AFFORDABILITY OF NUTRITIOUS FOODS FOR COMPLEMENTARY FEEDING IN **MOZAMBIQUE**

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KEY MESSAGES

- Several foods commonly available in Mozambique are rich in nutrients lacking in young children's diets. However, around half of households face affordability barriers to supplying their young children's diets with even 50% of requirements for iron. The lowest-cost sources of iron are pulses, chicken liver, dark green leafy vegetables, and small dried fish. Liver, small dried fish, and dark green leafy vegetables were also the most affordable foods when several micronutrients commonly lacking in young children's diets in the region were considered jointly. Substantial price reductions or subsidies, or increases in the home production of pulses and greens, would likely make these foods more accessible to low-resources households in adequate quantities to meet half of iron requirements from complementary feeding. Alternatives, such as iron supplementation or cash transfers to boost household incomes, could also be considered.
- The lowest-spending 10–25% of households also struggle to afford enough protein through animal-source foods. Small dried fish and fresh fish are the most affordable animal sources of protein. Modest price reductions could likely address affordable barriers for many households.
- While a dietary gap in vitamin A persists, it is not primarily due to unaffordability. Almost all households can afford enough liver, dark green leafy vegetables, or orange-fleshed fruits and vegetables to meet 50% or more of children's daily vitamin A requirements from complementary feeding. Interventions to help generate demand for these foods by caregivers may be needed to increase vitamin A in young children's diets.
- 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, it will be crucial to promote home production of nutritious foods, lower the prices of these foods, and/or raise households' incomes.

WHY DOES AFFORDABILITY OF COMPLEMENTARY FOODS MATTER IN MOZAMBIQUE?

Mozambique, a low-income country in Sub-Saharan Africa, is home to 30 million people, almost half of whom live under the poverty line.[1–3] While economic growth ranged from 6 to 7% from 2007 to 2015, growth dropped in 2016 following an economic crisis, during which inflation rose to 16%.[4,5] The agricultural sector employs 73% of the workforce but accounts for only 21% of GDP.[3] Child undernutrition is widespread: 43% of children under five are stunted, and 89% of children aged 6–23 months do not consume an adequately diverse diet.[6,7] Dietary diversity is low in part because rural households rely heavily on foods from their own production but tend to produce only about five types of crops.[7,8]

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, and animal-source protein, and these shortfalls hinder their growth and development.[9,10] 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 programmes and policy.

METHODS

Using price and household expenditure data from the 2014–15 Inquérito ao Orçamento Familiar (IOF [Household Budget Survey]),[11] we benchmarked the cost of foods that could meet nutrient requirements against current household food expenditures to assess affordability, using a previously developed method.[12] 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, and vitamin A for their children under age two through specific foods. These foods were chosen because of their nutrient content and availability in Mozambique. 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.[13] 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.[12] 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).[12]

HOUSEHOLD FOOD EXPENDITURE AND CONSUMPTION PATTERNS

On average, households spent 62% of their total expenditures on food. A substantial portion of food expenditures (that is, the total value of food from all sources) came from home production, as well as in-kind sources, with purchases making up less than half of food expenditures. Households with children under age two allocated the most resources to cereal products (30% of food expenditure on average), meat, fish, and eggs (18%), vegetables (11%), and roots and tubers (11%). In the week before being surveyed, 94% of households had consumed vegetables, 87% had consumed cereals, 83% had consumed meat, fish, or eggs, 69% had consumed pulses, 60% had consumed roots and tubers, 40% had consumed nuts and seeds, and 30% had consumed fruits. Dairy consumption was rare, with only 2% of households consuming dairy products in the previous week. Cereal products and vegetables were frequently consumed from both purchases and home production, whereas animal-source foods were more often purchased.

The specific nutritious foods chosen as options to meet requirements for one or more nutrients are shown in Figure 1, alongside cereal products for reference. The most frequently consumed foods were pulses (consumed by 69% of households with children under two), dark green leafy vegetables (62%), and small dried fish (51%). Chicken, orange sweet potato, fresh or frozen fish, and groundnuts were consumed by 19–33% of households, while the remaining foods were consumed by 11% or fewer. Dark green leafy vegetables (75% of households), pulses (49%), chicken (25%), groundnuts (21%), and sweet potatoes (17%) were all commonly consumed from home production.

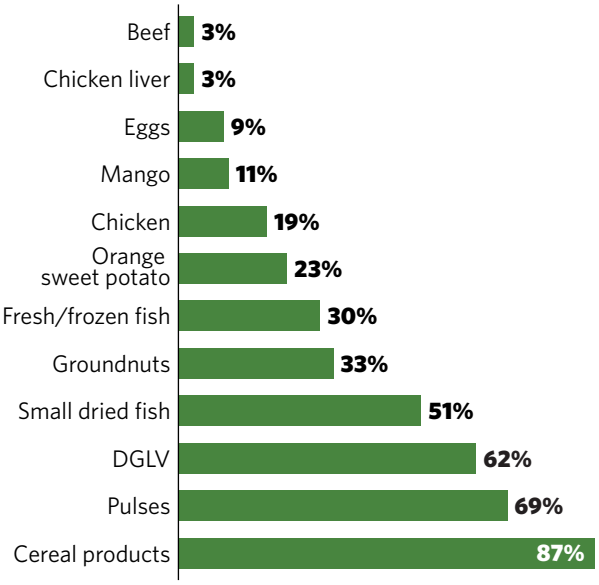

FIGURE 1. Percentage of surveyed households that had consumed select foods in the past week. Data are from 9,441 household observations in the 2014–15 IOF.[11] DGLV = dark green leafy vegetables.

AFFORDABILITY BY NUTRIENT

Animal-source protein: Two animal-source foods could meet half of children's protein requirements from complementary foods for less than 10% of adjusted food expenditure for the average household: small dried fish (5%) and fresh or frozen fish (9%). At a 10% threshold, these foods would be affordable for 90% and 78% of households, respectively. This means, however, that at least 10% of households likely struggle to supply children's diets with adequate animal-source protein. Beef, chicken, and eggs are the next lowest cost animal sources of protein, but they cost substantially more and would be affordable in adequate quantities for only 21–35% of households with children under two. Milk is the least affordable animal-source food for meeting protein requirements.

Iron: Many households in Mozambique likely face affordability barriers in meeting young children's iron needs from complementary feeding. There are no foods commonly consumed in Mozambique that could meet half of requirements for less than 10% of adjusted food expenditure on average. Pulses and chicken liver are the lowest-cost options, costing an average of 17% and 21% of adjusted food expenditure respectively, followed by dark green leafy vegetables and small dried fish (both averaging 24% of adjusted food expenditure). However, these foods would be unaffordable for more than half of households.

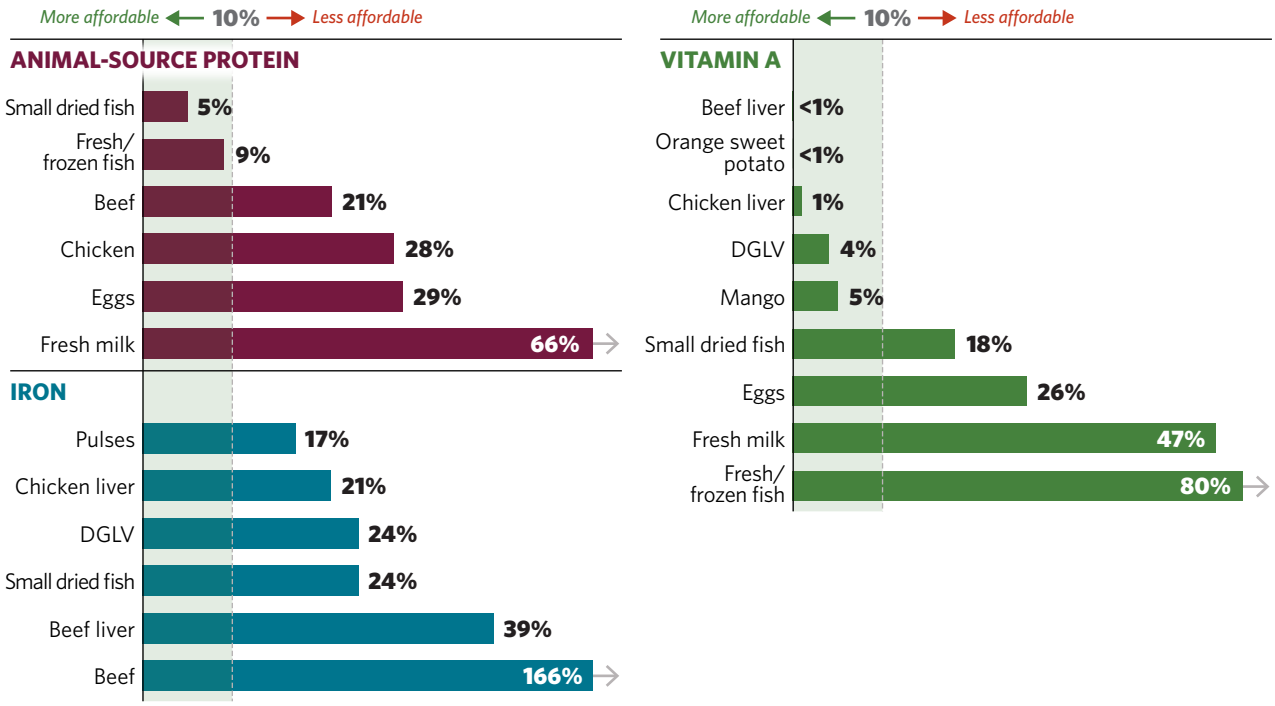

FIGURE 2. Share of food expenditures per adult equivalent needed to meet half of nutrient requirements from complementary foods. The dashed line represents the affordability threshold of 10%. Bars below the dashed line are considered affordable. Household expenditure data are from 9,441 household observations in the 2014–15 IOF.[11] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[14–20] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[12] DGLV = dark green leafy vegetables.

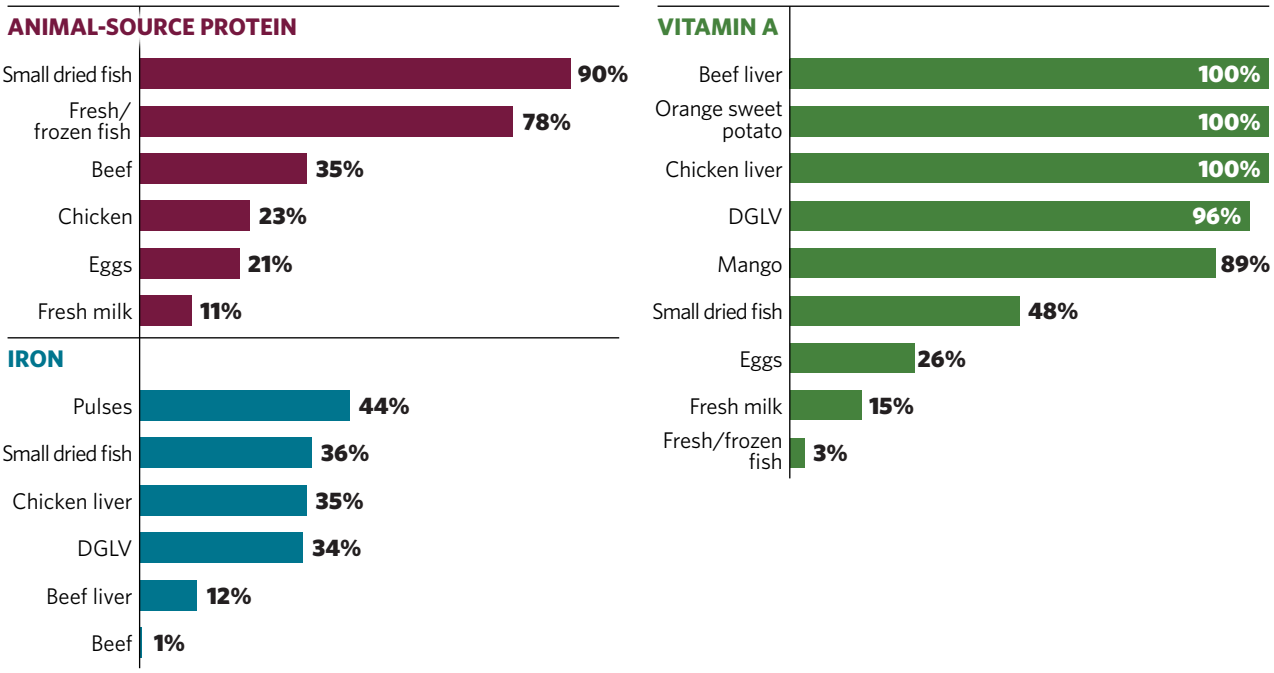

FIGURE 3. Percentage of households able to afford portion sizes meeting half of nutrient requirements from complementary foods. Foods were considered affordable if their required share of food expenditures per person was below the affordability threshold of 10%. Household expenditure data are from 9,441 household observations in the 2014–15 IOF.[11] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[14–20] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[12] DGLV = dark green leafy vegetables.

Vitamin A: Vitamin A is much more affordable than animal-source protein and iron. Beef liver (averaging less than 1% of adjusted food expenditure), orange-fleshed sweet potatoes (also less than 1%), chicken liver (1%), dark green leafy vegetables (4%), and mango (5%) all cost far less than the 10% threshold. They would fall under this threshold even if portion sizes were doubled, corresponding to 100% of daily vitamin A requirements from complementary feeding. All households could afford enough liver and sweet potatoes to meet half of daily needs, and 89–96% of households could afford enough dark green leafy vegetables and mango. Non-liver animal sources of vitamin A are far more expensive and are unaffordable for most households in Mozambique.

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 foods include liver and dark green leafy vegetables, which were affordable sources of vitamin A and among the lowest-cost options to fill iron gaps, and small dried fish, which were the most affordable animal-source protein. While pulses were the lowest-cost food to meet iron requirements, they were not included in this analysis because their nutrient densities were not high enough to achieve one-third mean probability of micronutrient adequacy with a portion size of 100 g or less. In fact, only two plant-source foods were included in the analysis for this reason, demonstrating the high nutrient densities of animal-source foods. While fresh or frozen fish was another affordable source of protein, its price is too high relative to its nutrient contributions for it be considered affordable in this analysis.

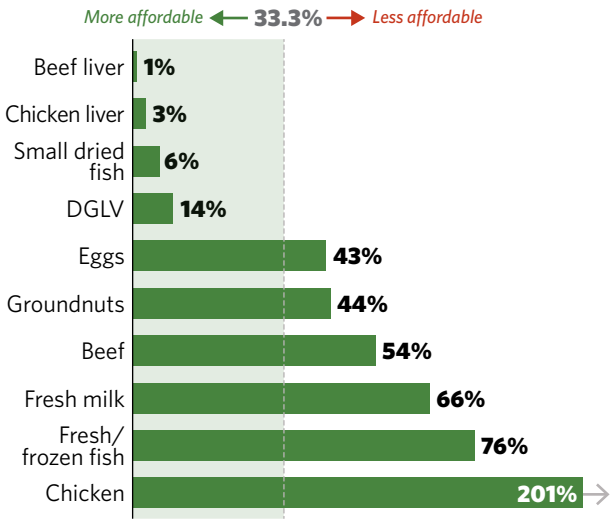

FIGURE 4. Share of food expenditures per person needed to provide an average of one-third of a young child's requirements for iron, vitamin A, zinc, folate, vitamin B_{12}, and calcium. The affordability threshold (dashed line) was set at one-third (33.3%) of food expenditures because this analysis is 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 9,441 household observations in the 2014–15 IOF.[11] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[14–20] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[12] DGLV = dark green leafy vegetables.

DIETARY ENERGY AFFORDABILITY

Although animal-source foods are often high in several of the focus nutrients, plant-source foods tend to be lower cost when analysed by their energy density (Figure 5). Pulses, groundnuts, and sweet potatoes cost two to three times less per kilocalorie than small dried fish, the lowest-cost animal-source food. Fish were the most affordable animal-source food when judged by both their protein and energy contributions, and small dried fish were also the only animal-source food considered in this analysis that was also considered affordable in the analysis of affordability across multiple micronutrients. Even pulses and groundnuts, the lowest-cost plant-source foods, cost almost twice as much as maize flour, a nutrient-poor but low-cost staple commonly consumed in Mozambique.

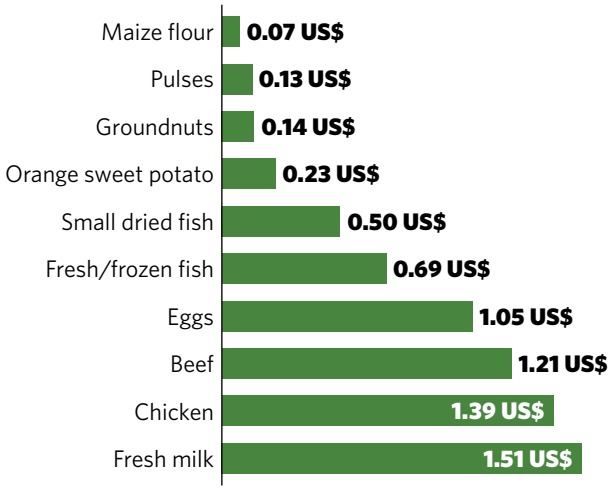

FIGURE 5. Cost of daily dietary energy requirements from complementary foods (450 kilocalories). Price data are from the 2014–15 IOF.[11] Dietary energy densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[14–20] 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 most households in Mozambique cannot affordably meet iron requirements for their young children of complementary feeding age. Pulses, small dried fish, chicken liver, and dark green leafy vegetables are the lowest-cost sources of iron, but all would be unaffordable for 56–66% of households. Substantial price reductions in these foods may help make them more accessible to some households. Other households may be able to rely on home production of these foods: in particular, 75% of households with children under age two in Mozambique already consumed dark green leafy vegetables from their own production, and 49% consumed pulses from their own production. Interventions to support low-resource households in producing these two foods could help reduce likely nutrient gaps. However, for some households, interventions to boost incomes or other approaches, such as iron supplementation, may be needed.

Although a dietary gap in vitamin A persists, it is not due primarily to unaffordability: almost all households can afford several foods rich in vitamin A to meet 100% of needs. Of these foods, however, only dark green leafy vegetables are consumed by the majority of households. Behaviour change interventions designed to encourage households to feed dark green leafy vegetables to young children could help reduce vitamin A gaps. Broader behaviour change interventions are likely needed for the other vitamin A–rich foods (orange-fleshed fruits and vegetables and liver): only 10–23% of surveyed households consume mango and sweet potatoes (and information is lacking on whether the sweet potatoes are orange-fleshed), and only 3% consume chicken liver; no data are available on beef liver consumption.

Both small dried fish and fresh fish are affordable animal sources of protein for most households. Reductions in the prices of these foods could help make them more accessible to the 10–25% of households that cannot currently afford them in adequate quantities. Chicken could be another food to explore in future research—it was among the least affordable sources of many nutrients but is by far the most commonly consumed animal-source food from home production (25% of households) and could thus be a focus for production-related interventions.

In conclusion, given the variation in food options and costs of these foods across nutrients, it is likely that a combination of approaches will be required to address likely nutrient gaps among children of complementary feeding age in Mozambique.

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