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Economic Inequalities in Triple Burden of Malnutrition in Low- and Middle-Income Countries: The Case of Tanzania

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Abstract

This chapter introduces the economic inequalities in the global nutrition challenge and the triple burden of malnutrition (i.e., undernutrition, overnutrition, and micronutrient deficiencies) in low- and middle-income countries (LMICs), with a case study of Tanzania. It describes the global disparities in malnutrition, highlighting the coexistence of malnutrition in LMICs. The chapter presents explanations linking income inequities to populations' nutrition situation, emphasizing their influence on food accessibility, affordability, and food security. We summarize empirical evidence on the link between economic factors influencing nutrition outcomes in Tanzania. Furthermore, we discuss Tanzania's governmental policies, such as the National Multisectoral Nutrition Action Plan II, an evidence-based five-year strategy aiming at addressing the triple burden of malnutrition in the country. Through those explorations, we seek to provide insights into effective strategies for addressing coexisting malnutrition that consider the underlying economic realities, with the goal of fostering a more equitable and healthy future for Tanzania.

KeywordsTriple burden of malnutrition -Undernutrition -Stunting -Wasting -Obesity -Overnutrition -Micronutrient deficiency -Income distribution -Economic disparities -Economic inequality -Relative deprivation -Food -Nutrition -Tanzania -Low-income and middle-income countries

Abbreviations

GNI

Gross National Income
LICs

Low-Income Countries
LMICs

Low- and Middle-Income Countries
NCDs

Noncommunicable Diseases
NMNAP II

National Multisectoral Nutrition Action Plan II
SBCC

Social and Behavioral Change Communication
SD

Standard Deviations
SDGs

Sustainable Development Goals
SSA

Sub-Saharan African
TBM

Triple Burden of Malnutrition
TDHS

Tanzania Demographic and Health Survey
WASH

Water, Sanitation and Hygiene
WHO

World Health Organization

Introduction

The world is facing an unprecedented nutritional crisis characterized by the coexistence of overnutrition (overweight and obesity), undernutrition (i.e., stunting, wasting, and underweight) and micronutrient deficiencies within the same household, population, or region/country—commonly referred to as the triple burden of malnutrition (TBM). Rather than addressing a single form of malnutrition, combating all forms is a key top priority of the United Nations Decade of Action on Nutrition and the Sustainable Development Goals (SDG, Target 2·2) (UN *2019*). This coexistence of malnutrition, which presents a rapidly evolving, complex, and multifaceted global public health challenge, is particularly prominent in low- and middle-income countries (LMICs), where economic disparities further exacerbate nutrition and health inequities. These disparities manifest through income inequality, unequal access to resources, and varying levels of human development, all of which contribute to the persistence of malnutrition in all its forms.

The primary aim of this chapter is to introduce the economic inequalities in the context of the TBM. To start, we examine the global scope of these inequalities, with a particular focus on LMICs. We then present the possible mechanisms linking economic inequalities to malnutrition. A secondary aim is to uncover how economic inequalities drive the prevalence of TBM in Tanzania, drawing on empirical evidence on socioeconomic factors and policy responses. Through this exploration, we

seek to provide insights into effective strategies that could address malnutrition by considering underlying economic realities, ultimately striving for a more equitable and healthy future for Tanzania.

Understanding the Global Nutrition Challenge: Triple Burden of Malnutrition

Malnutrition, in all its forms, remains a major global public health issue affecting children, adolescents, and adults (WHO *2024*). It encompasses undernutrition, overnutrition, and micronutrient deficiency, all resulting from an imbalance of nutrient intake and the body's requirements. Undernutrition, marked by insufficient nutrient intake, manifests as stunting (low height for age), underweight (low weight for age), and wasting (low weight for height). It could also be presented in the form of micronutrient deficiency resulting from lack of minerals and vitamins. In contrast, overnutrition stems from an excessive intake of certain nutrients like carbohydrates and fats, leading to conditions such as overweight and/or obesity, which have being associated with diet-related noncommunicable diseases (NCDs) such as diabetes and cardiovascular diseases to mention a few (WHO *2024*). Although malnutrition can affect anyone, it disproportionately impacts vulnerable populations, including children, adolescents, women of reproductive age, the elderly, immune-compromised individuals, and those living in poverty. Malnutrition is a critical issue that transcends geographic, socioeconomic, and demographic boundaries, affecting households, communities, and nations on a global scale.

Despite the global economic growth, the global burden of malnutrition remains alarmingly high. In 2022, 2.5 billion adults were overweight or obese, while 390 million were underweight. Among children under five, 149 million were stunted, 45 million were wasted, and 37 million were overweight or obese (WHO *2024*). Regional inequalities persist, with 76.6 million children under five in Asia and 63.1 million in Africa stunted, and 31.6 million and 12.2 million wasted, respectively. Overweight children number 17.7 million in Asia and 10.2 million in Africa (UNICEF et al. *2023*). Approximately 45% of global deaths among under-fives are attributable to undernutrition (UNICEF et al. *2023*). The coexistence of multiple forms of malnutrition presents a more complex challenge to control and heightens associated health risks compared to individual forms of malnutrition. Beyond its health implications, malnutrition impedes economic growth, reduce productivity, and hampers efforts to eradicate global poverty. It imposes significant economic losses, resulting from lost opportunities for growth and human capital development, particularly through preventable deaths in both children and adults (Development Initiatives *2021*).

Undernutrition

Undernutrition continues to be one of the most devastating issues affecting impoverished populations globally. Children under 5 years of age are particularly vulnerable to undernutrition due to their high nutritional needs for growth and development. Poor nutrition in early life can adversely affect school performance, resulting in fewer years of schooling, reduced productivity, and earlier childbearing. The risk of growth faltering increases around 6 months of age, coinciding with the introduction of nutritionally inadequate complementary foods and environmental factors that

heighten illness risk (Makori et al. *2018*). During the first 2 years after birth, children's nutritional requirements are exceptionally high, making them vulnerable to factors leading to growth retardation. Sub-Saharan Africa (SSA) is home to the largest number of undernourished children, with the east African region, including Tanzania, exhibiting the highest prevalence of undernutrition (MOH/NBS/OCGS/ICF *2022*; WHO *2024*).

Stunting

Stunting is defined as a child's height-for-age Z-score below minus two standard deviations (SD) from the median of the reference population, indicating retarded linear growth and cumulative growth deficits in children due to exposure to chronic malnutrition (WHO *2006*). The adverse effects of stunting are often irreversible, with the first 1000 days from conception exerting a lasting negative impact on both physical and cognitive development. Stunted children who gain weight gain rapidly after the age of two are still at a higher risk of lower earnings, reduced productivity and increased risk of obesity and other NCDs in later life (Hoffman et al. *2000*; Kasajja et al. *2022*).

Globally, stunting rates are declining, but Africa is witnessing a troubling rise. The 2020 Joint Child Malnutrition Estimates reported an estimated 57.5 million children under 5 years of age stunted in 2020 (UNICEF/WHO/World Bank Group *2020*), a figure that rose to 63.1 million in 2021 (Development Initiatives *2021*). In Tanzania, a cross-sectional study of children aged 6–23 months in Dodoma Region by Makori et al. (*2018*) showed a 40% prevalence of stunting, with key risk factors such as poor maternal health, inadequate antenatal care, insufficient feeding and care practices, and inadequate healthcare infrastructure. Further, the Tanzania Demographic and Health Survey (TDHS) of 2022 revealed an increase in the stunting prevalence in Iringa Region, 42% in 2015 to 56.9% (MOH/NBS/OCGS/ICF *2022*). This stunting issue in Africa continues to have far-reaching detrimental impact on child health, development, and future potential.

Wasting

Wasting in a child is defined as low weight-for-height, characterized by a weight-for-height Z-score falling below -2 SD from the median of the reference population (WHO *2006*). It serves as an indicator of acute undernutrition (UNICEF/WHO/World Bank Group *2020*), typically reflecting recent and severe weight loss, often due to insufficient food intake or the impact of infectious diseases, such as diarrheal diseases and other chronic health conditions. According to the 2020 Joint Child Malnutrition Estimates 2020 WHO report, of the 47.0 million children under the age of 5 years who were wasted, 14.3 million were severely wasted, with over a one-third of them living in Africa (UNICEF/WHO/World Bank Group *2020*).

Several factors contribute to child wasting, including socioeconomic background, which influences access to resources and overall well-being. Maternal education and health conditions impact the quality of care and child feeding practices. Access to health services is vital for preventing and treating wasting, especially in the context of prevalent infectious diseases that worsen nutritional deficiencies. Additional risk factors include low birth weight, inadequate exclusive breastfeeding, and inappropriate complementary feeding practices. Furthermore, low nutritional knowledge and

awareness, insufficient energy and micronutrient intake, and inadequate birth spacing all interplay to heighten children's vulnerability to this serious form of undernutrition (Duncan et al. *2022*).

Underweight

Underweight among children under the age of 5 years is defined as low weight-for-age, with a Z-score below −2 SD from the median of the reference population. This condition often indicates underlying nutritional issues that may also manifest as either wasting or stunting. Various factors contribute to underweight in children, including the educational level and occupation status of caregivers, low birthweight emanating from poor maternal health, and the child's age and birth order. Additionally, gender dynamics and inequalities in decision-making within households can significantly impact nutrition and food security (Akombi et al. *2017*; Sunguya et al. *2019*).

Overweight and Obesity

Overweight in children is defined as a weight-for-height Z-score exceeding 2SD from the median of the reference population, while a score above 3SD indicates obesity. It is an emerging facet of childhood malnutrition, posing significant health risks. The modernization theory of obesity suggest that globalization and urbanization have led to increased disposable income, limited physical activity, prolonged screen time, and physically inactive modes of transportation (Muhomba et al. *2023*), which contribute to the rising prevalence of childhood obesity (Fox et al. *2019*). Over the last decade, overweight and obesity has become a public health issue in LMICs including SSA (Jebeile et al. *2022*; Okunogbe et al. *2022*). This trend is largely driven by nutrition transitions as a result of urbanization and rising purchasing power. This has increased the widespread availability and consumption of highly processed, energy-dense foods rich in sugars, fats, refined starches, and artificial additives. For instance, in Tanzania, the rate of overweight among children under five rose from 0% in 1990 to 4% in 2022 (MOH/NBS/OCGS/ICF *2022*). This upward trend is also evident among school-aged children. A cross-sectional study of school children in Urban Arusha in 2019 reported an overweight/obese prevalence of 17.7% (Chomba et al. *2019*). Another study in Morogoro region reported an overweight/obese prevalence of 19.0% (Muhomba et al. *2023*).

The consequences of overnutrition in LMICs are far-reaching, affecting both individuals and society. At the individual level, excessive caloric intake and poor dietary choices can lead to obesity, which increases the risk of numerous health problems, including type 2 diabetes, cardiovascular diseases, and certain cancers. Societal impacts include the financial burden on healthcare systems for treating these obesity-related conditions. In addition to direct medical costs, there are indirect costs from lost productivity, as individuals with obesity-related health issues may experience reduced work performance or require time off for medical treatment.

Micronutrient Deficiency

Micronutrient deficiency, often termed as hidden hunger, is a critical globally public health issue, especially affecting children and pregnant women. It is a condition resulting from insufficient intake,

absorption, or utilization of essential vitamins and minerals necessary for proper growth, development, and overall health. Micronutrients include vitamins (like A, B, C, D, E, and K) and minerals (such as iron, zinc, iodine, and calcium), which are crucial for numerous physiological functions, including immune response, cognitive development, and growth. Iron deficiency can lead to anemia, impairing cognitive development and increasing the mortality risk. Vitamin A deficiency can cause vision problems and increase susceptibility to infections, while iodine deficiency can lead to developmental delays and growth impairment. Approximately one-third of people experience at least one type of micronutrient deficiency (Han et al. *2022*). The global burden of deficiency in at least one of those three micronutrients affects 56% of preschool-age children and 69% of women of reproductive age (Global Alliance for Improved Nutrition and Micronutrient Forum *2022*).

The 2020 Global Nutrition Report highlighted dramatic global inequities in the prevalence of micronutrient deficiencies (Development Initiatives *2020*). In low-income countries, iron deficiency and iron-deficiency anemia are prevalent due to inadequate diets and frequent infections that chronically impair iron absorption. Furthermore, dietary patterns in LMICs are shifting toward energy-dense but nutrient-poor foods, leading to poor dietary diversity, which exacerbates micronutrient deficiencies. Contributing factors micronutrient deficiencies include food insecurity, cultural practices, a lack of nutrition education, with limited consumption of fruits, vegetables, and animal-source foods significantly reducing the intake of essential micronutrients (Han et al. *2022*).

The Coexistence of Malnutrition in LMICs

Globally, nearly one-third of the population is affected by at least one form of malnutrition (Alem et al. *2023*). LMICs countries are increasingly characterized by the complex coexistence of multiple forms of malnutrition, presenting profound challenges to global health (Seferidi et al. *2022*). The prevailing of both undernutrition and overnutrition underscores the inconsistent situations in economic growth, where growth does not necessarily translate into improved nutritional outcomes for all population segments. In LMICs, undernutrition remains a critical issue, often driven by poverty, inadequate access to health care, and food insecurity, which together undermine efforts to achieve optimal health and development (Wells et al. *2021*). Simultaneously, overnutrition is on the rise in these regions (Mamun and Finlay *2015*), with obesity in LMICs having tripled over the past 20 years (Alem et al. *2023*). In 2022, the majority of overweight children (77%) lived in LMICs. As shown in Fig. 1, low- and lower-middle-income countries also bear the greatest burden of stunting and wasting (FAO/IFAD/UNICEF/ WFP/WHO *2024*). This coexistence of malnutrition in LMICs reflects a significant and complex public health challenge, demanding comprehensive strategies to address all coexisting forms of malnutrition within these vulnerable populations.

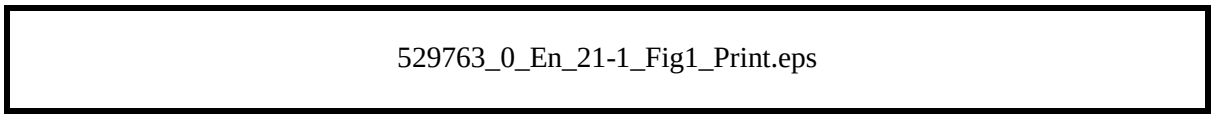

Fig. 1

The distribution of the global burden of stunting, wasting, and overweight by income group. (Source: FAO, IFAD, UNICEF, WFP and WHO *2024*. The State of Food Security and Nutrition in the World 2024 – Financing to end hunger, food insecurity and malnutrition in all its forms. Rome. https://doi.org/10.4060/cd1254en)

Global Inequalities in the Burden of Coexisting Malnutrition

No country is on track to meet all World Health Assembly global nutrition targets by 2025, with 87% of countries experiencing high levels of at least two forms of malnutrition (Development Initiatives *2022*). The 2020 Global Nutrition Report documented the coexistence of three forms of malnutrition at the country level: childhood stunting (for under-fives), anemia among women of reproductive age (aged 15–49 years), and overweight (including obesity) in adult women (Development Initiatives *2020*). Of the 194 countries assessed, 143 have comparable data for all three indicators. Each of those countries experiences at least one form of malnutrition at high levels, as defined by the respective thresholds. Of the 51 countries not represented in the analysis, the majority (78.4%) are high-income nations. Among the 143 countries, 124 report high levels of at least two forms of malnutrition, with 56 countries experiencing both anemia and overweight, 28 facing both anemia and stunting, and 3 dealing with overweight and stunting. Notably, 37 of the 124 countries—primarily in Africa—experience high levels of all three forms of malnutrition. Although data availability and quality vary between countries and indicators over time, it is clear that most nations and regions worldwide are burdened by one or more forms of malnutrition. In the past two decades, LMICs have witnessed rising prevalence of overweight and obesity while still battling the undernutrition and micronutrients deficiency problem. Thus, the "triple burden" of malnutrition is posing as an unprecedented crisis in LMICs, given its widespread incidence and enormous costs for good nutrition and the unstable economy in contemporary society (Gómez et al. *2013*; Alao et al. *2021*).

The global burden of malnutrition varies across country income groups and, in some cases, meanwhile over time. The burden per income group depends on both the prevalence of specific nutrition outcome and the population size of that income group; thus, understanding those two aspects are essential for interpreting disparities. In 2020, low-income countries (LICs) and lower-middle-income countries together bear 83% of global burden of low birthweight among newborns (FAO/IFAD/UNICEF/WFP/WHO *2024*). Between 2012 and 2020, the burden of stunting among children under five shifted slightly from lower-middle-income countries to LICs, increasing from 21% to 24%. Wasting, disproportionately affects children under five in LICs and lower-middle-income countries, which account for 93% of all wasted children worldwide. Moreover, four in five women of reproductive age suffering from anemia reside in these countries. Meanwhile, the prevalence of obesity among adults continues to rise in low- and lower-middle- income countries, with over one-quarter of the global burden of obesity now found in these regions. The coexistence of two or more forms of malnutrition across different income levels underscores global economic inequalities, revealing a divide where wealth contrasts with poverty, advanced healthcare clashes with limited medical access, and food security is pitted against scarcity, all highlighting the uneven distribution of resources and opportunities (Siddiqui et al. *2020*).

How Economic Inequalities Could Be Linked to Population Nutrition

In the field of nutrition, economic inequality has not yet been fully incorporated into mainstreaming nutrition science or practice. However, it has the potential to enhance our understanding of how economic inequality influence human nutritional status and health, as well as how these challenges can be addressed. Poverty significantly undermines nutrition, as low-income households often struggle to provide adequate nutrition for their families. But in addition to being deprived in an absolute sense, being poor in a wealthy society is the worst kind of poverty (Stiglitz *2012*). Growing economic inequality often follows the potential for economic growth to lift people out of poverty (The world bank poverty reduction and economic management network poverty reduction group *2003*). During the past three decades of globalization, economic inequality has risen in many LMICs despite their relatively high economic growth rates. Economic inequality, a measure of the distribution of income within a population, has been recognized as a major determinant of population health including nutritional outcomes (Larrea and Kawachi *2005*; Pickett and Wilkinson *2015*), independent of poverty and absolute household income.

A growing but disparate literature has sought to characterize the evident economic inequalities in coexisting forms of malnutrition in LMICs, with variations in how these disparities manifest. For whom inequality is harmful? As Kawachi and Subramanian noticed, a conjecture to this question is that the adverse impact of income inequality could be more accentuated among the poor compared with the rich who may be more effectively able to insulate themselves from its corrosive effects (Kawachi and Subramanian *2014*). An analysis of worldwide trends in underweight and obesity from 1990 to 2020 by the NCD Risk Factor Collaboration documented that a rise in double burden has been largest in some LMICs and newly high-income countries (Phelps et al. *2024*). A regional analysis of adolescent girls and adult women in sub-Saharan Africa showed wealth-inequality trend in malnutrition, that is, coexisting forms of malnutrition within SSA countries are emerging since 2000, with underweight persisting, while overweight and obesity being rising among adult women, the rich and capital city residents, alongside declining but persistently high rates of underweight and anemia adolescent girls (Jiwani et al. *2020*). The effect of income inequality on household-level double burden of malnutrition could also be heterogeneous, although it has not been fully explored. Seferidi and colleagues investigated global inequalities in the double burden of malnutrition within the same household (stunted child with overweight mother) using data from Demographic and Health Surveys from 55 LMICs from 1992 to 2018 (Seferidi et al. *2022*). They found that the probability of double burden of malnutrition was higher among richer households in poorer LMICs (with lower gross national income [GNI] per capita), and poorer households in richer LMICs (with higher GNI per capita).

In recent years, a growing number of studies have investigated the association between economic inequalities and malnutrition, using inequality metrics from economics: concentration curves, concentration indices, and Gini index (Wagstaff and Doorslaer *2000*; Zere and McIntyre *2003*). These metrics measure the extent to which the distribution of income or consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution. For example, Wagstaff and colleagues developed a malnutrition concentration curve to visualize the cumulative proportions of population ranked by socioeconomic status against the cumulative proportions of malnutrition (see Fig. 2, reproduced from Wagstaff and Watanabe) (Wagstaff and Watanabe *2000*). Rather than summarizing previous studies individually, we refer to a systematic review conducted by Alao and colleagues, who sought to summarize the literature up to 2020 (Alao et al. *2021*). The meta-analysis undertook a systematic research of all relevant databases including Medline, Embase, Global Health, Eldis, Web of Science, and EBSCO Discovery Service. This meta-analysis identified 46 studies with concentration indices and 10 with Gini coefficient. The key findings were that child undernutrition is concentrated among poorer households globally. Adult

overweight and obesity is concentrated in better-off households globally in LICs only. There was a lack of information on economic inequalities in anemia and child overweight. Although there is no overall support for the causal relationship between economic inequality and malnutrition, Alao et al. speculated that the association between Gini coefficient and nutritional outcomes may be nonlinear. In other words, there might be threshold effects of economic inequality on nutrition. This is similar to the threshold effect hypothesis of income inequality on health (Kawachi and Subramanian *2014*). In a meta-analysis conducted by Kondo et al. (*2009*), the relationship between income inequality and mortality was stronger in countries with Gini ≥0.3, compared with studies conducted in countries with Gini <0.3.

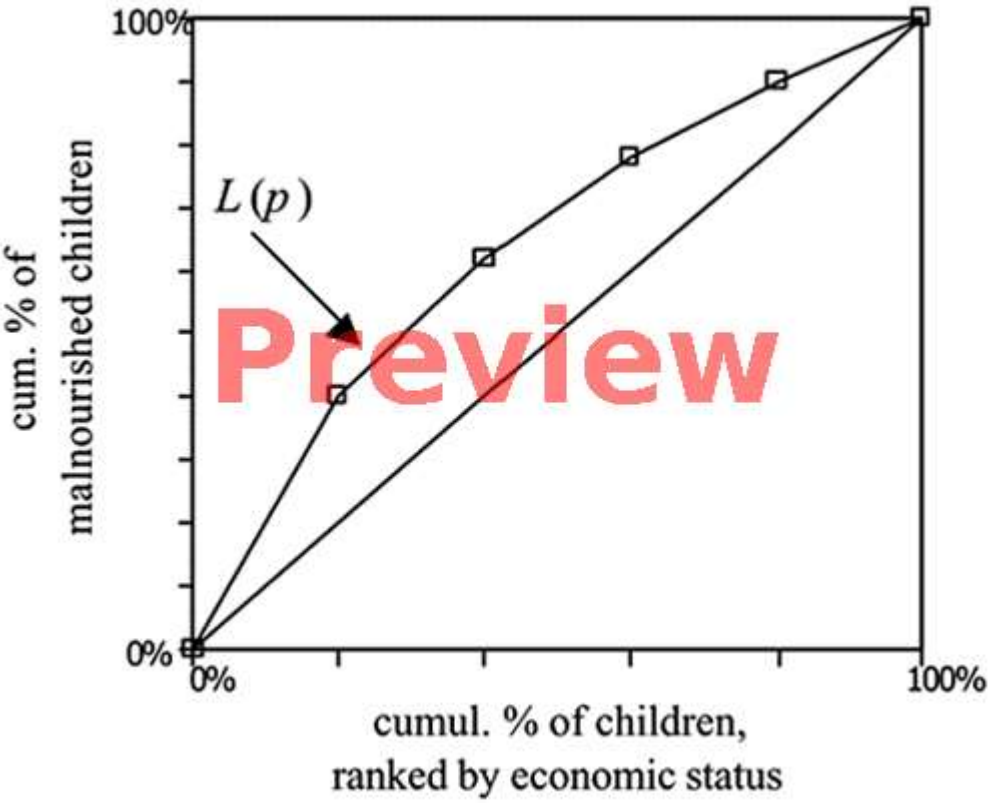

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Fig. 2

Malnutrition concentration curve among children in the developing world. It plots the cumulative proportion of malnourished children (on the y-axis) against the cumulative proportion of children (on the x-axis), ranked by equivalent household consumption, beginning with the most disadvantaged child. (Source: Wagstaff A., Watanabe N. 2000. Socioeconomic inequalities in child malnutrition in the developing world (English). Policy, Research working paper; no. WPS 2434 Washington, DC: World Bank Group. http://documents.worldbank.org/curated/en/537741468182938105/Socioeconomic-inequalities-in-child-malnutrition-in-the-developing-world)

Accounts Linking Income Inequality to Malnutrition

Unequal societies are less healthy than more equal societies (Wilkinson and Pickett *2006*; Shimonovich et al. *2024*). In the literature on accounts of why and how income inequality poses a threat to population health, there are three major distinct stories: absolute income effect, relative

income effect, and contextual effect of income inequality (see Table 1) (Kawachi and Subramanian *2014*). The absolute income effect assumes that there are diminishing marginal returns to health from incremental gains in income. Households with lower absolute incomes have reduced access to nutritious food because they cannot afford it (Lo et al. *2009*). Poorer families might resort to cheaper, energy-dense but nutrient-poor foods, leading to malnutrition. Essentially, the absolute income effect explains how family income constraints limit food security and dietary quality through nutritional intakes, dietary diversity, dietary pattern, dietary knowledge, food preference, and food choices (Lo et al. *2009*; Ren et al. *2019*). The income status of an individual determines the purchasing power and food choices and ultimately could affect the nutritional status; further, food costs could be a barrier for low income families to afford healthier foods (Lo et al. *2009*).**Table 1**

Three explanations linking income inequality to population health. Source: Wagstaff and Van Doorslaer (*2000*); and Kawachi and Subramanian (*2014*)

Theory	Mechanism
Absolute income effect	The concave shape of the relationship between income and health predicts that, ceteris paribus, more unequal societies have worse average health
Relative income effect	Income inequality creates a bigger gap between your income and income of others you compare yourself to. The size of this gap leads to stress and frustration
Contextual effect of income	When the income of the top 1% pull away from the rest, they cause a variety of "pollution effects" on the quality of life the bottom 99%

The relative income hypothesis posits that as income inequality rise, it creates a bigger gap between an individual's income and the income of others to whom they compare themselves. For instance, a person may have sufficient income to fulfil basic needs yet be lacking in the means to purchase goods and services that others in the community are able to afford. The social comparisons are in turn to generate negative psychological effects. For any given level of per capita income, lower-income inequality implies more expenditure on food for the poor, and rich ones have a more diversified consumption (Larrea and Kawachi *2005*). The social comparisons and social exclusion in less egalitarian societies (Kawachi and Kennedy *1999*; Subramanian and Kawachi *2006*; Kondo et al. *2008*; Präg et al. *2014*) also exert pathophysiological effects on nutrition (Larrea and Kawachi *2005*).

The contextual effect posits that some people at the top might benefit from living in an unequal society. As Stiglitz argues (Stiglitz *2012*), when power is concentrated in one group, it generally succeeds in getting policies that benefit that group, at the expense of society. In Homo Deus: A Brief History of Tomorrow, historian Yuval Noah Harari discussed how future advancements in technology are likely to widen health disparities, as income inequality means that the wealthy will benefit more from these innovations, exacerbating the gap between rich and poor (Harari *2017*). In

more egalitarian societies, both social and human capitals are strengthened; conversely, violence, mistrust, and conflict often derive from inequality (Larrea and Kawachi *2005*). Community health not only depends on individual factors but also is the result of social cohesion and organization (Kawachi et al. *1997*; Kawachi and Kennedy *1999*). Societies invest more on social development programs, for example, in public health nutrition education, food systems, and sanitation infrastructure, and have better local governance structures and more universal access (Alao et al. *2021*). Food markets, such as diversification of supply, lower prices and costs, and better quality, may improve under more egalitarian circumstances (Larrea and Kawachi *2005*).

Economic Inequalities in Food Accessibility, Affordability, Food Security

Economic inequalities lead to unequal access to food resources. Increased accessibility of meat, dairy products, fruits, and vegetables may reduce micronutrient deficiency and undernutrition, while greater accessibility of saturated fats, sugar, artificial sweeteners, sweetened beverage, and ultra-processed food may contribute to overweight, obesity, and nutrition-related chronic diseases. In low-income households, financial constraints limit the ability to purchase a variety of foods due to higher relative costs, thereby affecting food accessibility and affordability (FAO *2022*). Furthermore, affordability issues persist even when diverse food options are available; economically disadvantaged households frequently struggle to purchase these foods, exacerbating food insecurity (World Business Council for Sustainable Development *2022*). While overall food availability may be sufficient, economic disparities still result in variations in food access, with lower-income households often relying on cheaper, calorie-dense, but less nutritious options, resulting in hidden hunger in which micronutrient deficiencies coexist with obesity or overweight (Drewnowski et al. *2020a*, *b*; Drewnowski *2022*).

Economic inequalities also impact food security, which encompasses both the availability and stability of food access. Food security is a critical issue in low-income countries, where economic disparities exacerbate the vulnerability of households to food insecurity. According to the 2023 Global Hunger Index report (Grebmer et al. *2023*), low-income households in LMICs are more susceptible to food shortages, which are often linked to fluctuations in economic conditions and local market dynamics. In upper middle-income countries, while food security might be less of a pressing issue, significant disparities remain. The marginalization of lower-income groups can lead to pockets of food insecurity even in economically prosperous regions. In the time of conflicts and wars, food insecurity is worsening, disproportionately affecting the purchasing power and ability to access affordable, nutritious food of people from low-income households, further aggravating undernutrition (FAO/IFAD/UNICEF/WFP/WHO *2024*; Rother et al. *2022*). Economic instability can lead to increased food prices, which reduce the affordability of nutritious foods for the economically disadvantaged (Drewnowski *2022*). Relative deprivation resulted in a higher preference for high-caloric and palatable foods (Van Rongen et al. *2022*). In such contexts, households may be forced to cut back on food expenditures or rely on cheaper, less nutritious food options, thus heightening the risk of triple burden of malnutrition.

The Triple Burden of Malnutrition in Tanzania

Currently, Tanzania is grappling with the TBM (Colecraft et al. *2020*). According to the WHO standards for the identification of severe acute malnutrition in infants and children, the prevalence of stunting in Tanzania remains a public health concern, while prevalence of overweight is within recommended levels, and the prevalence of wasting is classified as acceptable (WHO and UNICEF *2009*). Further, micronutrient deficiencies among under-fives, adolescents, and pregnant women remain questionable (MOH/NBS/OCGS/ICF *2022*).

Malnutrition in Tanzania mainly affects vulnerable population groups, particularly children under five, women of reproductive age (including pregnant and lactating women), and adolescents (United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children *2021*). According to the 2022 TDHS, the prevalence of stunting, underweight, wasting, and overweight among children under 5 years of age was 30%, 12%, 8%, and 4%, respectively (MOH/NBS/OCGS/ICF *2022*). Furthermore, the trend of malnutrition among under-fives has been decreasing at a very steady state (see Fig. 3). The prevalence of anemia among children under 5 years of age and women of reproductive age was reported at 59% and 42%, respectively, with 57% of pregnant women also affected by anemia. The TDHS 2022 report also recorded that the prevalence of overweight or obese among men and women of reproductive age (20–49 years) was 17% and 37%, respectively. A key risk factor associated with overweight or obesity in Tanzania include poor food environment, which is characterized by high consumption of unhealthy foods, including those high in saturated fats, sugar-sweetened beverages, salt, coupled with a low intake of healthy foods such as milk, eggs, fruits, and vegetables (United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children *2021*). Another possible explanation of rising overweight and obesity in Tanzania could be the cultural beliefs in African countries that associate overweight/obesity with beauty and consider it as a symbol of wealth, success, and bless (Bray *2009*; Keding et al. *2013*).

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Fig. 3

Trends in nutritional status of children below 5 years of age. (Source: MOH/NBS/OCGS/ICF (*2022*) Demographic and Health Survey and Malaria Indicator Survey 2022 Final Report. Dodoma, Tanzania, and Rockville, Maryland, USA: MoH, NBS, OCGS, and ICF. https://dhsprogram.com/pubs/pdf/PR144/PPR144.pdf)

Case Study 1: Co-occurrence of overweight, stunting, and anemia among adolescents aged between 10 to 19 years old in Tanzania Mainland.

A cross-sectional study by Mchau et al. (*2024*) revealed the coexistence of overweight, stunting, and anemia in school adolescents (see Fig. 4). Out of 44,120 primary school adolescents involved in the study, 34.1% were anemic, 32% were stunted, and 4.2% were overweight. Among the malnourished adolescents, 41.7% exhibited a single form of malnutrition, 13.5% had double forms of malnutrition, and 0.3% presented all three forms of malnutrition (overweight, stunting, and anemia). Female adolescents were at higher risks of being overweight when compared to their male counterparts. Additionally, residing in urban areas was associated with lower odds of stunting and anemia compared to living in rural areas. The finding underscores the importance of designing policies and programs that address the complexity of the triple burden of malnutrition among adolescents.

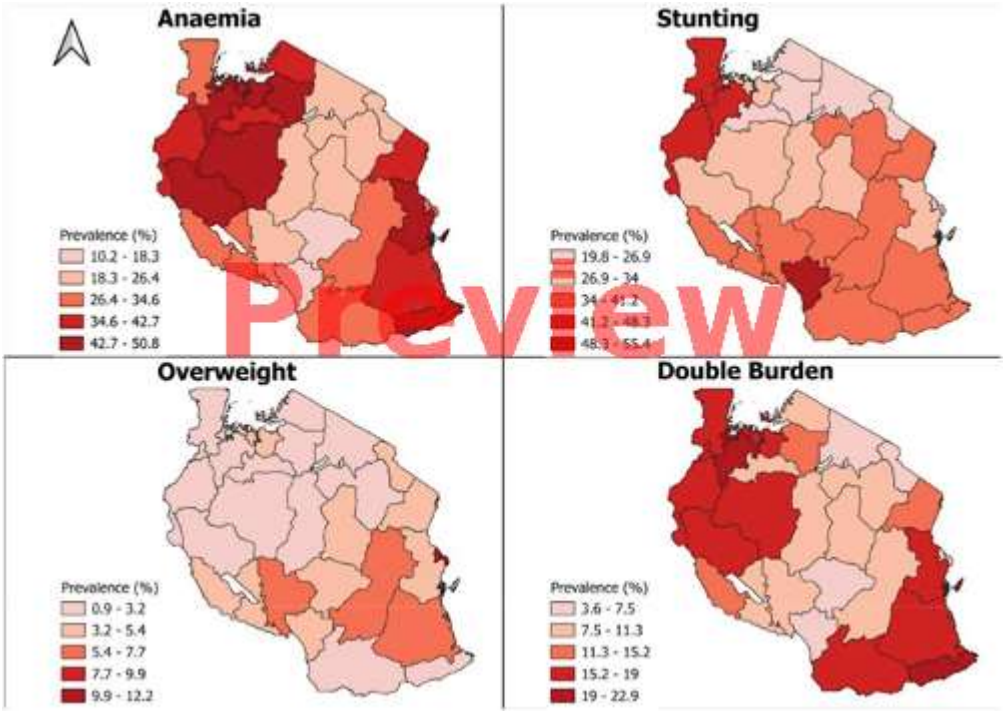

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Fig. 4

The map of Tanzania Mainland showing the triple burden of malnutrition among in school adolescents (10–19 years). (Source: Mchau G, Killel E, Azizi K, et al. (2024) Co-occurrence of Overweight, Stunting, and Anemia among Adolescents (10–19 Years) in Tanzania Mainland: A School-Based Cross-Sectional Study. Curr Dev Nutr 8:102016. https://doi.org/10.1016/j.cdnut.2023.102016)

Source: Mchau G, Killel E, Azizi K, et al. (2024) Co-occurrence of overweight, stunting, and anemia among adolescents (10–19 years) in Tanzania Mainland: A school-based cross-sectional study. Curr Dev Nutr 8(1):102016.

Economic Inequalities in Malnutrition in Tanzania

Tanzania has been considered as an example of high economic performance in SSA, due to its steady economic growth and resilience to external shocks (Zeufack et al. *2020*). Despite the

challenges posed by the COVID-19 pandemic, Tanzania has reached a growth rate of 6% in real gross domestic product over the past decade (UNDP *2020*). However, the country's upgrade from low- to lower-middle-income status in 2020 has not alleviated significant challenges such as widespread poverty and income inequality. As of 2018, approximately 45% of its people lives in extreme poverty (with the international poverty threshold at less than 2.15 US dollars a day per capita) (World Bank Group *2020*). Tanzania's Gini index, a measure of income inequality, was estimated at 40.5 in 2018 (World Bank Group *2020*). Economic inequality remains a pressing issue in the country (Hassine and Zeufack *2015*).

The economic inequality in Tanzania may exuberate the coexistence of different forms of malnutrition among its population. According to the 2022 TDHS (MOH/NBS/OCGS/ICF *2022*), stunting was more prevalent among children from lower wealthy quintiles. Meanwhile, overweight among women of reproductive age was more likely to be found in those with higher levels of education and wealth. A secondary analysis of the TDHS 2016 by Chen et al. (*2024*) showed that the double burden of malnutrition at household level (overweight/obese mother with stunted child) was unequally distributed across regions of Tanzania. Greater household wealth, coupled with inadequate dietary diversity, was associated with higher odds of this double burden of malnutrition (see Fig. 5).

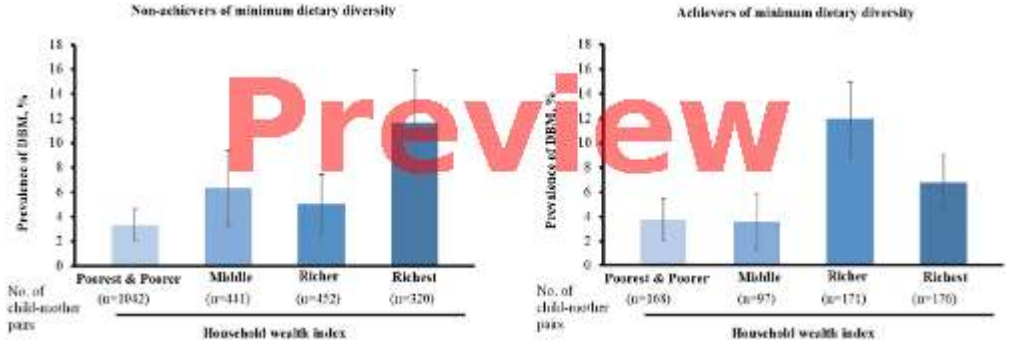

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Fig. 5

The estimated prevalence and 95% confidence interval of the double burden of malnutrition according to the household wealth index levels among non-achievers and achievers of minimum dietary diversity. Source: Chen S, Shimpuku Y, Honda T, et al. (2024) Dietary diversity moderates household economic inequalities in the double burden of malnutrition in Tanzania. Public Health Nutr 27:1–24. https://doi.org/10.1017/s136898002400106x

Nutritional Inequalities in Rural and Urban Areas in Tanzania

While Tanzania's overall economic growth has been promising, the benefits have not been evenly distributed, with poverty concentrated mainly in rural areas where subsistence agriculture dominates (Hassine and Zeufack *2015*). For example, despite the fact that the stunting rates have declined in the past two decades, the reductions have been more pronounced in urban areas compared to rural ones. In 1991–1992, stunting prevalence stood at 50.5% in rural areas and 46.8% in urban areas. By 2022, it dropped to 33% in rural and 21% in urban areas (MOH/NBS/OCGS/ICF *2022*).

One possible explanation for these differences is diet. Urban residents tend to consume more processed and fast foods, driven by globalization, which often leads to unhealthy dietary habits. In contrast, rural residents consume more traditional, starchy diets that lack diversity. Furthermore, urban populations are more prone to sedentary lifestyles, which, combined with unhealthy diets,

result in higher levels of overweight and obesity. Approximately 52% of women of reproductive age (15–49) in urban areas reported weekly exposure to media, compared to only 17% of rural women (MOH/NBS/OCGS/ICF *2022*).

A study by Mkupete et al. (*2022*) explored the regional and contextual nutritional inequalities between rural and urban areas in Tanzania. It found that poor water and sanitation (WASH) services were the primary contributors to nutritional inequality in rural areas (Mshida et al. *2018*), while in urban areas, factors such as fluctuating food prices and intergenerational influences were more significant. Addressing Tanzania's TBM requires tailored interventions that account for economic inequalities along with the unique challenges of each locality. This study provided context specific recommendations whereby policies to improve the Water, Sanitation, and Hygiene (WASH) services should be appropriate to equalize the nutrition opportunities in rural context, while policies to promote the Social and Behavior Change Communication (SBCC) strategy on child feeding practices should be recommended for urban context.

Case Study 2: Combatting the Triple Burden of Malnutrition in Tanzania: responsive nutrition programs by the Catholic Relief Services.

Catholic Relief Services (CRS) is a humanitarian organization founded in 1943 by the Catholic bishops of the United States to serve the poor and vulnerable around the world. CRS Tanzania aims to reduce the triple burden of malnutrition among vulnerable populations, particularly adolescents, pregnant, and lactating women, and young children (Catholic Relief Services *2021*). They adopt an integrated approach for their nutrition programming: developing good governance to reach national nutrition priorities, strengthening financial and human resources to support the prioritization and funding of nutrition service delivery, and building local and international partnerships to expand their reach and enhance the impact of their nutrition programs:

- Accelerating Stunting Reduction Project (ASRP) (2015–2021) to reduce the occurrence of childhood stunting.
- Care for Child Development (CCD) (2018–2022) to train caregivers in appropriate early childhood development and positive parenting behaviors.
- Improving Maternal and Child Nutrition Outcomes (IMCN) Project (2021–2022) to improve maternal and child nutrition outcomes.
- Community Led Total Nutrition (CLTN) (2021–2022) through an innovative approach of community involvement for improving the nutritional status in communities.
- Health System Strengthening Project (HSS) (2020 – Present) to strengthen the health system from the regional level down to the communities.

Source: Catholic Relief Services (*2021*) Combatting the triple burden of malnutrition. Baltimore, USA; Dar es Salaam Tanzania.

Governmental Policies and Strategies in Tanzania

Governmental policies and legal frameworks play a crucial role in improving nutrition and overall well-being for Tanzanians and globally. The government of Tanzania has shown political will and commitment to addressing malnutrition issues in the country (United Republic of Tanzania Prime

Minister's Office *2020*). It has developed the National Strategy for Growth and Reduction of Poverty to accelerate poverty alleviation and promote equitable growth.

A notable initiative is the Tanzania National Multisectoral Nutrition Action Plan 2020/21–2025/26 (NMNAP II) (United Republic of Tanzania *2021*), published in 2021, which outlines actions to tackle the triple burden of malnutrition in the country through multisectoral approach. This plan aims to accelerate efforts through established policies and guidelines related to food and nutrition. However, while it acknowledges the complexities of TBM, it often presents separate actions for each type rather than integrating them into a cohesive strategy.
Other key policies, guidelines, and strategies governing Tanzania's nutrition agenda include the following:

- Tanzania Food and Nutrition Policy (1992)
- Food Labelling Regulation (2006)
- National Health Policy (2007)
- Tanzania Food Regulations (2008)
- Tanzania Food Composition Tables (2008)
- Action Plan for the Provision of Vitamins and Minerals (2008)
- Drugs and Cosmetics Regulations (2011)
- Commitment to Scaling Up Nutrition Movement (SUN) 2011
- National Nutrition Strategy (2011)
- National Agricultural Policy (2013)
- National Guideline on Infant and Young Child Feeding (IYCF) (2013)
- NMNAP I (2016–2021)
- NCD Strategic Plan 2016–2020
- National Summit on Food Fortification (2017)
- Tanzania National Bio-fortification Guideline (2020)
- National Food-Based Dietary Guidelines (2022)
- Implementation Strategy of the National Trade Policy (2023–2033)
- National School Feeding Guideline (2021)
- Nutrition Sensitive Agriculture Action Plan (NSAAP) 2021–2026
- Tanzania Vision 2025

According to the 2022 Global Nutrition Report, country progress toward global targets can be tracked using indicators such as child wasting, stunting, and exclusive breastfeeding, making undernutrition a significant determinant of a nation's socioeconomic developmental status. Tanzania is on course to meet two of the global nutrition targets for stunting, wasting and birth weight (United Republic of Tanzania, Ministry of Health, Community Development, Gender, Elderly and Children *2021*). To combat childhood malnutrition, the Tanzanian government is implementing various strategies, including the NMNAP, which guide nutrition efforts at the country level. The government has also engaged multiple stakeholders to enhance the nutritional status of its citizens.

Despite these initiatives, some of these policies are outdated, fail to address current nutrition challenges, and lack effective coordination in implementation. There are gaps in monitoring and evaluation mechanisms, limited inter-sectoral collaboration, and a perception among stakeholders

that nutrition is a separate discipline rather than an interdisciplinary field. Notably, only the NCD Strategic Plan 2016-2020 addresses diet-related diseases and dietary risk factors.

Conclusion

This chapter introduces the economic inequalities in the TBM in LMICs, with a specific focus on Tanzania. Here, undernutrition, overnutrition, and micronutrient deficiencies coexist, disproportionately affecting vulnerable population, particularly children under 5 years of age, women, and adolescents. Economic inequalities could play a central role in this landscape, as poorer or relatively deprived groups consistently experience the highest rates of undernutrition and micronutrient deficiencies, while wealthier groups are more prone to overweight and obesity. Collectively, these inequalities could contribute significantly to the TBM seen in Tanzania and other LMICs.

Tanzania's government has made commendable progress in addressing the TBM, through policy initiatives such as the National Multisectoral Nutrition Action Plan II, which seeks to tackle the TBM across multiple sectors. However, gaps persist in policy implementation, coordination, and coverage, limiting the full potential of these interventions. Tailored, integrated, and context-specific strategies that accounts for the reality of regional variations and socioeconomic disparities will be essential for achieving meaningful reductions in malnutrition rates and enhancing population nutrition.

To address the TBM in Tanzania, and more broadly in other LMICs, will require comprehensive, multi-sectoral solutions that tackle the root causes of economic inequality. These solutions must prioritize equitable access to nutritious food, incorporate nutrition-sensitive and specific interventions, and improve healthcare services, water and sanitation, education, and social protection systems. Without these efforts, the long-term consequences for child development, maternal health, and economic productivity will remain profoundly negative.

Applications to Other Areas of National, International or Global Public Health Public Health Nutrition

This chapter describes the economic inequalities in the triple burden of malnutrition in low- and middle- income countries, with a specific focus in Tanzania where undernutrition, overnutrition, and micronutrient deficiencies coexist. Instead of separate actions for single form of malnutrition, here we suggest integrating them into a cohesive strategy by taking dual or triple actions. A success example of responsive nutrition programs to the triple burden of malnutrition adopts an integrated approach by developing good governance to reach national nutrition priorities, strengthening financial and human resources to support the prioritization and funding of nutrition service delivery, and building local and international partnerships to expand their reach and enhance the impact of their nutrition programs.

Given the evident economic inequalities in the triple burden of malnutrition, addressing this challenge requires tailored interventions that account for economic inequalities along with the unique challenges of each locality. For instance, policies to improve the Water, Sanitation, and

Hygiene services should be appropriate to equalize the nutrition opportunities in rural context, while policies to promote the Social and Behavior Change Communication strategy on child feeding practices and healthy eating should be recommended for urban context.

The Tanzania government's policy response has made strides toward addressing the triple burden of malnutrition, but gaps remain in coordination and implementation. To combat the triple burden of malnutrition, based on the experience from the Tanzanian government, here we suggest government's engaging with multiple stakeholders to enhance the nutritional status of its citizens.

Mini-dictionary of Terms

- **Triple burden of malnutrition:** Coexisting of undernutrition, overnutrition, and micronutrient deficiencies within the same household, population, or region/country.
- **Stunting:** A child's height-for-age Z-score below minus two standard deviations from the median of the reference population.
- **Wasting:** A child's weight-for-height Z-score below minus two standard deviations from the median of the reference population.
- **Underweight:** A child's weight-for-age Z-score below minus two standard deviations from the median of the reference population.
- **Overweight:** A child's weight-for-height Z-score exceeding 2SD from the median of the reference population.
- **Obesity:** A child's weight-for-height Z-score exceeding 3SD from the median of the reference population.
- **Micronutrient deficiency:** A condition resulting from insufficient intake, absorption, or utilization of essential vitamins and minerals necessary for proper growth, development, and overall health.
- **Economic inequality:** The disparities in the distribution of wealth and income among individuals, groups, or populations within a society.

Summary Points

- No country is on track to meet all World Health Assembly global nutrition targets by 2025, with 87% of countries experiencing high levels of at least two forms of malnutrition.
- Low- and middle-income countries are facing an unprecedented nutritional crisis characterized by the coexistence of overnutrition (overweight and obesity), undernutrition (i.e., stunting, wasting, and underweight) and micronutrient deficiencies within the same household, population, or region—commonly referred to as the triple burden of malnutrition.
- Significant global inequalities exist in the distribution of the triple burden of malnutrition, varying across countries based on their income levels.

- Economic inequality has been increasingly recognized as a major determinant of population health including nutritional outcomes, independent of poverty and absolute household income.
- Tanzania is grappling with the triple burden of malnutrition, mainly affecting the vulnerable population groups, particularly under-fives, women of reproductive age (including pregnant and lactating women), and adolescents.
- Economic inequalities in malnutrition are evident in Tanzania, such as the nutritional inequalities in rural and urban areas. The burden of coexisting malnutrition is unequally distributed across regions and varying by income levels.
- The government of Tanzania has shown political will and commitment to addressing the issues of the triple burden of malnutrition in the country.
- Limited resources, outdated policies, fail to address current nutrition challenges, and lack effective coordination in implementation.

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