend more than 10% of adjusted food expenditure to purchase enough pulses or dark green leafy vegetables to meet half of young children's requirements from complementary feeding. Some households may be able to meet iron needs through production of these foods, given that 20–24% of households already consume home production of these foods. Interventions to boost home production of these foods could help address likely iron gaps in Tanzania. Price reductions could also help some households, but households with very low resources may require other approaches, such as iron supplementation.

This analysis has shown that complementary feeding gaps in animal-source protein and calcium can be affordably filled by all but the very lowest-spending households through small dried/tinned fish. One-third of households in Tanzania already consume small dried fish, but interventions may be needed to increase their availability and/or desirability (especially as a food for young children). Price reductions could also help the lowest-resource households afford this food and make it a more attractive option for other households. Fresh fish (protein), dark green leafy vegetables (calcium), and fresh milk (both) are other options to fill these nutrient gaps, but they are currently unaffordable for 10–30% of households, so price reductions or subsidies, increased home production (of milk or greens, for example), or efforts to increase household resources for food may be needed to improve affordability if small dried/tinned fish is not an option for some households.

Several of the same foods that are affordable for meeting single nutrient requirements are also affordable when several micronutrients commonly lacking in young children's diets in the region are considered jointly. These affordable foods include liver, small dried/tinned fish, dark green leafy vegetables, and milk, as well as groundnuts, eggs, and beef for some households.

While a dietary gap in vitamin A persists, it is not due primarily to unaffordability: almost all households can afford enough foods rich in vitamin A to meet 50% or even 100% of needs. These foods include liver, orange-fleshed fruits and vegetables, and dark leafy green vegetables.

Demand creation interventions, focused on caregivers and young children, may be needed to increase vitamin A intake among children of complementary feeding age in Tanzania.

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