



The Effect of Food Cost on Dietary Diversity: Insights from Rural and Urban Households, and Agricultural Involvement in Tanzania

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1. Introduction

Food is central to human survival, health, and productivity. Data from the Tanzania Demographic and Health Survey (2022) indicates that about 30% of children under five are stunted, while 12% are underweight and 3% are wasted. Meanwhile, overweight and obesity rates are rising, affecting 36% of women and 17% of men. Micronutrient deficiencies are also widespread, with anemia affecting 58% of children and 45% of women of reproductive age.

Despite high household food expenditures, consumption of nutrient-rich foods, particularly animal-source foods, remains low. Limited dietary diversity and low intake of fruits, vegetables, and animal-source foods continue to fuel both undernutrition and diet-related noncommunicable diseases. Rising food costs and price variability directly affect household dietary diversity, particularly for low-income and rural populations.

2. Rationale of the Issue

Healthy diets are becoming increasingly unaffordable for Tanzanian households. Although staple foods remain widely consumed, nutritious options such as fruits, pulses, and animal-source foods are less accessible due to high and rising costs. Nutrient-rich foods typically cost more per calorie than grains or processed alternatives. Globally, the cost of a healthy diet exceeds the international poverty line, making it unaffordable for over three billion people.

At the same time, household food budgets are stretched, leaving limited flexibility for healthier choices. This lack of flexibility is critical in low-income settings where households spend a large share of their income on food, meaning even modest price fluctuations can significantly affect dietary choices. Variability in food prices often pushes financially constrained households toward cheaper, calorie-dense options. From a theoretical standpoint, rising prices reduce real purchasing power and cause consumers to substitute nutrient-dense foods with cheaper, less nutritious options.

This has both short-term and long-term consequences: poor nutrition undermines child growth, reduces productivity, increases health risks, and perpetuates cycles of poverty. Understanding how food costs and intra-household dynamics shape dietary diversity is critical for designing effective food, nutrition, and agricultural policies.

3. Methodology

This study analyzed nationally representative panel data from the Tanzania National Panel Survey (NPS), using the fourth wave (2014/15) and the fifth wave (2020/21). The core analysis focused on 2,585 mainland households that were successfully tracked across both waves and had complete food consumption data.

Key outcome indicators included the following:

- Food-Based Dietary Guidelines (FBDG) score: measures household adherence to national dietary guidance by counting consumption across six key food groups (maximum score of six).
- Weighted Food-Based Dietary Guidelines (WFBDG) score: enhances the FBDG score by assigning weights based on the relative nutritional importance recommended by the Tanzania Mainland FBDG (e.g., 0.36 for cereals and 0.10 for animal-source foods).
- Food Consumption Score (FCS): combines dietary diversity, frequency, and nutritional value based on global standards, providing a broader indicator of household food access.
- Household Dietary Diversity Score (HDDS): tracks consumption across 12 food groups.

The affordability of a balanced diet was estimated using national dietary guidelines. The “healthy-diet plate” price is constructed to capture the minimum cost of meeting dietary recommendations, based on the Tanzania Mainland FBDG. This calculation includes recommended amounts for an adult, such as 580 grams of starches, 155 grams of animal-source foods, 290 grams of pulses, 280 grams of fruits, 280 grams of vegetables, and 28 grams of healthy fats and oils. Food group price indices captured cost variations.

Econometric models, primarily the Mundlak Correlated Random Effects models, tested the impact of food costs on dietary diversity over time. The CRE approach incorporates time-averaged covariates into a random effects framework, addressing potential correlations with unobserved factors. It is particularly suited for our analysis due to its ability to handle low within-individual variation and avoid the incidental parameters problem found in nonlinear fixed effects models. Poisson fixed effects were also used for robustness checks.

4. Findings

Dietary Patterns: Cereals and starches dominate diets, consumed nearly every day of the week. Vegetables and fats are the second most frequently consumed groups, averaging about six days a week. Consumption of animal-source foods fell from four days a week in 2014/15 to about three days a week by 2020/21. Pulses are eaten approximately three times a week, and fruits are consumed about twice a week, limiting overall diversity.

Affordability: The affordability of a balanced diet emerges as a critical issue, often surpassing household budgets, especially for low-income families. The mean annual cost of a healthy diet increased by approximately 5.2% between 2014/15 (TZS 903,322) and 2020/21 (TZS 950,400). For a significant proportion of households (around 67%), the cost of a balanced diet plate exceeds their

food budget expenditure. The cost of a healthy diet also surpassed total household expenditure per adult equivalent in both years, rising from 2% over budget in 2014/15 to 10% over budget in 2020/21. Alarming, about 40% of households cannot afford the minimum cost of a balanced diet even if they use their entire budget.

Impact on Food-Based Dietary Guidelines (FBDG) Adherence: The cost of a balanced diet plate is negatively associated with adherence to the FBDG. The analysis shows that a higher cost of a healthy diet is consistently associated with lower adherence to food-based dietary guidelines (FBDG). As the cost increases, households are less likely to meet recommended food-based dietary guidelines. Specifically, rising costs disproportionately reduce consumption of nutrient-dense foods such as fruits and animal-source products, while reliance on cereals and starches increases. Fruit consumption, in particular, shows a strong negative price elasticity.

Rural–Urban Differences: The negative association between the cost of a healthy diet and dietary diversity is concentrated among rural and agricultural households. Rural households exhibit a greater sensitivity to food cost increases, with dietary diversity declining significantly as costs rise. For rural households, the negative relationship is statistically significant across the FBDG, WFBDG, and FCS indicators. In contrast, the relationship between food cost and dietary diversity is not statistically significant in urban areas, suggesting greater resilience in urban settings. The findings indicate that own-production does not insulate agricultural households from affordability constraints due to limited production diversity, market integration, and income liquidity

5. Recommendations

Protecting dietary diversity in Tanzania requires a multi-pronged strategy focused on lowering the retail cost of nutrient-dense foods and mitigating household exposure to price volatility. Given that rural and agricultural households are disproportionately affected by rising costs, interventions must be targeted geographically and sectorally. We recommend the following:

- **Enhance Access to Nutritious Foods in Rural Areas:** Invest in rural food infrastructure, strengthen local markets, and promote production and distribution of diverse foods (fruits, pulses, and animal-source foods) to counter rural sensitivity to food price increases.
 - Medium-term priorities include investments in storage, transport, and local market infrastructure to reduce post-harvest losses and high marketing margins, thereby lowering consumer prices. This is necessary because the negative cost association is concentrated among rural households.
 - Over the longer term, promoting more diversified production systems can help align own-production with dietary needs, as own-production does not insulate agricultural households when they rely primarily on staples or cash crops.
- **Expand Nutrition-Sensitive Financial Protection and Subsidies:** Scale up targeted safety nets, including food vouchers, direct subsidies, and school feeding programs, tailored to regional food cost realities.

- Short-term options include targeted cash or food transfers to safeguard diet quality during price spikes. Evidence suggests that cash transfers and price vouchers can help improve nutrient adequacy for poorer households.
- The need for targeted social protection is paramount, as affordability is a key barrier to diet quality. To directly combat substitution effects, the government should implement measures to lower the cost of nutritious foods. This includes promoting Targeted subsidies/tax waivers for smallholder producers and vendor incentives to reduce cost barriers for critical nutrient-rich groups (fruits, pulses, animal sources), consumption of which declines significantly when costs rise

Costing considerations and estimates for the implementation of proposed policy recommendations

General Recommendation	Specific Recommendation	Proposed Actions / Activities	Indicative Costs (TZS)	Financing Sources	Key Assumptions
Enhance Access to Nutritious Foods in Rural Areas	Invest in rural food infrastructure & strengthen local markets	- Construct or rehabilitate rural storage facilities - Improve rural transport links (feeder roads) - Support aggregation and cold chain centers for smallholders	80–120 million per district (initial investment)	Gov't rural development funds; IFAD; AfDB; PPPs	- Cost of basic rural warehouse: TZS 40M - Feeder road upgrade per km: TZS 30–50M - One-time capital investment targeting 3–5 rural wards per district
	Promote production & local distribution of diverse foods	- Extension support for fruit, legume, and livestock value chains - Provide inputs (seeds, chicks, seedlings) - Farmer group training and demos	30–50 million per district annually	Ministry of Agriculture; NGOs; FAO; local gov't	- Targeting 2,000 farmers per district - Extension cost per farmer: ~TZS 25,000/year - Inputs provided to 30% of participants
Expand Nutrition-Sensitive Social Protection	Scale up food vouchers and school feeding programs	- Pilot region-wide voucher system for low-income households - Expand fortified school meal programs	150–250 million per region annually	National Social Protection Fund; WFP; UNICEF; Education sector	- 5,000 households per region receive TZS 3,000/month in food vouchers - School meals at TZS 500 per child per day, 180 school days/year
	Implement emergency support during price spikes	- Cash transfers during lean seasons or price shocks - Early warning-based food security response	100 million per region (contingency reserve)	Disaster relief fund; humanitarian partners	- Supports approx. 3,000 vulnerable households during price surges - Transfer of TZS 10,000–15,000 per month for 3 months
Subsidize Nutritious Food Groups	Reduce cost barriers for fruits, pulses, and animal-source foods	- Targeted production subsidies for smallholders (inputs, tax waivers) - Vendor incentives (reduced fees, market stall subsidies)	40–60 million per region annually	Ministry of Finance, development partners, private sector CSR	- Subsidies lower farmgate prices by ~15% - Targeted to critical food groups: fruits, legumes, eggs, dairy - Includes conditional market licenses or vendor rebates

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