

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

May 2021



Recommended citation

Global Alliance for Improved Nutrition (GAIN) and United Nations Children's Fund (UNICEF). *Affordability of nutritious foods for complementary feeding in Kenya*. Geneva: GAIN, 2021.

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Acknowledgements

This briefing paper was written by Theresa Ryckman and Ty Beal. This work was funded by contributions from the Ministry of Foreign Affairs of the Netherlands (grant no. MINBUZA-2019.334151 to the Global Alliance for Improved Nutrition) and the Bill & Melinda Gates Foundation through the Regional Initiatives for Sustained Improvements in Nutrition and Growth (RISING) to UNICEF (grant no. OPP1179059). The funders had no role in data collection and analysis, manuscript preparation and revision, or the decision to publish. This study used data from public sources, and all authors had access to the data analysed as part of this study. The findings and conclusions contained within are those of the authors and do not necessarily reflect positions or policies of the Bill & Melinda Gates Foundation. We thank Stella Nordhagen and the nutrition teams in UNICEF's Country Offices (Kenya), UNICEF's Eastern and Southern Africa Regional Office (ESARO), and UNICEF Headquarters for their inputs and feedback. Graphic design is by Danielle DeGarmo. Copy editing is by Heidi Fritschel. Cover photo: Shutterstock/Aleksandar Todorovic.

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KEY MESSAGES

- Several foods commonly available to households in Kenya are rich in nutrients lacking in young children's diets. Many nutrient needs can be affordably met through small dried fish (protein, calcium, zinc, vitamin B₁₂), liver (vitamin A, vitamin B₁₂), and pulses (folate, iron). All nutrients analysed are affordable to most households if these foods are accessible. However, current consumption levels of liver and small dried fish are low or vary widely within Kenya. Efforts to increase the availability and acceptability of these foods should be prioritized.
- Animal-source protein, zinc, and calcium present affordability barriers for 25–50% of households if small dried fish are not a feasible option. Iron is unaffordable for many households regardless of small dried fish and liver availability, although about two-thirds of households could afford iron from pulses, which are commonly consumed. If small dried fish are not an option, zinc is the least-affordable nutrient. Liver and small dried fish are the most affordable foods when all six micronutrients are considered jointly. Interventions could focus on increasing the availability and desirability of small dried fish and liver as complementary foods for young children.
- For some households, other affordable options for meeting key nutrient needs include cow milk (protein, calcium, vitamin B₁₂, vitamin A, several micronutrients jointly), dark green leafy vegetables (iron, calcium, vitamin A, several micronutrients jointly), eggs (protein, vitamin B₁₂, vitamin A, several micronutrients jointly), avocado (folate), and mango (folate, vitamin A). However, with the exception of vitamin A, folate, and vitamin B₁₂, most of these foods are unaffordable for the average household. Increasing the affordability of these foods for low-resource households, potentially through a combination of price reductions, home production, and transfers or subsidies, is another policy priority. Increasing the desirability and availability of these foods may also be needed.
- Gaps in vitamins A and B₁₂ are not primarily due to unaffordability, since multiple food options could meet young children's requirements. Folate is also affordable for the majority of households, but only through pulses. For these nutrients, interventions could focus on raising awareness and encouraging caregivers to feed these affordable nutritious foods to young children.

WHY DOES AFFORDABILITY OF COMPLEMENTARY FOODS MATTER IN KENYA?

Kenya, a lower-middle-income country with a population of 51 million in 2018, is the largest economy in Eastern Africa. The majority of the population lives in rural areas, with only 27% of people living in cities.¹ Agriculture accounts for 61% of Kenya's labour force and 35% of its GDP.² GDP growth has been strong, exceeding 4.5% every year over the past decade.¹ However, more than one-third of Kenyans fall below the national poverty line, and unemployment hovers around 40%.² In 2010 Kenya underwent a constitutional devolution, and many administrative responsibilities, including most health and nutrition programming, have since been transferred to 47 county governments. Although mortality rates and stunting and wasting prevalence among children under age five have been on the decline,³ there is substantial subnational variation in nutrition outcomes and programs. Nationally, 26% of children under age five are stunted, and 59% of children under age two do not consume an adequately diverse diet; in 8 of the 47 counties, stunting prevalence exceeds 30%.³

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 B₁₂, and animal-source protein, and these shortfalls hinder their growth and development.^{4,5} 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. A complementary report on provincial food and nutrient affordability is forthcoming.⁶

METHODS

Using price and household expenditure data from the 2015–16 Kenya Integrated Household Budget Survey,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 B₁₂ for their children aged 6–23 months through specific foods. These foods were chosen because of their nutrient content and availability in Kenya. 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 surveyed. In previous analysis, we established a threshold of 10% of household food spending per adult equivalent to assess absolute affordability.⁸ Because households with children of complementary feeding age tend to spend less on food than the average household (even after adjusting for household composition), we focus on an adjusted threshold of 7.6% that accounts for the fact that these households may have fewer resources available for food. 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

On average, households spent 51% of their total expenditures on food. Purchases made up 77% of food expenditures; the other 23% came from home production and in-kind sources. The 20% of households with the lowest food expenditures spent on average 57% as much as the average household and 37% as much as the highest-spending households. In the week before being surveyed, 97% of households had consumed cereal products, 94% had consumed vegetables, 87% had consumed

dairy, 78% had consumed fruits, 77% had consumed meat, fish, and eggs, 71% had consumed pulses, and 69% had consumed roots and tubers. Lower-resource households consumed the fewest food groups, with the most noticeable differences in weekly consumption of meat, fish, and eggs (only 53% of households in the lowest expenditure quintile had consumed these foods in the previous week), fruits (57%), and roots and tubers (50%). The greatest share of household food expenditures went towards cereal products (27% but as high as 35% for the lowest-quintile households), meat, fish, and eggs (13% but as low as 6% for the lowest-quintile households), dairy (12%), and vegetables (10%). Compared with all households in Kenya, households with children of complementary feeding age tended to have lower food expenditures per adult equivalent but slightly greater dietary diversity.

The nutritious foods chosen to meet one or more nutrient gaps are shown in Figure 1. Between 50% and 75% of households consumed dark green leafy vegetables, pulses, and cow milk; 30–40% of households consumed eggs, beef, avocado, and/or oranges, while 8–25% consumed the remaining foods.

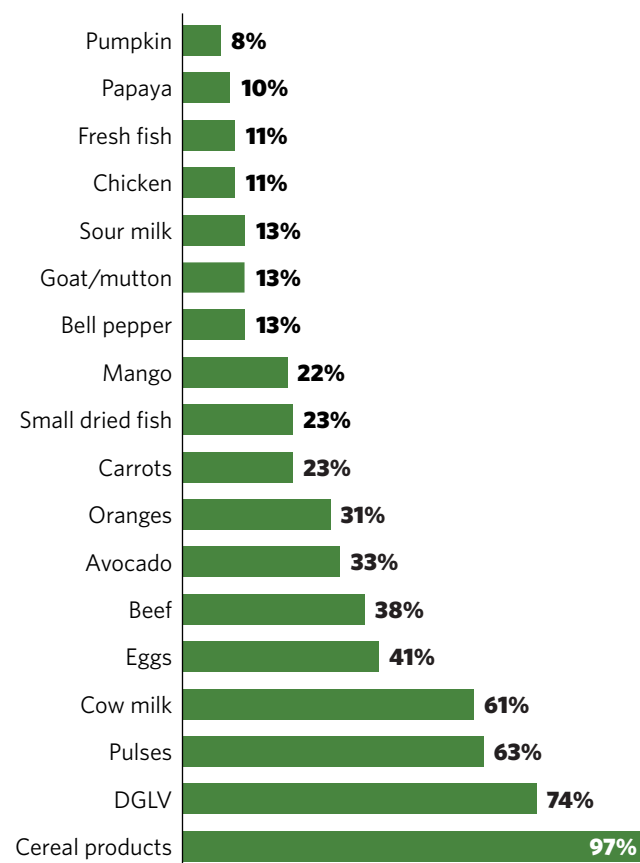


FIGURE 1. Percentage of surveyed households that had consumed selected foods in the past week. Data are from 21,747 households in the 2015–16 Kenya Integrated Household Budget Survey.⁷ DGLV = dark green leafy vegetables.

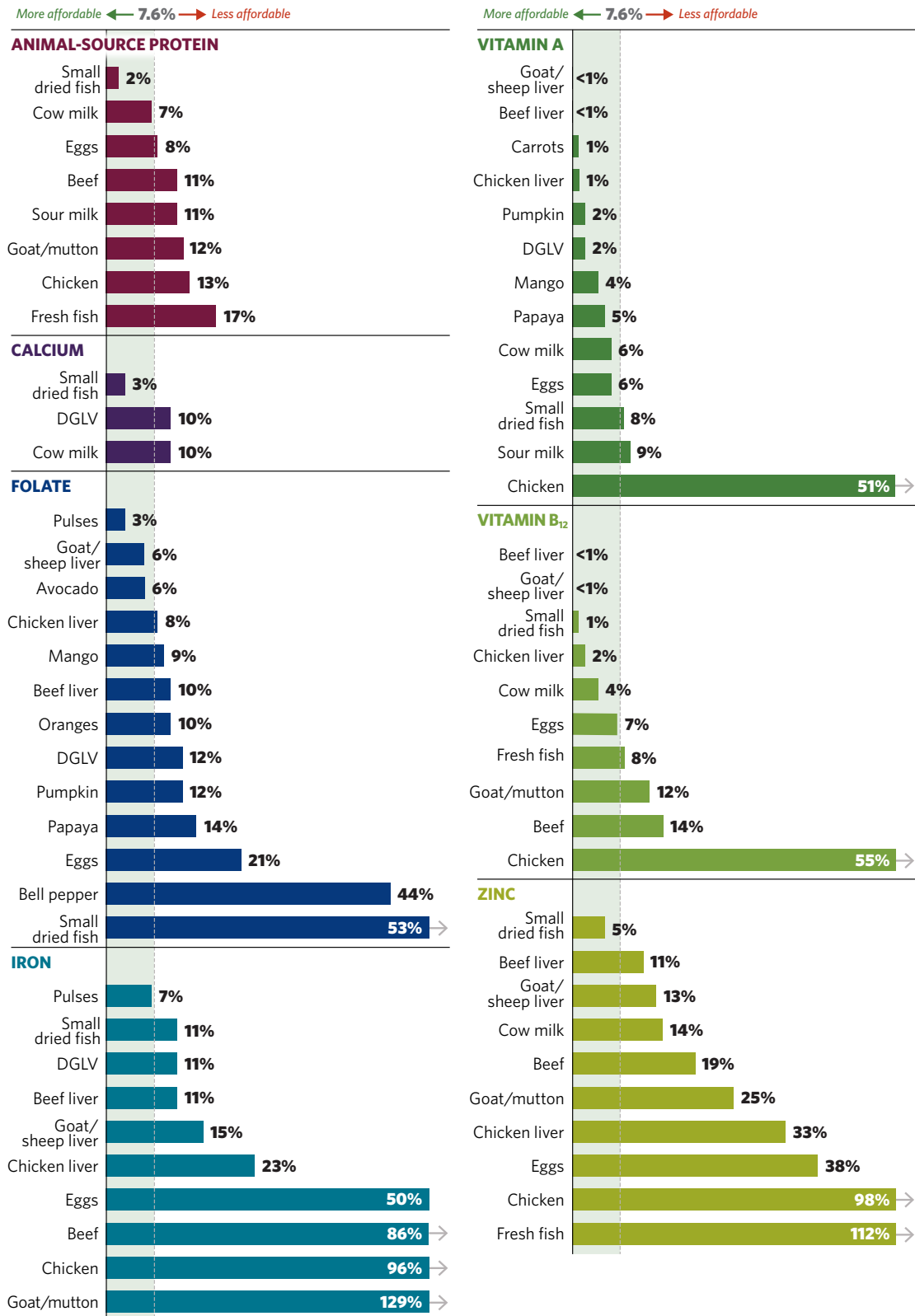


FIGURE 2. Share of food expenditures per adult equivalent needed to meet half of nutrient requirements from complementary foods. The dashed line represents an adjusted affordability threshold (7.6%) after accounting for lower expenditures among households with children in this sample (those with children 6–23 months) compared with all households. Bars below the dashed line are considered affordable. Household expenditure data are from 21,747 households in the 2015–16 Kenya Integrated Household Budget Survey.⁷ Nutrient densities are from the 2018 Kenya Food Composition Tables.¹⁰ Nutrient requirements from complementary foods are from Ryckman et al. (2021).⁸ DGLV = dark green leafy vegetables.

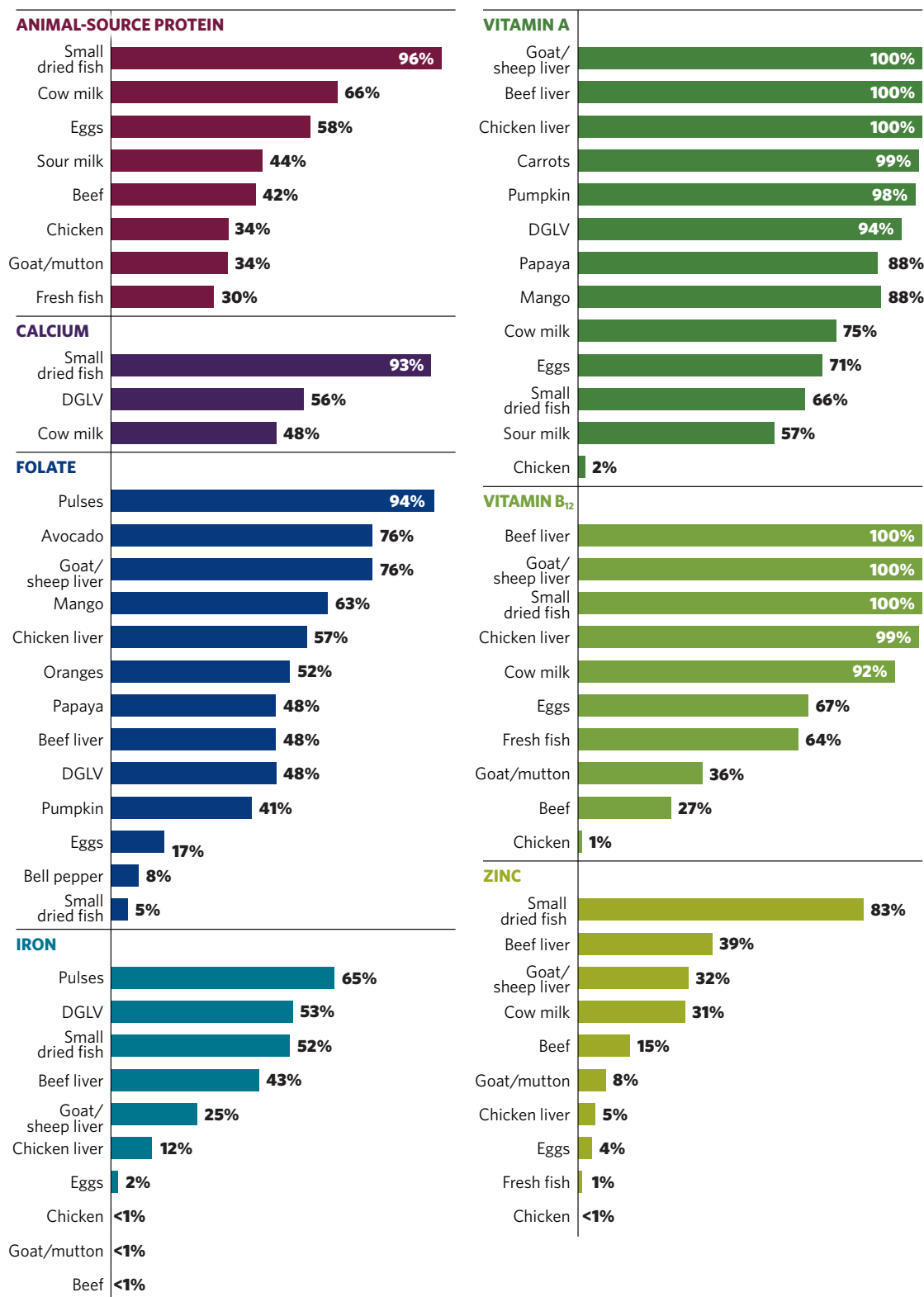


FIGURE 3. Percentage of households able to afford portion sizes meeting half of nutrient requirements from complementary foods. Foods were considered affordable if their required share of food expenditures per person was below the adjusted affordability threshold (7.6%) after accounting for lower expenditures among households with children in this sample (those with children 6–23 months) compared with all households. Household expenditure data are from 21,747 households in the 2015–16 Kenya Integrated Household Budget Survey.⁷ Nutrient densities are from the 2018 Kenya Food Composition Tables.¹⁰ Nutrient requirements from complementary foods are from Ryckman et al. (2021).⁸ DGLV = dark green leafy vegetables.

AFFORDABILITY BY NUTRIENT

Animal-source protein: Small dried fish are the most affordable source of animal-source protein and the only food that falls firmly below both the adjusted (7.6%) and unadjusted (10%) affordability thresholds (the former is shown in Figure 2). Small dried fish cost less than half as much as the next lowest cost foods: cow milk (which also falls below both thresholds) and eggs (which fall below the unadjusted threshold only). Based on the adjusted threshold, 96% of households could afford small dried fish as a source of protein, while 66% and 58% could afford cow milk and eggs, respectively (Figure 3). However, small dried fish consumption varies by province, with less than 2% of households consuming this food in the Central, Eastern, and North Eastern provinces. Ruminant meat, sour milk, and chicken fall slightly above both thresholds and are affordable to only 34–44% of households.

Calcium: Only three foods commonly consumed by households in Kenya were identified as potentially good sources of calcium for young children: small dried fish, dark green leafy vegetables, and fresh cow milk. Small dried fish are the most affordable source, costing less than 3% of food expenditures per adult equivalent and falling below the adjusted threshold for 93% of households. Dark green leafy vegetables and milk are also somewhat affordable and may be more feasible options in provinces where fish consumption is low. Low-resource households in these provinces, however, may struggle to afford enough calcium to meet complementary feeding requirements.

Folate: Pulses, goat/sheep liver, and avocado are the most affordable sources of folate and fall below both affordability thresholds, while chicken liver, mango, beef liver, oranges, dark green leafy vegetables, pumpkin, and papaya may also be affordable in some cases but cost more than 7.6% of food expenditures per adult equivalent for one-third to one-half of households. Pulses are affordable to 94% of households at a 7.6% threshold. Eggs, bell peppers, and small dried fish are the least affordable sources of folate.

Iron: The most affordable source of iron is pulses, which fall below both affordability thresholds and are currently consumed by over 60% of households but are still unaffordable to 35% of households at the adjusted (7.6%) threshold. Small dried fish, dark green leafy vegetables, and beef liver are also found to be affordable to some households (43–53%) but are slightly above the thresholds. Other livers (goat/sheep and chicken) are the next most affordable iron sources, while eggs, beef, chicken, and goat/mutton meat

are all highly unaffordable, costing more than half of food expenditures per adult equivalent on average.

Vitamin A: Vitamin A is the most affordable nutrient analysed. Several foods (liver, carrots, pumpkin, dark green leafy vegetables, mango, papaya, cow milk, and eggs) fall below both affordability thresholds, and liver, carrots, and pumpkin are affordable to 98–100% of households and cost less than 2% of food expenditures per adult equivalent on average. Households currently rarely consume liver and also consume pumpkin and papaya only infrequently, but larger shares of households consume carrots (23%), dark green leafy vegetables (74%), cow milk (61%), and eggs (41%).

Vitamin B₁₂: Liver and small dried fish are very affordable sources of vitamin B₁₂ (less than 2% of food expenditures per adult equivalent on average and affordable to 99–100% of households at the adjusted threshold), followed by milk and eggs. Milk and eggs cost more than liver and dried fish but still fall below both affordability thresholds and are consumed by more households, with less provincial variation in consumption.

Zinc: Small dried fish are the most affordable source of zinc and the only food that falls below either affordability threshold (although they exceed 7.6% of food expenditures per adult equivalent for 17% of households). Ruminant liver, cow milk, and beef are unaffordable to two-thirds or more of households, while other sources of zinc cost more than 25% of food expenditure per adult equivalent on average.

AFFORDABILITY ACROSS MULTIPLE MICRONUTRIENTS

When food affordability is assessed based on foods' contributions to the requirements of six micronutrients that are commonly lacking in young children's diets in Eastern and Southern Africa, the most affordable foods are liver and small dried fish, followed by cow milk, dark green leafy vegetables, and eggs (Figure 4). These findings largely align with the single micronutrient affordability findings. Dark green leafy vegetables were the only plant-source food that could meet several micronutrient needs with an edible portion size of less than 100 g and were also relatively affordable sources of iron, vitamin A, and calcium in the single nutrient analysis. For single nutrients, liver was a highly affordable source of vitamin A, folate, and vitamin B₁₂; it also provides iron and zinc. Small dried fish were a relatively affordable source of iron, calcium, zinc, and vitamin B₁₂ and also a somewhat affordable source

of vitamin A, but they were the least affordable source of folate. Milk and eggs were moderately affordable sources of several micronutrients and are also more commonly consumed than liver and small dried fish. The cost of ruminant meat (beef and goat/mutton) was above but close to the joint nutrient affordability threshold and could be a moderately affordable source of multiple nutrients for some households.

DIETARY ENERGY AFFORDABILITY

The most affordable nutritious foods to meet energy requirements are pulses, followed by cow milk, small dried fish, sour milk, and eggs (Figure 5). With the exception of sour milk, these foods were also among the most affordable foods to fill one or more micronutrient needs. Pulses cost less than half as much per kilocalorie than these other foods, at US\$0.16 for 450 kilocalories, but they still cost twice as much as maize flour (US\$0.08 for 450 kilocalories), a nutrient-poor but lower-cost and commonly consumed staple. Fresh fish is the least affordable food in terms of energy contributions, followed by ruminant meat and chicken.

CONCLUSIONS

Vitamins A and B₁₂ are the most affordable nutrients for which there is evidence of inadequate consumption among 6–23-month-old children in Kenya. For both of these micronutrients, there are multiple foods that could meet complementary feeding requirements for less than 2% of food expenditures per adult equivalent on average; 98–100% of households could afford adequate portion sizes for less than 7.6% of food expenditures per adult equivalent. Folate is the next most affordable nutrient, followed by calcium, zinc, and protein, and then iron. However, small dried fish is the only source of calcium, zinc, and animal-source protein that is affordable for almost all households in Kenya, and consumption varies across the country. Liver is another affordable source of several nutrients and, like small dried fish, is also among the lowest-cost foods when joint micronutrient contributions are considered, but current consumption is also low. Pulses are the most affordable source of folate and iron (they are also the lowest-cost food per kilocalorie). After liver and small dried fish, cow milk (protein, zinc, calcium, vitamin B₁₂, vitamin A), dark green leafy vegetables (calcium, iron, vitamin A), and eggs (protein, vitamin B₁₂, vitamin A) are the most affordable options to fill several single micronutrient requirements and joint requirements. Beef is another option to fill protein, zinc, and vitamin B₁₂ gaps but is less affordable than these other foods.

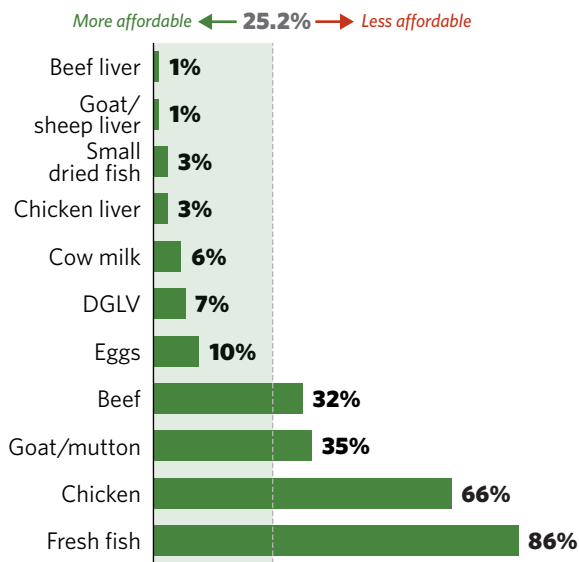


FIGURE 4. Share of food expenditures per person needed to provide an average of one-third of a young child's requirements for iron, vitamin A, zinc, folate, vitamin B₁₂, and calcium.

The dashed line represents an adjusted affordability threshold (25.2%) after accounting for lower expenditures among households with children 6–23 months compared with all households. The share of daily requirements of each nutrient provided by the specified quantity of food was capped at 100%. Household expenditure data are from 21,747 households in the 2015–16 Kenya Integrated Household Budget Survey.⁷ Nutrient densities are from the 2018 Kenya Food Composition Tables.¹⁰ Nutrient requirements from complementary foods are from Ryckman et al. (2021).⁸ DGLV = dark green leafy vegetables.

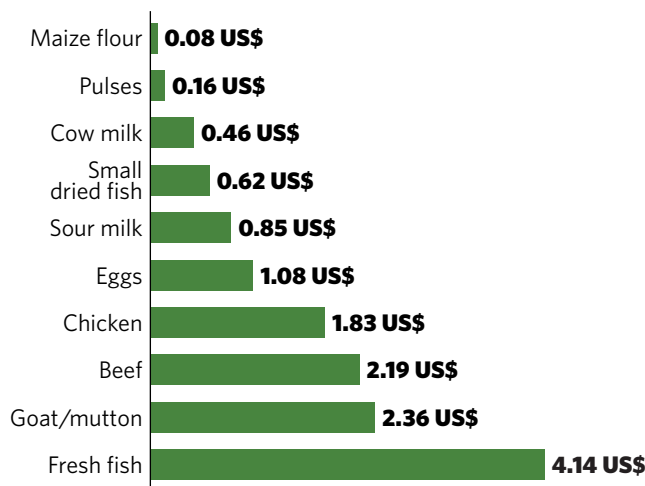


FIGURE 5. Cost of daily dietary energy requirements from complementary foods (450 kilocalories).

Price data are from the 2015–16 Kenya Integrated Household Budget Survey.⁷ Dietary energy densities are from the 2018 Kenya Food Composition Tables.¹⁰ The cost of 450 kilocalories is shown because this is the average daily dietary energy requirement for a child aged 6–23 months.

If small dried fish and liver are excluded from the analysis (based, e.g., on low and/or regionally variable consumption), then folate (pulses), vitamin B₁₂ (cow milk), and vitamin A (orange-fleshed fruits and vegetables, dark green leafy vegetables) are the only nutrients affordable to almost all households. The most affordable non-fish and non-liver options to fill iron, calcium, and animal-source protein gaps are generally unaffordable to 25–50% of households, and zinc is unaffordable to two-thirds of households. Considering these findings, programme and policy priorities could include the following:

- Behaviour change communication could be used to improve the desirability and acceptability of liver consumption, especially for young children. Although chicken liver should be widely available since chickens are generally purchased whole, additional interventions may be needed to increase the availability of ruminant liver, including ensuring that it can be purchased in small quantities.
- Research is needed to understand the reasons for low consumption of small dried fish in locations where it is less frequently consumed. Results could lead to interventions to increase the desirability (e.g., by addressing cultural barriers), availability, or acceptability of small dried fish consumption for young children.
- Interventions could reduce the prices or increase the home production of eggs, milk, pulses, and dark leafy green vegetables, which are among the more affordable widely consumed foods to meet several nutrient needs but present affordability challenges for 15–30% of households or more. Ruminant meat could also be a focus for price reductions. Efforts may also be needed to increase the desirability and/or availability of some of these foods; in particular, eggs and ruminant meat are consumed by less than half of households on a weekly basis.
- Several of these foods are less frequently consumed in the North Eastern province, which has lower dietary diversity, and this situation may require additional interventions. Social protection programmes, such as cash transfers or food subsidies, could be another option for improving affordability in this province and for the 15–30% of households currently unable to afford many of the abovementioned nutrient sources.
- Large-scale commercial and point-of-use fortification, iron and zinc biofortification, and iron supplementation should also be considered, since these nutrients were among the least affordable.

REFERENCES

1. World Bank. *DataBank*. Accessed February 9, 2020.
2. Central Intelligence Agency. *The World Factbook: Kenya*. Accessed February 9, 2020.
3. Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, National Council for Population and Development/Kenya, and ICF International. 2015. *Kenya Demographic and Health Survey 2014*. Rockville, MD, USA: Kenya National Bureau of Statistics, Ministry of Health/Kenya, National AIDS Control Council/Kenya, Kenya Medical Research Institute, National Council for Population and Development/Kenya, and ICF International. Accessed February 1, 2020.
4. Beal T, White JM, Arsenault JE, Okronipa H, Hinnouh G-M, Morris SS. Comprehensive Nutrient Gap Assessment (CONGA): A method for identifying the public health significance of nutrient gaps. *Nutr Rev.* 2021;79(4,Suppl 1):4-15.
5. Global Alliance for Improved Nutrition (GAIN), United Nations Children's Fund (UNICEF). *Comprehensive Nutrient Gap Assessment (CONGA): Micronutrient gaps during the complementary feeding period in Kenya*. Geneva: GAIN; 2021.
6. GAIN. *Affordability of Nutritious Complementary Foods in Kenya: Provincial Report*. Forthcoming online.
7. Kenya National Bureau of Statistics. *Kenya Integrated Household Budget Survey 2015-2016*. Nairobi: Kenya National Bureau of Statistics; 2018. Accessed February 1, 2020.
8. Ryckman T, Beal T, Nordhagen S, Chimanya K, Matji J. Affordability of nutritious foods for complementary feeding in Eastern and Southern Africa. *Nutr Rev.* 2021;79(4,Suppl 1):35-51.
9. Semba RD, Shardell M, Sakr Ashour FA, et al. Child stunting is associated with low circulating essential amino acids. *EBioMedicine.* 2016;6:246-252.
10. Food and Agriculture Organization of the United Nations (FAO)/Government of Kenya. *Kenya Food Composition Tables*. Nairobi: FAO/Government of Kenya; 2018.