Original Research Article

Toward Advancing Dietary Policy: Examining Economic Hurdles to the Affordability of a Healthy Diet in Tanzania

ABSTRACT

Tanzania has made big strides in improving the cost of accessing a healthy diet to enhance health for economic growth. However, it was determined that around 59% of households experience difficulties with affordable access to healthy food, thus prohibiting the expansion of dietary options. This study thus sought to investigate the economic hurdles to the affordability of a healthy diet in Tanzania from 2010 to 2023, specifically to: (i) visualize trends and correlations between the people who cannot afford a healthy diet and socioeconomic indices; (ii) estimate the overall and specific food category costs of a healthy diet, and (iii) compute econometric coefficients related to economic barriers to affordability of a healthy diet. Using descriptive statistics and ordinary least squares (OLS) linear regression models on a panel dataset, the study found significant changes in socioeconomic status over the period. The number of people unable to afford a nutritious diet increased from 30.7 million (53%) in 2010 to 57.2 million in 2023. Despite a decrease in poverty and unemployment rates, the affordability issue persisted due to a 31% rise in the cost of a healthy diet, from $1.988 to $2.866. GDP per capita nearly doubled from $878 to $1,742, indicating economic growth; however, this increase was outpaced by the rising costs of a nutritious diet, reducing actual purchasing power. Urbanization rates increased from 27.4% to 36.4%, potentially contributing to higher living costs. Literacy rates improved from 73% to 93.5%, yet did not significantly impact food affordability. Inflation rates decreased from 7.19% to 4%, suggesting price stability, but this did not address the high cost of a healthy diet. The overall cost of a nutritious diet rose from $1.988 in 2010 to $2.903 in 2023. Animal-based foods consistently had the highest share of diet expenses, followed by starchy staples, while the costs of fruits, legumes, nuts, seeds, vegetables, oils, and fats showed minor increases. In addition, econometric analysis revealed that the macroeconomic challenges to affordable healthy food include inflation, unemployment, poverty level, household income, and the expense of a healthy diet at a probability level of $P < 0.05$. The paper recommends directing capital towards the livestock and agricultural production of foodstuffs in a bid to bring down food production costs and therefore retail prices for the improvement of the dietary policy in Tanzania.

***Keywords**: Healthy diet; affordability, economic hurdles; socioeconomic trends; macroeconomic challenges;dietary policy; economic growth; Tanzania.*

1. INTRODUCTION

Global, A healthy diet is essential to sustaining good health and avoiding chronic illnesses such as stunted growth, obesity, and noncommunicable diseases (NCDs) (Cena & Calder, 2020). Previous research has emphasized the importance of a nutritious diet in maintaining general well-being and health. However, food costs continue to be a substantial hurdle to obtaining a nutritious diet for several people and families; especially those living in poverty or on limited incomes (Correa-Matos et al., 2020). Health Diet is one of the most important risk factors contributing to the worldwide illness burden. The youth contribute towards unfolding the probabilities of developing healthy food practices. However, youths across the globe experience several challenges in the attainment and maintenance of a healthy nutrition plan (Mcnaughton et al., 2018). It indicates that there are certain barriers with regard to achieving the recommended dietary practices among such persons, some of which may be peer pressure, social norms, financial challenges, as well as less access to nutrient-dense foods as mentioned by Correa-Matos et al., (2020). Moreover, although not a significant barrier on its own, the cost of healthful meals works in concert with other hurdles like time restrictions and customer cravings for unhealthful foods to produce a significant proportion of diets low in nutrients (Anekwé&Rahkovsky, 2015). This is particularly

problematic for customers who are short on both time and cash. Malnutrition and food shortages are prominent in Tanzania owing to low-quality diets, with a prevalence of stunted growth, wasting, and deficiency of micronutrients among young people and adults; however, proof of the cost-efficiency of food-based programs that alter diets is limited (World Food Programme-WFP, 2019; Canton, 2021). In several nations, food shortages and malnutrition continue to be major public health challenges (World Health Organization-WHO, 2020).The The price of food makes the nation's malnutrition burden worse by compounding it with other economic hurdles including poverty, poor access to healthcare, and poor sanitation (World Food Programme-WFP, 2019; Canton, 2021). Although access to a good diet is critical for supporting health and well-being, many people experience barriers to finding inexpensive and healthy foods. As per the most recent available statistics from the World Health Organization the total number of people globally who are unable to afford a healthy diet rose by 112 million to over 3.1 billion, implying the impact of increasing customer food expenses throughout the global epidemic (World Health Organization, 2022). Additionally, the ongoing situation in Ukraine is disrupting supply lines and raising prices for food, fertilizer, and oil. This resulted in further increases in food costs over the first half of 2022. At the same time, more frequent and more severe weather conditions are disrupting supply chains, especially in low-income countries (FAO, 2022; World Health Organization, 2022). A balanced diet is affordable not just because of the expense of healthy foods but also because of individual incomes and access to high-fat, sugary, and salty meals. Tanzania, a nation with a low income, possesses the sixth-biggest population in sub-Saharan Africa (World Population Prospects 2019, World Bank, 2019). Poverty is pervasive; with 23% of the population living below the national poverty level (Central Intelligence Agency, 2019). Around, 59% of households struggle to afford healthful food, creating a significant barrier to dietary diversification (Tanzania Food and Nutrition Centre, 2019).

Thus, this study intends to examine the economic hurdles to affordability of a healthy diet in Tanzania, since it has an important role in deciding whether people, especially those who are less fortunate financially, can get and continue eating a balanced diet. This study is unique in that it links economic obstacles to the affordability of healthy diets with the rising number of people who cannot afford a healthy diet, rather than focusing exclusively on the cost and affordability of healthy diets within and between nations. It also improves overall health and well-being and catalyzes economic growth. Notably, knowing the economic hurdles related to the cost and affordability of a healthy diet in Tanzania gives insights into prospective strategies and interventions to overcome these hurdles and encourage healthier food choices among the public (Marjot et al., 2021). Additionally, economic hurdles linked to the cost and affordability of a healthy diet have a significant impact on dietary patterns and health outcomes for people who cannot afford a healthy diet. The affordability of a healthy diet in Tanzania by removing economic barriers is critical for tackling the growing number of unhealthy diets and increasing nourishment among the public (Ignowski et al., 2023), resulting in better dietary policy in Tanzania.

2. MATERIAL AND METHODS

2.1.Dataset and Sources

This study makes use of a panel dataset of Tanzania's Cost and Affordability of a Healthy Diet (CoAHD), including the number of people unable to afford a healthy diet, sourced from the Food and Agriculture Organization of the United Nations Statistical Database (FAOSTAT), the Word Bank Database, and the National Bureau of Statistics (NBS). FAOSTAT is a wide-ranging database maintained by the Food and Agriculture Organization (FAO) of the United Nations. FAOSTA, Word Bank, and NBS have committed to maintaining the best possible capacity to collect, process, validate, harmonize, and analyze incoming data and generate and disseminate accurate and timely information on healthy food and agriculture. Data are collected every year through questionnaires, submitted to countries by the teams, and published regularly in the FAOSTAT and NBS databases. Data has been collected with the highest feasible consistency. The dataset includes information on the cost of a healthy diet, disaggregated into various food categories such as animal source foods, fruits, legumes, nuts and seeds, oils and fats, starchy staples, and vegetables. Additionally, data on the number of people unable to afford a healthy diet,

poverty rates, unemployment rates, urbanization rates, literacy rates, inflation rate, and household income levels (GDP per capita) are included. Notably, Table 1 shows the original dataset.

Table 1. Original dataset

Year	Number of people unable to afford a healthy diet (Million)	Poverty rates (%)	Unemploymen t rates (%)	Household income levels (GDP per capita-(US$)	Cost of a healthy diet (US$)	Urbanizatio n rates (%)	Literacy rates (%)	Inflation rates (%)
	Y_1	X_1	X_2	X_3	X_4	X_5	X_6	X_7
2010	26.7	28.2	10.9	878	1.988	27.4	73.0	7.19
2011	28.3	28.2	10.7	933	2.043	28.2	74.8	12.69
2012	29.9	28.2	10.6	1003	2.173	28.9	76.7	16.00
2013	31.6	28.2	10.5	1085	2.228	29.6	78.5	7.87
2014	33.3	28.2	10.3	1162	2.358	30.3	80.2	6.13
2015	34.9	26.4	10.1	1228	2.488	31.0	81.9	5.59
2016	36.6	26.4	10.0	1310	2.543	31.7	83.6	5.17
2017	48.3	26.4	9.9	1392	2.598	32.4	85.2	5.32
2018	49.7	26.4	9.7	1468	2.648	33.1	86.8	3.51
2019	50.8	26.4	9.6	1548	2.681	33.8	88.3	3.35
2020	52.5	26.4	9.5	1614	2.736	34.5	89.8	3.29
2021	54.1	26.4	9.0	1652	2.866	35.2	91.2	3.69
2022	56.1	26.4	8.9	1704	2.996	35.9	92.6	4.35
2023	57.2	26.3	8.8	1742	3.116	36.4	93.5	4.04

Source: Food and Agriculture Organization of the United Nations Statistics (FAOSTAT).Regional FAO data groupings, 2023, Word Bank Database, 2023, and the National Bureau of Statistics (NBS), 2023.

2.2Conceptual Framework

To address the affordability challenges of healthy diet issues in Tanzania, enabling more effective initiatives to improve access to healthy diets, thereby boosting overall health and well-being for catalyzing economic growth. This study hypothesized that the enhanced affordability of a healthy diet among individuals in Tanzania is reliant on the link between the reduced number of people who are unable to afford a healthy diet and its economic hurdles. The economic hurdles include poverty rates, unemployment rates, household income levels (GDP per capita), the price of a healthy diet (PPP dollar per person per day), urbanization rates, literacy rates, inflation rates, and agricultural productivity. Furthermore, once these economic hurdles have been thoroughly investigated, they open the door to effective dietary policy formulation, thereby reducing the high prevalence of unhealthy diets for better health and economic development in Tanzania. Fig. 1 depicts the interrelationships between the economic hurdles and the reduced number of people who are unable to afford a healthy diet in this study and how they are interlinked.

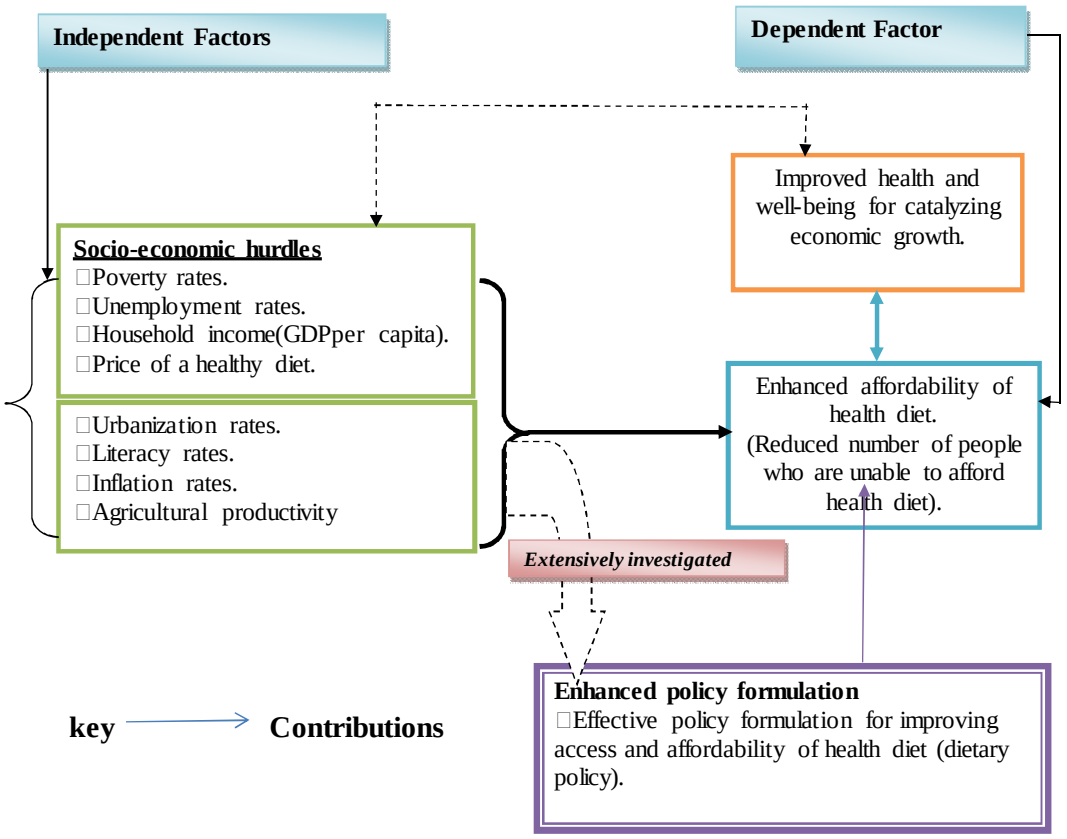

Fig 1. Conceptual framework.

2.3. Analytical Methods

This study used regression (econometric) analysis models together with inferential and descriptive statistics to analyze data.

Descriptive and inferential statistics involved mean, maximum, minimum, standard deviation, and percentages of the number of people unable to afford a healthy diet, the cost of a healthy diet (PPP dollar per person per day), the cost of animal source foods, the cost of fruits, the cost of legumes, nuts, and seeds, the cost of oils and fats, the cost of starchy staples, the cost of vegetables, poverty rates, unemployment rates, the price of a healthy diet, urbanization rates, literacy rates, agricultural productivity, inflation rate, and household income levels (GDP per capita) for the period from 2010 to 2023, presented in the table and line graphs.

Regression (econometric) analysis: The ordinary least squares (OLS) estimation strategy was utilized to examine the panel data for the present study. The number of people who are unable to afford a nutritious diet was specifically impacted by a variety of aspects, which were examined using the multiple linear regression model with ordinary least squares (OLS). The Ordinary Least Squares (OLS) model was selected due to its ability to convey and clarify the relationship between various independent factors and a continuous dependent factor (the number of people unable to afford a healthy diet), as cited by

Kibonaand Yuejie (2022). Additionally, co-integration and stationary inspections may be carried out using the OLS.

The number of people unable to afford a healthy diet (Y_1) was hypothesized as a function of the poverty rates (X_1), unemployment rates (X_2), household income levels (GDP per capita) (X_3), cost of a healthy diet (PPP dollar per person per day) (X_4), urbanization rates (X_5), literacy rate (X_6), and inflation rate (X_7) (see Eq 1):

$$Number\ of\ people\ unable\ to\ afford\ a\ healthy\ diet = (X_1, X_2, X_3, X_4, X_5, X_6, X_7) \quad (1)$$

Thus, the actual OLS model for Number of people unable to afford a healthy diet with its independent variables in Tanzania is expressed as:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \beta_n X_n + \varepsilon_i \quad (2)$$

Here;

Yi denotes the number of people unable to afford a healthy diet, β_0 is a constant (intercept), β_1, …., and $\beta_n$are the coefficients to be estimated and X_1,…., and X_n stand for the vectors of the independent variables (drivers of the number of people unable to afford a healthy diet in Tanzania), *f* signposts the function of, and ε_i is the error term capturing unobserved factors.

To evaluate the elasticity of the number of people unable to afford a healthy diet as an independent variable, the regression equation model presented above was first normalized using a natural logarithm. A natural logarithm converts the non-linear regression equation into a linear regression equation, hence eliminating irregularities (Akonaay, 2018; Kibona&Yuejie, 2022). Thus, the attained equation is summarized as follows;

$$LnY_{it} = \beta_0 + \beta_1 LnX_{1t} + \beta_2 LnX_{2t} + \beta_3 LnX_{3t} + \beta_4 LnX_{4t} + \beta_5 LnX_{5t} + \beta_6 LnX_{6t} + \beta_7 LnX_{7t} + \varepsilon_{it} \quad (3)$$

Here;

LnY_{it} = denotes the number of people unable to afford a healthy diet in Tanzania in year t in natural logarithm

LnX_1 = poverty rates in natural logarithm

LnX_2 = unemployment rates in natural logarithm

LnX_3 =household income levels (GDP per capita) in natural logarithm

LnX_4 =cost of a healthy diet (PPP dollar per person per day) in natural logarithm

LnX_5= urbanization rates in natural logarithm

LnX_6= literacy rates in natural logarithm

LnX_7= inflation rates in natural logarithm

Thus, the condensed ordinary least squares (OLS) regression model for variables influencing the number of people unable to afford a healthy diet in Tanzania was defined as follows (see Eq. 4):

$$Ln\text{number of people unable to afford a healthy diet} = \beta_0 + \beta_1 Ln\text{poverty rates} + \beta_2 Ln\text{unemployment rates} + \beta_3 Ln\text{household income levels} + \beta_4 Ln\text{Cost of a healthy diet} + \beta_5 Ln\text{urbanization rates} + \beta_6 Ln\text{Literacy rate} + \beta_7 Ln\text{in lation rate} + \varepsilon. \quad (4)$$

The descriptive statistics in the original form and the hypothesized sign effects of the independent variables used in the regression model are shown in Table 2. The converted panel dataset to the natural logarithm (*Ln*) and its units are shown in Table 3. Such natural logarithm adjustments serve to stabilize the variation and prepare the data for regression analyses and other methods of statistical analysis.

Table 2. Descriptive statistics and expected sign effects of the independent variables on the number of people unable to afford a healthy diet in Tanzania from 2010 to 2023.

Variables	Mean	Std.Deviation	Maximum	Minimum	Effects Sign
Poverty rates (%)	27.036	0.901	28.2	26.30	+
Unemployment rates (%)	9.893	0.680	10.9	8.80	+
Household income (PPP US$ per person per day)	1337.070	295.032	1742.0	878.00	-
Cost of a healthy diet (US$)	2.533	0.344	3.1	1.99	+
Urbanization rates (%)	32.029	2.917	36.4	27.40	±
Literacy rates (%)	84.007	6.712	93.5	73.00	-
Inflation rates (%)	6.299	3.744	16.0	3.29	+

Source: Food and Agriculture Organization of the United Nations Statistics (FAOSTAT). Regional FAO data groupings, 2023), Word Bank Database, 2023 and the National Bureau of Statistics (NBS), 2023.

Table 3. Dataset converted into natural logarithm (*Ln*).

Year	Number of people unable to afford a healthy diet (Million)	Poverty rates (%)	Unemployment rates (%)	Household income levels (GDP per capita-(US$)	Cost of a healthy diet (US$)	Urbanization rates (%)	Literacy rates (%)	Inflation rates (%)
	LnY_1	LnX_1	LnX_2	LnX_3	LnX_4	LnX_5	LnX_6	LnX_7
2010	3.285	3.339	2.389	6.778	0.687	3.311	4.290	1.973
2011	3.343	3.339	2.370	6.838	0.714	3.339	4.314	2.541
2012	3.398	3.339	2.361	6.911	0.776	3.364	4.341	2.773
2013	3.453	3.339	2.351	6.989	0.801	3.388	4.364	2.063
2014	3.506	3.339	2.332	7.058	0.858	3.411	4.384	1.813
2015	3.552	3.273	2.313	7.113	0.911	3.434	4.402	1.721
2016	3.600	3.273	2.303	7.178	0.933	3.456	4.418	1.643
2017	3.877	3.273	2.293	7.238	0.955	3.478	4.442	1.671
2018	3.906	3.273	2.272	7.292	0.973	3.400	4.462	1.255
2019	3.928	3.273	2.262	7.345	0.986	3.520	4.482	1.209
2020	3.961	3.273	2.251	7.386	1.006	3.096	4.497	1.191
2021	3.991	3.273	2.197	7.409	1.053	3.561	4.515	1.306
2022	4.027	3.273	2.186	7.442	1.097	3.5821	4.528	1.470
2023	4.047	3.270	2.173	7.461	1.137	3.592	4.538	1.396

Source: Food and Agriculture Organization of the United Nations Statistics (FAOSTAT).Regional FAO data groupings, 2023, Word Bank Database, 2023, and the National Bureau of Statistics (NBS), 2023**.**

2.4.Multicollinearity Variable Diagnosis for Analytical Model Setup

Earlier stated, the Ordinary Least Squares (OLS) Model was used to determine the factors leading to the rise in the number of people who cannot afford a nutritious diet. Prior to implementing the model, an evaluation was performed to check for multicollinearity among the hypothesized explanatory variables. Multicollinearity is defined as a perfect or precise linear connection between at least one independent variable and another (Gujarati, 2003). The existence of multicollinearity can cause calculated regression coefficients to have wrong values and lowered t-ratios, leading to incorrect conclusions. As a result, it was critical to evaluate major multicollinearity concerns among the continuous variables throughout the model estimation phase.

Multicollinearity among explanatory factors was detected using the variance inflation factor (VIF) technique (Chatterjee and Price, 1991). The VIF is calculated using the square of the multiple correlation coefficient (R^2), which is derived by regressing one explanatory variable (x) against all other variables. The VIF is calculated as the reciprocal of one minus the square of R^2. A VIF score greater than 10 is typically thought to indicate multicollinearity in the model. Upon assessing the VIF coefficient values, it was concluded that there were no major issues concerning multicollinearity. As a result, all explanatory factors were considered in the model.Table 4 displays the results of the multicollinearity evaluations for the variables.

Table 4. Multicollinearity test for explanatory variables.

Variables	VIF	R^2_i
Poverty rates (%)	2.21	0.451
Unemployment rates (%)	2.07	0.410
Household income (PPP US$ per person per day)	1.50	0.303
Cost of a healthy diet (US$)	1.47	0.250
Urbanization rates (%)	1.41	0.217
Literacy rates (%)	1.37	0.217
Inflation rates (%)	1.16	0.107
Poverty rates (%)	1.03	0.013

2.5Ethical Considerations

As this study utilizes secondary data from FAOSTAT, Word Bank, and NBS, ethical considerations regarding data privacy and confidentiality are not applicable. FAOSTAT, Word Bank, and NBS ensure data confidentiality and anonymize individual-level information to protect the privacy of respondents. Hence, consent was not obtained.

3. RESULTS AND DISCUSSIONS

3.1 The Overall Trends and Correlations in the Number of People Unable to Afford a Healthy Diet and Socioeconomic Factors in Tanzania from 2010 to 2023

Table 5 shows that Tanzania's socioeconomic level changed dramatically between 2010 and 2023, with a big number of individuals unable to buy healthful diets. Targeting people in this group, the number increased by 53%, from 30. 7 million to 57. 2 million in 2023. Furthermore, Figure 2 shows a substantial increase from 36.6 million in 2016 to 48.3 million in 2017. This 11.7 million rise in only one year indicates substantial economic challenges affecting affordability. Except for the big increase in 2017, the number of people unable to afford a nutritious diet has been pretty stable, with an annual rise of around 2 million people. Notably, Tanzania's population growth leads to rising numbers. As the population rises, more people become vulnerable, especially if economic progress falls behind population growth. Despite a 7% decline in poverty rates from 28.2% to 26.3% and a 24% decrease in unemployment rates from 10.9% to

8.8%, the affordability issue persisted. This paradox means that progress in these areas was insufficient to cover the rising costs of a nutritious diet, which increased by 31%, from $1.988 to $2.866.

Household income, as assessed by GDP per capita, nearly doubled from $878 to $1,742, demonstrating economic expansion. However, this gain was exceeded by the growing expense of a nutritious diet, lowering households' actual purchasing ability. Policies should prioritize faster income growth, particularly for low-income households, to increase their ability to purchase relative to food costs. Similarly, government subsidies for nutritious meals can make them more affordable, especially for the neediest people. To reduce consumer prices, producers or merchants may get direct subsidies. Strengthening social welfare services, such as aid for food or cash-based payments, can significantly help narrow the cost disparity for families with low incomes, guaranteeing access to a healthy diet. Urbanization rates increased by 25%, from 27.4% to 36.4%, indicating a change toward urban life, which may be associated with greater living expenditures and food prices. Rural growth ought to be overlooked while cities expand. Improving agricultural output and developing countryside job opportunities can alleviate urban migration pressures and increase the affordability of food in rural communities.

Literacy rates rose by 22%, from 73.0% to 93.5%, indicating expanded educational access. Nevertheless, this failed to result in enough economic gains to render healthier diets more accessible to a larger population. Though literacy rates have increased, specialized dietary and budgetary initiatives can assist families in making better-educated, cost-effective decisions. Inflation rates fell by 78%, from 7.19% to 4.04%, suggesting improved stability in prices, however, this failed to tackle the problem of affordability matter.

The paper highlights the importance of strong social safety nets and tailored strategies to combat food poverty. To raise household incomes and eliminate poverty, policymakers should prioritize food subsidies, increased agricultural output, and economic changes.

By tackling these issues, Tanzania will be able to better connect its socioeconomic progress with its population's nutritional demands, lowering the number of those who cannot afford a nutritious meal.

Table 5. The Overall Trends and Correlations in the Number of People Unable to Afford a Healthy Diet and Socioeconomic Factors in Tanzania from 2010 to 2023.

Year	Number of people unable to afford a healthy diet (Million)	Poverty rates (%)	Unemployment rates (%)	Household income levels (GDP per capita-(US$)	Cost of a healthy diet (US$)	Urbanization rates (%)	Literacy rates (%)	Inflation rates (%)
2010	26.7	28.2	10.9	878	1.988	27.4	73.0	7.19
2023	57.2	26.3	8.8	1742	2.866	36.4	93.5	4.04
Change	**+30.7 (53%)**	**-1.9 (7%)**	**-2.1 (24%)**	**+864 (50%)**	**+0.88 (31%)**	**+9.0 (25%)**	**+20.5 (22%)**	**-3.15 (78%)**

Source: Food and Agriculture Organization of the United Nations Statistics (FAOSTAT).Regional FAO data groupings, 2023, Word Bank Database, 2023, and the National Bureau of Statistics (NBS), 2023**.**

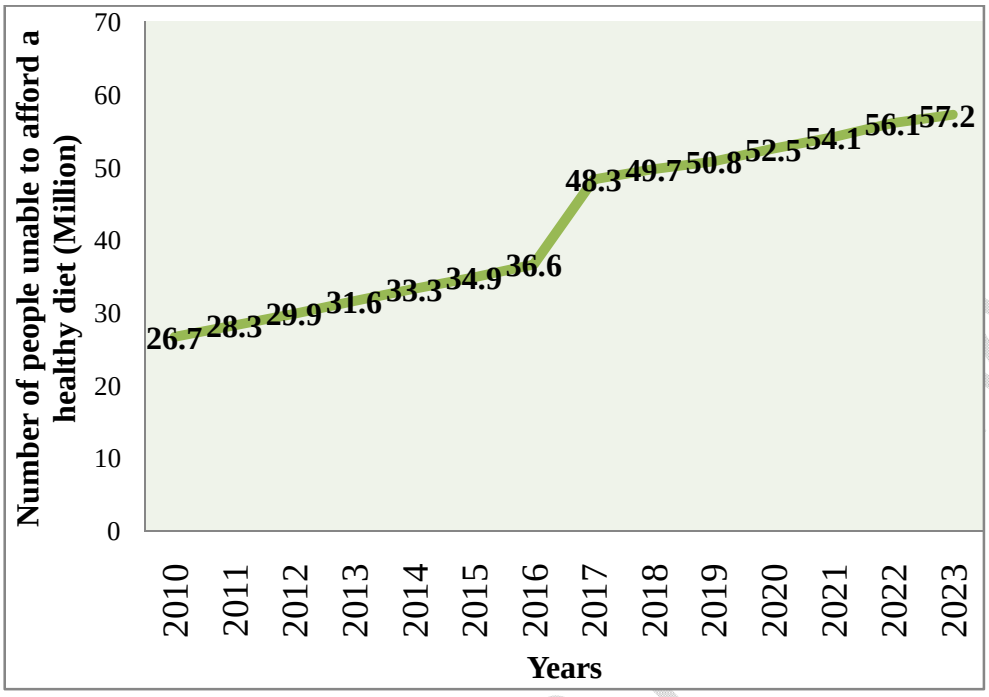

Figure 2. Number of People Unable to Afford a Healthy Diet in Tanzania from 2010 to 2023.

3.2Overall Cost of a Healthy Diet along with the Breakdown for Various Food Groups in Tanzania from 2010 to 2023

Table 6 illustrates the overall cost of a healthy diet in Tanzania from 2010 to 2023 (in PPP dollars per person per day), as well as the contributions of individual food groups. The analysis shows many patterns and insights into the cost structure of a healthy diet in Tanzania over time. The overall cost of a healthy diet rose from $1.988 in 2010 to $2.903 in 2023, representing a progressive rise in the expense of living and food expenses throughout this time.

Animal-based foods constantly contributed to the greatest proportion of overall diet costs, which varied between 26.87% to 28.36%. This demonstrates the enormous expense burden involved with obtaining protein-rich foods, which are required for a healthy diet. Considering the high cost and necessity of animal-based commodities, specific subsidies or aid schemes to increase livestock production may assist in rendering these necessities more accessible.

Starchy staples, including grains and cereals typically accounted for a significant amount of the diet expense, at roughly 24-25%. This underlines their significance in the Tanzanian diet as a key source of energy.

Fruits and legumes, nuts, and seeds' cost shares increased little over time. This can possibly be attributed to increased knowledge and assimilation of varied food categories into regular meals, resulting in improved dietary balance. Enhancing people to consume of a diverse range of food categories, specifically fruits and legumes might boost nutritious intake whilst lowering expenses.

Vegetables typically constituted between 16 and 18% of the diet expenses, demonstrating their critical function in delivering important vitamins and minerals. The proportion of the expense of oils and fats stayed generally consistent, slightly rising over time, demonstrating their importance in cooking and meal

preparation. Notably, putting money into agricultural technologies and effective farming techniques may help cut the expenses involved in producing different kinds of food, resulting in cheaper pricing for customers. Furthermore, ongoing tracking of food prices as well as expense implications can assist policymakers in adopting measures that guarantee that healthy diets stay cheap and readily available to all individual groups. These guidelines are critical for tackling the issues associated with sustaining a healthy diet that is balanced in Tanzania, especially among households with low incomes.

Table 6. The Overall Cost of a Healthy Diet along with the Breakdown for Various Food Groups in Tanzania from 2010 to 2023.

Year	Overall Cost of a Healthy Diet (PPP $/person/day)	Cost of Animal Source Foods (PPP $)	Cost of Fruits (PPP $)	Cost of Legumes, Nuts, and Seeds (PPP $)	Cost of Oils and Fats (PPP $)	Cost of Starchy Staples (PPP $)	Cost of Vegetables (PPP $)
2010	1.988	0.55 (27.7)*	0.25 (12.6)	0.15 (7.8)	0.20 (10.1)	0.48 (24.1)	0.36 (18.1)
2011	2.031	0.57 (28.1)	0.26 (12.8)	0.16 (7.9)	0.21 (10.3)	0.50 (24.6)	0.37 (18.2)
2012	2.081	0.59 (28.4)	0.27 (13.0)	0.17 (8.2)	0.22 (10.6)	0.52 (25.0)	0.38 (18.3)
2013	2.135	0.60 (28.1)	0.28 (13.1)	0.18 (8.4)	0.23 (10.8)	0.54 (25.3)	0.39 (18.3)
2014	2.203	0.62 (28.1)	0.29 (13.2)	0.19 (8.6)	0.24 (10.9)	0.56 (25.4)	0.40 (18.2)
2015	2.279	0.64 (28.1)	0.30 (13.2)	0.20 (8.8)	0.25 (11.0)	0.58 (25.5)	0.41 (18.0)
2016	2.371	0.66 (27.8)	0.31 (13.1)	0.21 (8.9)	0.26 (11.0)	0.60 (25.3)	0.42 (17.7)
2017	2.469	0.68 (27.5)	0.32 (13.0)	0.22 (8.9)	0.27 (10.9)	0.62 (25.1)	0.43 (17.4)
2018	2.566	0.70 (27.3)	0.33 (12.9)	0.23 (9.0)	0.28 (10.9)	0.64 (25.0)	0.44 (17.2)
2019	2.664	0.72 (27.0)	0.34 (12.8)	0.24 (9.0)	0.29 (10.9)	0.66 (24.8)	0.45 (16.9)
2020	2.745	0.74 (27.0)	0.35 (12.8)	0.25 (9.1)	0.30 (10.9)	0.68 (24.8)	0.46 (16.8)
2021	2.829	0.76 (26.9)	0.36 (12.7)	0.26 (9.2)	0.31 (11.0)	0.70 (24.7)	0.47 (16.6)
2022	2.866	0.78 (27.2)	0.37 (12.9)	0.27 (11.2)	0.32 (9.4)	0.72 (11.2)	0.48 (16.6)
2023	2.903	0.79 (27.2)	0.39 (13.4)	0.29 (10.3)	0.33 (11.4)	0.75 (25.8)	0.50 (17)

Source: FAO Statistical Yearbook 2023 (Tanzania), Food and Agriculture Organization of the United Nations Statistics (FAOSTAT).Regional FAO data groupings, 2023, Word Bank Database, 2023, and the National Bureau of Statistics (NBS), 2023.*****_Numbers in the parentheses indicate the percentage contribution of each food item to the Overall cost of a healthy diet for each year_

3.3Econometric Estimation Results on the Economic Hurdles to Affording a Healthy Diet in Tanzania from 2010 to 2023

Table 7 displays the results of the ordinary least squares (OLS) regression analysis on the economic hurdles to affording a healthy diet in Tanzania, which generated an R-squared (R^2) value of 0.978 and an adjusted R^2 of 0.952. The remaining 2.2% is the unexplainable variance in the number of people who are

unable to afford a healthy diet caused by the error term. This shows that the model's independent variables account for a high share (97.8%) of the variation in the number of Tanzanians unable to afford a healthy diet. The model developed using SPSS v.27, fitted accurately and was statistically significant at $P < 0.05$.

The number of people who cannot afford a healthy diet is increased by higher levels of inflation at a 5% ($p < 0.05$) level of significance which is why there exists a strong relationship between high inflation rates and an increased number of such persons with positive coefficient 1.243 and significant p-value 0.021. This implies that inflation undermines purchasing power by which means food becomes more expensive to many. As stated by D'Souza and Jolliffe (2021), substantial increases in inflation are associated with increasing shortages of food, especially in less developed nations where food prices account for a large amount of household budgets.

Regarding unemployment rates. The correlation coefficient is 0.567, implying a positive relationship, with a p-value of 0.054. This suggests that among other things, at a 5% ($p < 0.05$) level increasing rates of unemployment lead to an increase in the incidence of hunger among populations living under conditions of poverty or social deprivation. According to International Labour Organization (ILO, 2021) research, young unemployment is particularly prevalent, adding to economic difficulties and limiting access to nutritional meals. Even though the unemployment rate in Tanzania is falling, several individuals still have trouble purchasing health diet (ILO, 2021).

Regarding poverty rates, the coefficient is positive (0.809) which means that areas with increased poverty rates have more people who do not afford quality healthy foods. The p-value (0.024) suggests that the association is statistically significant at 5% level of significance ($p <.05$). It indicates that if Tanzania's poverty rates rise by one percent, the number of Tanzanians unable to afford a healthy diet rises by 0.809%. Research has indicated that households with lower incomes are less likely to be able to purchase a balanced diet since nutrient-dense foods are expensive (Smith and Haddad, 2015).Furthermore, Food affordability is a direct function of poverty. In Sub-Saharan Africa, high rates of poverty mean that there is a shortage of money for buying nutritious meals. Research indicates a substantial correlation between food insecurity and poverty in the area. According to the World Bank (2022), poverty is still widespread and has an impact on nutrition and food security even in those African nations where the economy is growing. Even though Tanzania's poverty rate has somewhat decreased, many households still find it difficult to pay for a nutritious food because of their tight budgets.

Regarding the rate of urbanization, has a positive coefficient (0.132) that implies urbanization could cause food affordability concerns owing to the higher costs of living in cities; yet, the p-value (0.141) shows no statistical significance. Urbanization affects food affordability by altering dietary habits and lifestyle choices. Sub-Saharan Africa is experiencing rapid urbanization, which has increased living expenses, particularly food prices. Because food costs are frequently greater in urban regions than in rural ones, it can be difficult for low-income urban residents to buy wholesome diets. Tanzania's rate of urbanization has grown, which is consistent with increasing urban food prices (World Bank, 2017).

In the case of household income, this is explained by the negative coefficient (-0.045). This implies that the more money one makes in their household, the less likely they are to face food insecurity; this makes sense because if you have more money then you have stronger purchasing power. The p-value shows that there is a statistical significance between people who unable to afford quality healthy foods and household income at 5% level ($p <.05$). Furthermore, the coefficient indicates that a 1US$ increment in household income reduces the number of Tanzanians unable to afford a healthy diet by -0.045%. Notably, Smith and Haddad (2015) contend that income growth may greatly enhance food security, but only if it exceeds inflation in food prices. Tanzania's GDP per capita has increased, but income disparity means that several families yet are unable to purchase nutritious food (NBS, 2022).

Moreover, the negative coefficient (-0.678) for literacy rates indicates that higher literacy rates are connected with fewer persons who cannot afford a healthy diet, most likely because education increases economic prospects and decision-making. However, the p-value (0.145) shows that this is not statistically significant at the 5% level. Levels of literacy affect food affordability by influencing work prospects and the growth of the economy. Better levels of literacy may result to more work opportunities and salary increases, hence enhancing food security. Studies suggest that education improves economic performance and food affordability in Sub-Saharan Africa. Education levels in Tanzania have increased dramatically, but this has nevertheless converted into economic gains that provide universal food security (ILO, 2022).

As predicted, the cost of a healthy diet exhibited a positive coefficient (5.687) and a significant p-value (0.031), indicating a substantial association between greater healthy diet expenses and an increase in the proportion of persons who cannot afford them. This demonstrates the direct influence of food prices on food security. This means that, if all other variables remain constant, a 1US$ increase in the cost of a healthy diet has a 5.687% positive impact on number of people who cannot afford a healthy diet. The expense of a healthy diet directly correlates with food affordability. Several families have trouble sustaining a proper diet due to the high expense of healthy items such as fruits, vegetables, and animal-based meals. According to FAO research (2020), numerous families in Sub-Saharan Africa cannot afford a nutritious diet due to high food costs and poor wages. In Tanzania, the expense of balanced food has risen over time, creating a substantial burden for low-income households.

Table 7. Econometric Estimation Results on the Economic Hurdles to Affording a Healthy Diet in Tanzania from 2010 to 2023.

Economic Hurdles in natural log.	Coefficient (β)	Standard Error	t-Statistic	p-Value
Inflation Rate	1.243*	0.456	2.17	0.012
Unemployment Rate	0.576*	0.312	1.77	0.054
Poverty Rate	0.809*	0.576	1.75	0.024
Urbanization Rate	0.132	0.067	1.26	0.141
Household Income	-0.054*	0.032	-1.69	0.051
Literacy Rate	-0.687	0.465	-1.38	0.145
Cost of a Healthy Diet	5.687*	2.354	2.24	0.031
Constant	-23.465	12.345	-1.81	0.048
R Squared (R^2)		0.978(97.8%)		
Adjusted R squared (Adj.R^2)		0.952(95.2%)		

**Indicate significance level at 5 % (P < 0.05). Dependent variable: Number of People Unable to Afford a Healthy Diet (Million).*

4. Conclusion

This study sought to investigate the economic hurdles to the affordability of a healthy diet in Tanzania from 2010 to 2023, specifically to: (i) highlight overall trends and correlations in the number of people unable to afford a healthy diet and socioeconomic factors, (ii) analyze the overall cost of a healthy diet, including a breakdown for various food groups, and (iii) estimate econometric results on the economic hurdles to affording a healthy diet. The findings hint at the idea that even though there have been economic improvements, people still finds it hard to buy food that promotes good health in Tanzania. Broad policies are needed in order to hasten the rate at which income grows up, provide healthy eating habits for less money, and widen out social security, foster an increase in agricultural productivity. These measures will ensure that economic development leads to improved nutrition making fewer individuals unable to cater for themselves with a diet they can manage.

Moreover, the cost of an optimal healthy diet in Tanzania has risen from $1. 988 to $2. 903 per person per day, as a result of the country's rising food costs and cost of living. Animal protein meals consistently dominated in this regard, demonstrating that obtaining protein foods necessary for a balanced diet plan was a never-ending challenge. To offset these expenditures, it is recommended to provide specific funds and efforts to improve cattle output.

Furthermore, the econometric estimation findings show that from 2010 to 2023, numerous economic factors significantly affected the affordability of a healthy diet in Tanzania, with the OLS regression model accounting for 97.8% of the variation. Higher inflation rates had a substantial beneficial influence on the number of persons who could not afford a nutritious diet, as demonstrated by a positive coefficient (1.243) and a p-value of 0.021. Similarly, higher poverty rates were linked to a greater difficulty acquiring healthy foods (coefficient 0.809, p-value 0.024). While urbanization did have a favourable link with food affordability issues, it was not statistically significant. Conversely, the number of persons unable to afford nutrient-dense meals decreased as household income and literacy rates rose. The price of maintaining a nutritious diet has a significant impact on healthy food affordability. These results highlight the need for targeted initiatives aimed at improving Tanzania's food security as well as its economic stability.

Generally, the growing number of individuals who cannot afford a healthy diet is the result of an intricate interaction of economic, social, and environmental variables. To tackle this problem, broad approaches are required, including economic development, social safety nets, targeted subsidies, and climate change mitigation policies. Ensure that these initiatives are effectively executed to increase food security and minimize the number of individuals who cannot afford healthy food.

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