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

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KEY MESSAGES

- Several foods commonly available to households in Malawi are rich in nutrients lacking in young children's diets. Probable gaps in vitamin A and vitamin B_{12} consumption could likely be affordably addressed for all households in Malawi through several of these foods: liver (both vitamins), fresh or small dried fish (vitamin B_{12}), dark green leafy vegetables (vitamin A), and orange-fleshed fruits and vegetables (vitamin A).
- Many households could afford multiple sources of animal-source protein (fresh or small dried fish), calcium (small dried fish, dark green leafy vegetables), and folate (pulses, mango, dark green leafy vegetables, chicken liver, avocado), but 5–20% of households likely face challenges in affording foods that are good sources of these nutrients. About 20% will also likely be unable to afford dark green leafy vegetables in adequate quantities to meet 50% of children's iron needs (for which this food is the only affordable option).
- Zinc is the least affordable nutrient. Small dried fish are by far the lowest-cost source of zinc, but they are unaffordable to close to one-third of households in Malawi.
- The most affordable foods for supplying multiple commonly lacking nutrients simultaneously are liver, dark green leafy vegetables, and small dried fish. Other foods that were considered affordable in this joint nutrient analysis include fresh milk, groundnuts, eggs, and beef.
- A combination of interventions to reduce prices, increase home production, encourage consumption, and boost household incomes will likely be needed to address nutrient gaps. Some promising interventions could focus on increasing the desirability and acceptability of dark green leafy vegetables for young children, extending markets for small dried fish, and initiating zinc fortification or biofortification.

WHY DOES AFFORDABILITY OF COMPLEMENTARY FOODS MATTER IN MALAWI?

Malawi is a low-income country with a population of 19 million and a per capita gross national income (GNI) of $380 in 2019, making it the sixth-poorest country in the world.[1–3] Economic growth in Malawi was slow over 2010–2020: GNI per capita grew by less than 3% almost every year and was negative in 2012, 2015, and 2017.[2] Agriculture makes up 77% of Malawi's labour force and 30% of its GDP.[4] More than half of the country's population was estimated to be below the national poverty line based on the latest available estimate.[4] Among children under five, 37% are estimated to be stunted, 3% are wasted, and 63% are anaemic, and only 8% of children aged 6–23 months consume a diet meeting minimum diversity standards.[5]

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, zinc, folate, vitamin B_{12}, and animal-source protein, and these shortfalls hinder their growth and development.[6] 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 Malawi's 2016–17 Integrated Household Survey (IHS),[7] we benchmarked the cost of foods that could meet nutrient requirements against current household food expenditures to assess affordability, using a previously developed method.[8] 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, calcium, zinc, folate, and vitamin B_{12} for their children aged 6–23 months through specific foods. These foods were chosen because of their nutrient content and availability in Malawi. 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.[9] 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.[8] 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 the methods used in this research contain several limitations, which are described in Ryckman et al. (2021).[8]

HOUSEHOLD FOOD EXPENDITURE AND CONSUMPTION PATTERNS

The average household with children aged 6–23 months in Malawi devoted 61% of total expenditures to food (including from purchases, home production, and in-kind sources). The greatest share of food expenditure tended to go towards cereal products (42% of food expenditure on average), followed by vegetables (14%) and meat, fish, and eggs (13%). Other food groups accounted for less than 10% of food expenditure, including pulses (7%), roots and tubers (4%), fruits (2%), nuts and seeds (2%), and dairy (less than 1%). One hundred per cent of households had consumed cereal products and vegetables in the previous week, while 84% consumed meat, fish, or eggs, 72% consumed pulses, 56% consumed roots and tubers, 52% consumed fruits, 39% consumed nuts and seeds, and 16% consumed dairy.

Dark green leafy vegetables were consumed by 96% of households, making them by far the most commonly consumed nutritious food chosen for this analysis (Figure 1). Apart from pulses (68%), the remaining foods were consumed by fewer than half of households: 43% of households consumed small dried fish, 43% consumed okra, and 28% consumed eggs. The other foods were consumed by only 8–23% of households. Forty-five per cent of households consumed dark green leafy vegetables from their own production, 16% consumed okra, 15% consumed pulses, and 12% consumed pumpkin. The remaining home-produced foods were consumed by less than 10% of households.

AFFORDABILITY BY NUTRIENT

Animal-source protein: Meeting half of daily protein needs from complementary feeding with small dried fish and fresh fish would cost 4–5% of adjusted food expenditure, on average, for households with 6–23-month-old children (Figure 2). The cost of both types of fish also falls below the 10% affordability threshold for more than 90% of households (Figure 3). Chicken and beef are the next lowest cost animal sources of protein, at 11–12% of adjusted food expenditures for the average household. However, chicken and beef would be affordable to only 55–56% of households at a 10% threshold.

Calcium: Small dried fish (5%) and dark green leafy vegetables (7%) both fall below the 10% threshold for the average household—and for 79–91% of households; this means, however, that 9–21% of households may face affordability barriers to accessing calcium for their 6–23-month-old children. Milk is a much more expensive source of calcium and is affordable to only one-fifth of households. Current low levels of milk consumption show that barriers to consuming more milk may extend beyond unaffordability and could also include lack of accessibility, acceptability, and/or desirability.

Folate: Several foods could meet half of folate requirements from complementary feeding for 5–10% of adjusted food expenditures for the average household, including pulses (5%), mango (6%), dark green leafy vegetables

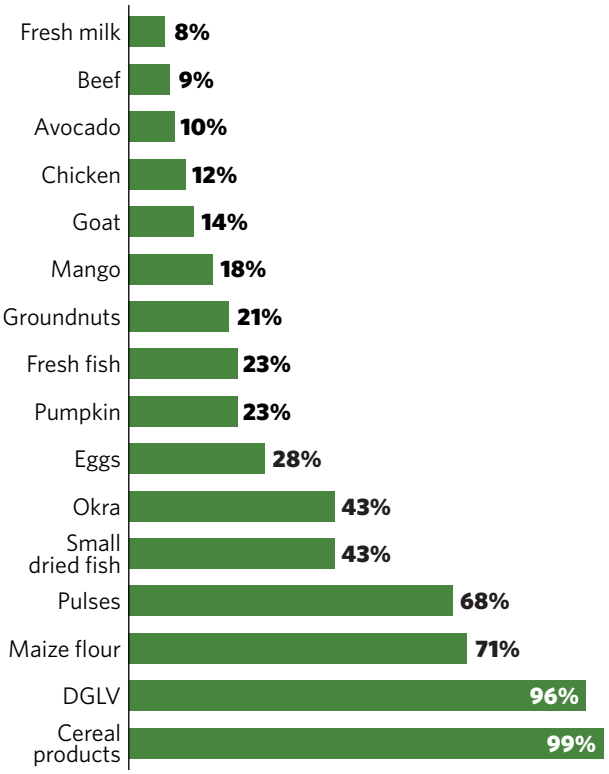

FIGURE 1. Percentage of surveyed households that had consumed selected foods in the past week. Data are from 2,117 households in the 2016–17 Integrated Household Survey.[7] DGLV = dark green leafy vegetables.

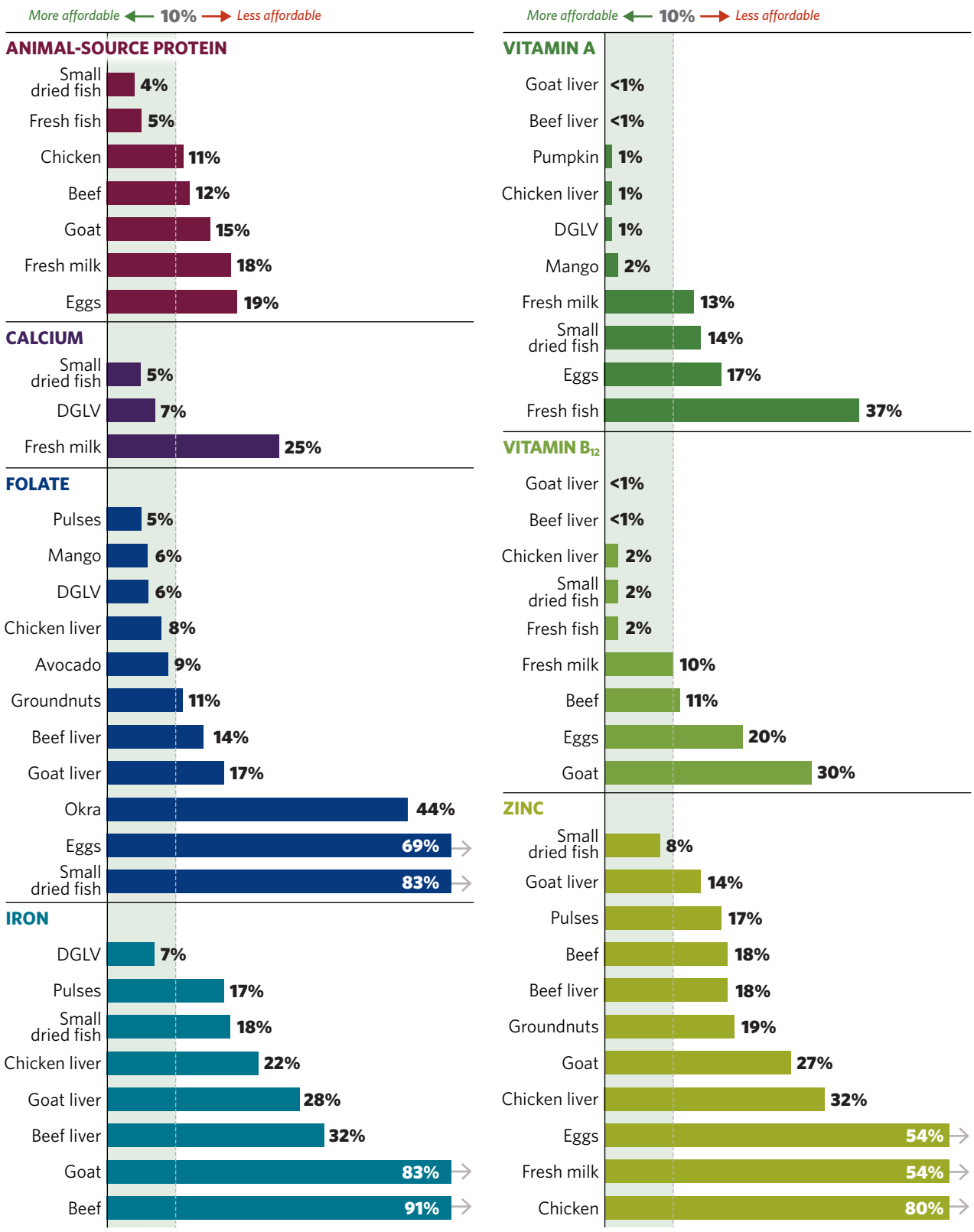

FIGURE 2. Share of food expenditures per adult equivalent needed to meet half of nutrient requirements from complementary foods. The dashed line represents the affordability threshold of 10%. Bars below the dashed line are considered affordable. Household expenditure data are from 2,117 households in the 2016–17 Integrated Household Survey.[7] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[10–16] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[8] DGLV = dark green leafy vegetables.

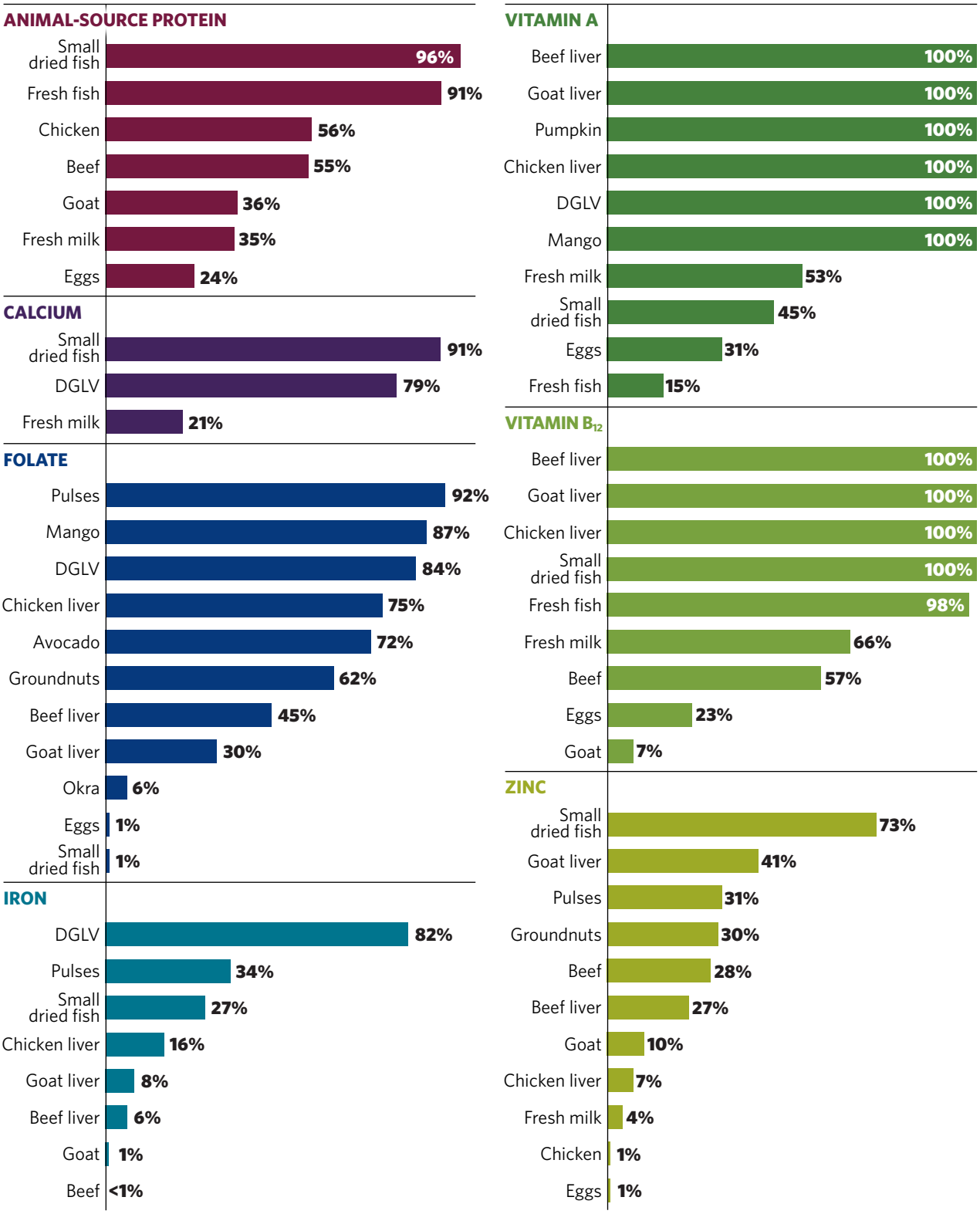

FIGURE 3. Percentage of households able to afford portion sizes meeting half of nutrient requirements from complementary foods. Foods were considered affordable if their required share of food expenditures per person was below the affordability threshold of 10%. Household expenditure data are from 2,117 households in the 2016–17 Integrated Household Survey.[7] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[10–16] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[8] DGLV = dark green leafy vegetables.

(6%), chicken liver (8%), and avocado (9%). These foods would be affordable for 72–92% of households. Groundnuts and beef liver slightly exceed the 10% threshold for the average household and would be affordable for only 45–62% of households.

Iron: Dark green leafy vegetables are the only source of iron that would cost less than 10% of adjusted food expenditure for the average household, but for 18% of households they would exceed 10% of adjusted food expenditure. Pulses and small dried fish are the next most affordable foods, but they average 17–18% of adjusted food expenditure and would be considered unaffordable to 66–73% of households at a 10% threshold.

Vitamin A: Several foods cost less than 10% of adjusted food expenditure for all households with 6–23-month-old children surveyed: liver (from goats, beef, or chickens), pumpkin, dark green leafy vegetables, and mango, each of which costs less than 2% of adjusted food expenditure for the average household. Milk, small dried fish, and eggs could also be affordable to one-third to one-half of households.

Vitamin B_{12}: Likely gaps in vitamin B_{12} consumption could be affordably filled by all households through liver (<1–2% of adjusted food expenditure on average, depending on the type), small dried fish (2%), and/or fresh fish (2%). Milk and beef could also be affordable options for 57–66% of households, while eggs and goat meat are the least affordable sources of vitamin B_{12}.

Zinc: Small dried fish is the lowest-cost food to fulfil zinc requirements from complementary feeding, costing 8% of adjusted food expenditure on average. However, 27% of households would be unable to afford it in adequate quantities, assuming a 10% affordability threshold. Other sources of zinc are affordable to less than half of households. The lowest-cost options apart from small dried fish include goat liver, pulses, beef, beef liver, and groundnuts.

AFFORDABILITY ACROSS MULTIPLE MICRONUTRIENTS

Liver, dark green leafy vegetables, and small dried fish are the most affordable foods to meet multiple micronutrient requirements in combination (Figure 4). These foods were also the most affordable options to meet several single micronutrient requirements. Fresh milk, groundnuts, eggs, and beef also fall below the 33.3% affordability threshold but cost 4–34 times as much as the most affordable foods for meeting joint micronutrient requirements. Dark green leafy vegetables and groundnuts were the only plant-source foods included in the analysis because they were the only plant-source foods that could provide an average of one-third of joint micronutrient requirements with portion sizes not exceeding 100 g.

DIETARY ENERGY AFFORDABILITY

When the nutritious foods are assessed based on their cost per unit of energy, groundnuts and pulses are the lowest-cost foods (and the only plant-source foods included in this analysis), while the animal-source foods are all at the higher end of the spectrum (Figure 5). The lowest-cost animal-source foods per kilocalorie include small dried fish, fresh fish, and milk, while goat was by far the most expensive. All foods cost at least twice as much as maize flour, a commonly consumed, cheaper, but nutrient-poor staple. This finding demonstrates the tension many households likely face between purchasing cheap sources of energy and higher-cost but nutrient-dense foods.

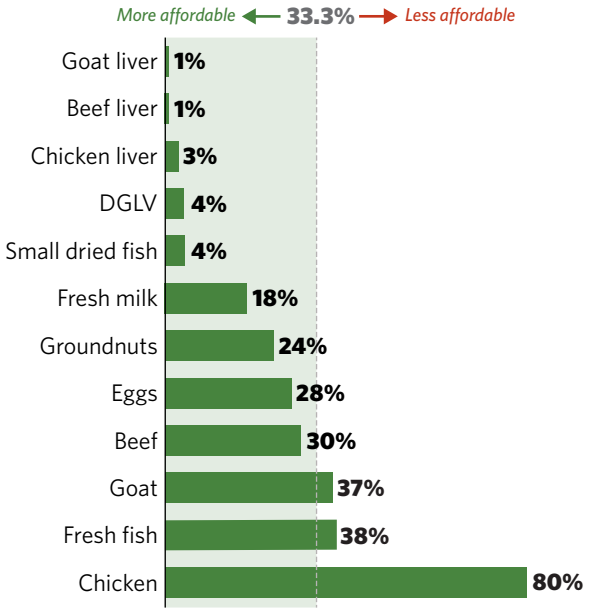

FIGURE 4. Share of food expenditures per person needed to provide an average of one-third of a young child's requirements for iron, vitamin A, zinc, folate, vitamin B_{12}, and calcium. The affordability threshold (dashed line) was set at one-third (33.3%) of food expenditures because this analysis is 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 2,117 households in the 2016–17 Integrated Household Survey.[7] Nutrient densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[10–16] Nutrient requirements from complementary foods are from Ryckman et al. (2021).[8] DGLV = dark green leafy vegetables.

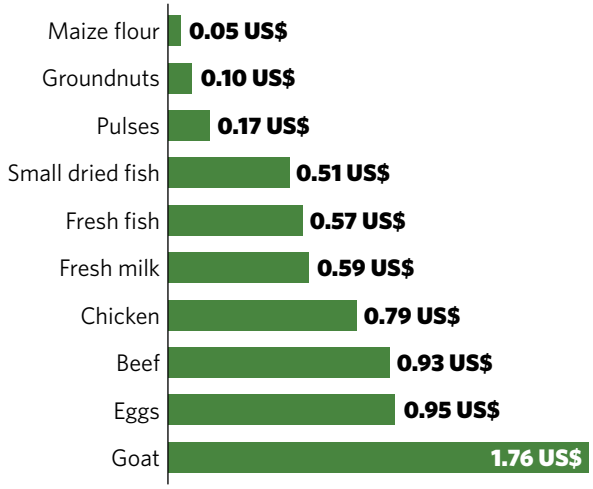

FIGURE 5. Cost of daily dietary energy requirements from complementary foods (450 kilocalories). Price data are from the 2016–17 Integrated Household Survey.[7] Dietary energy densities are mostly from the United States Department of Agriculture food composition database as well as regional food composition tables and published literature.[10–16] The cost of 450 kilocalories is shown because this is the average daily dietary energy requirement for a child aged 6–23 months.

CONCLUSIONS

In summary, likely gaps in vitamin A, vitamin B_{12}, folate, protein, and calcium consumption among children of complementary feeding age in Malawi could be affordably filled through at least two foods each for at least 80% of households. Dark leafy green vegetables are the only source of iron that could be affordably purchased in adequate quantities by 80% of households. Virtually all households could meet half of vitamin A and vitamin B_{12} requirements for less than 10% of food expenditure per adult equivalent. However, 5–20% of households will likely face affordability barriers when trying to supply children's diets with adequate quantities of calcium, folate, protein, and iron. Closer to 25–30% of households likely struggle to afford zinc, for which small dried fish is the only affordable option.

The most affordable foods to fill nutrient gaps include dark green leafy vegetables (vitamin A, calcium, iron), small dried fish (protein, calcium, vitamin B_{12}, zinc), liver (vitamin A, vitamin B_{12}, and, for chicken liver, folate), fresh fish (protein and vitamin B_{12}), pulses (folate; also the second lowest cost food to meet iron needs), mango (vitamin A and folate), and pumpkin (vitamin A). Several of these foods (liver, small dried fish, dark green leafy vegetables) were the most affordable foods when multiple micronutrients were considered in combination. Other affordable foods in this joint micronutrient analysis were milk, groundnuts, eggs, and beef.

Policy interventions to reduce prices, increase home production, and encourage consumption of these foods, as well as to increase household incomes, could help address dietary gaps among children of complementary feeding age in Malawi. In particular, the following interventions could be explored:

- Behaviour change interventions could encourage households to feed dark green leafy vegetables to their young children and share how to do so. Dark leafy greens are affordable sources of several micronutrients and are commonly consumed and produced in Malawi, but nutrient gaps persist. Efforts to increase home production or decrease prices of dark green leafy vegetables could also help make them a more affordable option to fill folate, iron, and calcium gaps for the 15–20% of households for whom they are currently unaffordable.
- Efforts to strengthen markets for small dried fish in order to reduce prices could help make calcium and zinc more affordable nutrients. In light of recent price increases and fish shortages,[17,18] such efforts may need to be paired with initiatives that ensure sustainable fishing or aquaculture practices.
- Given how unaffordable zinc is compared with other nutrients, different interventions may be required; these could include fortification or biofortification to increase accessibility, or cash transfers or food subsidies for low-resource households.
- Future research could assess the acceptability and desirability of liver and, if applicable and promising, design interventions to increase consumption among young children. Data on current levels of liver consumption were lacking in the Malawi survey data.

Given high poverty and low levels of economic growth, a combination of interventions, including those that improve the livelihoods of low-resource households, will likely be needed to improve young children's diets and nutritional status in Malawi.

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