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Status of Food and Nutrition Security in Kenya: An Implementation of the Framework for Harmonizing Nutrition Indicators



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Gideon Nyakundi; Allan Gathuru; Samuel Kipruto; Isabella Kiplagat; Japheth Kathenge; Eunice Mulango; Damaris Mulwa; and Dorah Momanyi

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Abbreviations and Acronyms

AUC	African Union Commission
BMI	Body Mass Index
CSI	Coping Strategy Index
DEWS	Drought Early Warning System
FAO	Food and Agriculture Organization
FCS	Food Consumption Scale
FIES	Food Insecurity Experience Scale
GAR	Gross Attendance Ratio
GHI	Global Hunger Index
GoK	Government of Kenya
IFAD	International Fund for Agricultural Development
IYCF	Infant And Young Child Feeding
KDHS	Kenya Demographic Health Survey
KeNADA	Kenya National Data Archive
KNBS	Kenya National Bureau of Statistics
KPHC	Kenya Population and Housing Census
LTA	Long-Term Averages
MAD	Minimum Acceptable Diet
MCS	Mean Coping Strategy
MDD	Minimum Dietary Diversity
MDD-W	Minimum Dietary Diversity for Women
MUAC	Mid-Upper Arm Circumference
NAR	Net Attendance Ratios
NDMA	National Drought Management Authority
NIPFN	National Information Platform for Food and Nutrition
PCA	Principal Component Analysis
rCSI	Reduced Coping Strategy Index
SDG	Sustainable Development Goals
UNICEF	United Nations International Children’s Emergency Fund
VCI	Vegetation Condition Index
WFP	World Food Programme
WHO	World Health Organization

Abstract

Food security and nutrition is a major global concern and remains a policy priority in Kenya. The targets of Sustainable Development Goal 2 (SDG 2) directly address nutrition, focusing on the reduction of hunger and all forms of malnutrition such as stunting and wasting; increasing agricultural productivity; and ensuring sustainable food production systems. In Kenya, the Food Security Act (2017) and the Constitution of Kenya (2010) recognize food security and nutrition as a basic human right for every individual. The food security and nutritional status in Kenya is measured by a comprehensive Food Security and Nutrition Index. The Index is derived from an intricate analysis of food and nutrition indicators from multiple sectors including health, agriculture, water, social protection, and education, and offers valuable insights into the intricacies of food security challenges in Kenya. The overall average score on the Food Security and Nutrition Index was 0.44 – which indicates moderate food security and nutrition – with significant variations across different sectors. Health, water, and education sectors performed relatively better, whereas social protection, agriculture, and environmental management lagged.

The average health sector index was 0.65. There was a significant improvement in certain areas in the sector, for example, iron/folic acid supplementation among women and the consumption of iron-rich foods. However, the low levels of vitamin A supplementation and exclusive breastfeeding rates highlight areas that need targeted interventions. The consumption of vitamin A-rich foods among children under five (5) years improved from 38 per cent in 2016 to 41 per cent in 2022. However, vitamin A supplementation among children reduced from 71.7 per cent in 2014 to 63.6 per cent in 2022, highlighting the need to enhance vitamin A supplementation programmes. Iron/folic acid supplementation among women for the same period improved from 53.2 per cent to 90.2 per cent. Consumption of iron-rich foods among pregnant and lactating women improved from 53.2 per cent in 2014 to 90.2 per cent in 2022. The proportion of children breastfed for 12-23 months improved from 53 per cent in 2014 to 65.2 per cent in 2022. Despite the steady progress made towards improving exclusive breastfeeding, the proportion of children exclusively breastfed for six months declined slightly from 61 per cent in 2014 to 59.9 per cent in 2022. This reflects the need to promote exclusive breastfeeding through public health campaigns and community health worker initiatives to address the decline.

The average index for the agriculture sector was 0.29. While the country has continued to face constraints in ensuring food security, there has been notable improvement in agricultural production, particularly livestock. Cattle production volumes increased by 13 percentage points from about 18.75 million heads in 2015 to about 22.85 million heads in 2022. Similar trends were noted in sheep, goats, camels, and poultry, which recorded an increase of 29, 26, 32, and 44 per cent, respectively. However, there was a slight decrease in maize and beans production by 3.0 and 8.0 per cent, respectively between 2015 and 2022. This poses a risk to food security. The food price index increased from 64.14 in 2013 to 141.74 in 2022, while the food price volatility reduced from 155.44 to 143.26 for the same period. This highlights the need to boost agricultural production through the implementation of policies that support smallholder farmers with access to inputs, training, and technology to improve crop yields, especially for staple foods such as maize and beans. Thus, it is necessary to diversify crop production to reduce reliance on a few staple foods. Improving agricultural storage facilities can also enhance food security by reducing post-harvest losses, and stabilizing food prices.

The country has made various efforts to improve water and sanitation access and infrastructure across the country. The average index for the sector was 0.52. The

proportion of households using improved drinking water increased from 66.9 per cent in 2014 to 76.6 per cent in 2022. Access to safe drinking water also improved from 66.9 per cent in 2016 to 76.6 per cent in 2022. However, the proportion of households connected to piped water supply reduced from 27.8 per cent to 25.3 per cent for the same period, suggesting a need to invest more in water infrastructure. The proportion of households connected to sewerage increased from 8.5 per cent in 2012 to 12 per cent in 2022. Measures to improve water and sanitation infrastructure include investing in the expansion of the piped water supply and maintaining the existing ones to ensure more households have reliable access to water and sanitation facilities.

The overall index for the social protection sector was 0.20. Various social protection programmes have been implemented in the country over recent years. They include a range of interventions targeting different segments of the society. Cash transfers under the Hunger Safety Net Programme (HSNP) reduced from 2.69 billion in 2021 to 984.6 million in 2022. Nationally, about five per cent of the population received cash transfers from the government in 2022. This highlights a gap in supporting vulnerable populations, exacerbating food insecurity and malnutrition issues. Increasing the reach of school feeding programmes ensures more children receive nutritious meals, which can improve educational outcomes and overall health. The country can also leverage schools as platforms for nutrition education and community outreach.

The average index for the education sector was 0.45. Educational attainment improved significantly from 2003 to 2022. The percentage of people aged six (6) years and above without education decreased from 23 per cent to 13 per cent among women and from 16 per cent to 10 per cent among men. However, a notable proportion of young children aged six to nine (6-9) years, 37 per cent of girls and 40 per cent of boys, had no education at all. The net attendance ratio (NAR) for primary school children aged 6-13 years increased from 85 per cent in 2014 to 89 per cent in 2022, with a higher NAR for girls (90%) compared to boys (87%). For secondary school children, the NAR in 2022 was 59 per cent. Gross Attendance Ratios (GARs) indicated some inefficiencies, with primary schools in rural areas having a higher GAR (108%) than urban areas (104%), suggesting the presence of underage and overage learners. The GAR for secondary schools in 2022 was 84 per cent for girls and 81 per cent for boys, indicating that not all children aged 14-17 years were in school. Although school feeding programmes have been shown to reduce absenteeism and improve performance, in 2016, only 20 per cent of learners were enrolled in schools offering such programmes. This calls for targeted programmes to ensure improved education outcomes.

Finally, environmental factors play a crucial role in ensuring food security by promoting sustainable food production, preserving natural resources, and mitigating climate change impacts. The average index for the sector was 0.38. The average vegetation index for the 23 counties covered under the National Drought Management Authority for 2022 was 38.44. This was a reduction from the Long-Term Average (LTA) of 2018, 2019, 2020, and 2021 of 55.78. The proportion of children under five (5) years at risk of undernutrition (measured through the middle upper arm circumference (MUAC) in 2022 was 10.31 per cent while the LTA was 9.26 per cent. The reduced coping strategy index declined from the LTA of 8.78 to 7.94 in 2022. The declining vegetation index and the high percentage of children at risk of undernutrition indicate environmental stress and the adverse impact of climate change on food security. To address these issues, it is crucial to develop and implement policies aimed at improving environmental conservation and climate resilience. Supporting sustainable farming practices and reforestation projects will also help in enhancing the vegetation index and reducing undernutrition risks.



Introduction

The 2023 Global Hunger Index (GHI) score for the world was estimated at 18.3 indicating a moderate level of hunger. This shows a declining trend from the 2015 score of 19.1. The number of undernourished people increased from 572 million in 2017 to about 735 million in 2023 translating to a higher prevalence of malnutrition, an indicator in the computation of GHI. In the 2023 Global Nutrition Report, the number of people faced with hunger increased from 618 million in 2019 to 783 million in 2022. In 2020 alone, 3.1 billion people could not be able to afford a healthy diet, with an increase of 134 million people from 2019. Almost a third (29.3%) of the world's population were moderately or severely food insecure in 2021. Concurrently, the kind of foods eaten across the world continues to fall short of the minimum standards for healthy and sustainable diets, the results being increased cases of obesity – around 40 per cent of all adults and 20 per cent of all children are now overweight or obese – and diet-related non-communicable diseases (NCDs). The burden of malnutrition is highest in Sub-Saharan Africa and affects almost every country in the region. The prevalence of moderate or severe food insecurity in the region increased from 49.8 per cent in 2015 to 67.2 per cent in 2022. The situation is worse in the East African region with a reported increase in moderate or severe food insecurity prevalence from 56.8 per cent in 2015 to 69.2 per cent in 2022 (FAO, IFAD, UNICEF, WFP, and WHO, 2023).

With a GHI score of 22.0 indicating a severe level of hunger, Kenya was ranked 90th out of 125 countries illustrating an urgent need for action to address food insecurity in the country (WHO, 2023). The Country's progress in combating hunger over the past two decades is commendable. The significant decline in its GHI score from 2000 to 2011 reflects tangible progress, transitioning from alarming levels to a serious phase. However, progress has slowed since 2012, with a marginal decrease in the GHI score by 2.4 points. This deceleration could be attributed to the rising cost of a healthy diet, which has increased by 12.1 per cent since 2017, contributing to undernourishment, child wasting, stunting, and mortality. This is also evidenced by about 74 per cent of the population that could not afford a healthy diet by 2021.

The status of food security and nutrition indicators reflects the overall trends and patterns in Kenya's GHI score. For instance, about 25 per cent of the population could not consume enough calories to live a healthy and productive life. In addition, acute malnutrition is still prevalent, though the rates have gradually declined to about 4.8 percent. This could be attributed to weather and climate shocks, the COVID-19 pandemic, and escalating food prices related to the Russia-Ukraine war. People with low incomes are unable to access necessities including nutritious meals, quality shelter, proper sanitation, and adequate healthcare (Siddiqui, Salam, Lassi, and Das, 2020).

Additionally, about 2.8 million people in Kenya's Arid and Semi-Arid Lands (ASALs) are classified in Integrated Food Security Phase Classification (IPC) Phase three (3) or above (crisis or worse) between July and September 2023. Noteworthy, there has been a general improvement across the ASAL counties, from 4.4 million people in IPC acute food insecurity (AFI) Phase three (3) or above in February 2023 and 5.4 million in March -June 2023 to 2.8 million, which could be attributed to good harvest across the ASALs supported by favourable rainfall. However, several shocks including high inflation on prices of staple food, and flash floods during long rains often lead to the loss of livestock and the destruction of infrastructure and farmlands affecting the household's food security status and livelihoods. This calls for strategic policy measures for implementation to curb the menace attributed to food insecurity and malnutrition. Therefore, there is a need to understand sectoral nutrition-related indicators and their contribution to nutrition for better planning and decision-making.

Good nutrition is linked to higher economic growth, enhanced productivity, and poverty reduction through improved health, cognitive development, school performance, and physical work capacity (Holmes, 2022; Horton and Steckel, 2011). Malnutrition, which refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients (WHO, 2020; Breewood, 2018) exacerbates the burden of poverty as poor health resulting from malnutrition leads to decreased productivity levels, increased healthcare costs and overall diminishing of economic welfare (Breewood, 2018; The World Bank, 2006). The relationship between nutrition and poverty is bidirectional in that poverty increases food insecurity and hidden hunger.

Kenya has made significant progress in reducing the malnutrition levels, particularly among the under-five stunting levels from 40 per cent in 1993 to 18 per cent in 2022. The prevalence of wasting and underweight declined from 7.0 per cent and 20 per cent respectively in 1993 to 5.0 percent and 8.0 per cent, respectively in 2022 (KNBS and Macro, 2022). Despite the improvements, the prevalence of malnutrition remains unacceptably high in relation to the country's national targets (GoK, 2022) and international obligations including the Sustainable Development Goals to which the country subscribes. Improved food security and nutrition is a core development agenda at the global, regional, and country levels as illustrated in the 2030 Agenda for Sustainable Development, the African Union's Agenda 2063, and country-specific nutrition institutional frameworks (AUC, 2015; Webb, 2014; Kihiu and Franklin, 2021). Better nutrition status is a core development goal and a contributor to development policy. Realizing nutrition can reinforce key development priority outcomes such as poverty reduction, improved governance, and human rights, health sector reforms, and trade liberalization (Global Nutrition Report, 2016; Haddad et al., 2004).

Effective planning, tracking, evaluation, and reporting on progress in the implementation of national food security and nutrition plans and programmes require knowledge of the actual nutrition condition of an individual, community, or country (Wüstefeld et al., 2015; de Guzman and Molano, 1994; Maire and Delpeuch, 2005). Further, countries need to track nutrition status changes over time and monitor, report on, and account for the progress of national plans and programmes towards improved nutrition (Wüstefeld et al., 2015; de Guzman and Molano, 1994; Maire and Delpeuch, 2005). Consequently, several nutrition-relevant indicators, which are highlighted in many other documents are being used across major sectors and even

within the sectors (Maire and Delpeuch, 2005). This presents decision-makers and planners with challenges in making a judicious choice among the indicators to take appropriate action as well as the presence of inconsistencies in data collection, data quality, and indicator measurement (WHO and UNICEF, 2020). Similar observations were made in a landscape analysis of nutrition information in the Eastern and Southern Africa region, including Kenya, where many countries collect large amounts of data, which impacts data quality (UNICEF, 2020).

Against this background, a framework for harmonizing nutrition indicators in Kenya was developed under the National Information Platform for Food and Nutrition (NIPFN). Harmonized nutrition indicators are crucial for effective assessment, surveillance, and monitoring of nutrition in a coordinated manner across existing systems in Kenya. This study seeks to implement the harmonized framework for nutrition indicators by assessing the status of food security and nutrition in the country across nutrition-specific and nutrition-sensitive sectors.



Methodology

2.1 Framework of Analysis

The analysis was based on harmonized nutrition-sensitive indicators proposed under the first cycle of the National Information Platform for Food Security and Nutrition (NIPFN) project for monitoring and evaluation of the country's food and nutrition security. The selection process of the indicators was achieved through a multi-sectoral expert approach that mapped out and harmonized nutrition indicators per sector and institution. This was achieved by reviewing nutrition-sensitive indicators, strategies, and programmes and identifying indicators with the highest priority. The experts – drawn from various sectors – applied the indicator selection criteria as demonstrated by Garnica Rosas et al. (2021). A total of 130 nutrition indicators were prioritized: health sector (57), agriculture sector (27), arid and semi-arid lands under the National Drought Management Authority (NDMA) (17), water sector (16), education sector (7), and social protection. The criterion is based on the principles of relevance, actionability, meaningfulness and usability, accuracy, feasibility, timeliness, and international comparability of the indicators (Kihiu et al., 2023; Karumba, 2023). There were data reporting gaps for the various indicators across the sectors: health sector (32 indicators at the county level and 15 indicators at the national level); water (6); agriculture (18); social protection (5); education (4); and NDMA (8).

For the health sector, data was not available on 32 indicators at the county level and 15 indicators at the national level. However, indicators were disaggregated based on gender, age, and other variable-specific categories. For instance, the indicator on the proportion of the population with BMI <18.5, >25, and >30 7 cohorts were disaggregated for underweight and overweight, and for adolescents, male adults, and female adults. The resulting number of indicators for health at the county level was 30. In the water sector, there was no data on six (6) indicators at the county level and two (2) indicators at the national level. Nonetheless, no disaggregation was done on the water data. The number of indicators with reported data from the agricultural sector was nine (9) at the county level and 19 at the national level. However, two of the county-level indicators were disaggregated. Production volume indicator was disaggregated by value chains, while iron-rich food consumption was disaggregated by children and lactating mothers. In the social protection sector, data was available for only one indicator at the county level and five indicators at the national level. In the education sector, data was available for three indicators both at the national and county level. However, the county-level data was disaggregated by gender

and educational attainment level. For indicators monitored by the NDMA, data was available for nine (9) indicators for the 23 counties covered by the institution. However, only one (1) indicator was monitored nationally.

Therefore, the county-level data used for index computation were as follows: health sector (30), agriculture sector (16), arid and semi-arid lands under the National Drought Management Authority (NDMA) (9), water sector (10), education sector (8) and social protection (1). The unreported indicators remain as a data gap.

Table 2.1 List of food security and nutrition indicators

No.	Sector/Indicator	Data available at the national level	Data available at the county level
Health			
1	The percentage of children under the age of five who are wasted (moderate acute malnutrition). Weight for height Z-score(-2sd)	Yes	Yes
2	Percentage of stunted (moderate and severe) children aged 0–59 months	Yes	Yes
3	Percentage of children aged under five (5) years who are overweight or obese	Yes	Yes
4	Percentage of underweight 0-59 months (<-2 z-score)	Yes	Yes
5	Percent of children with (moderate/severe) acute malnutrition receiving therapeutic treatment	Data gap	Data gap
6	Prevalence of acute malnutrition (MUAC)<210MM PLW	Data gap	Yes -23 counties
7	Prevalence of Diarrhoea among under five (5) years children	Yes	Yes
8	Per cent consumption of iron-rich foods among children	Yes	Yes
9	Proportion of households with latrines or population using improved sanitation facilities (per cent)	Yes	Yes
10	Percentage of population with BMI <18.5, >25 & >30 – cohorts	Yes	Yes
11	Food consumption score	Yes	Yes
12	Minimum acceptable diet – children	Yes	Data gap
13	Minimum meal frequency – children	Yes	Data gap
14	Minimum dietary diversity – children	Yes	Data gap
15	Proportion of the population with access to safe water	Yes	Yes
16	Prevalence of iodine deficiency in the population (cohort) (per cent)	Yes	Data gap
17	Early initiation of breastfeeding	Yes	Yes
18	Exclusive breastfeeding under six months	Yes	Data gap

No.	Sector/Indicator	Data available at the national level	Data available at the county level
Health			
19	Children under five (5) years with diarrhoea receiving oral rehydration solution (ORS) and zinc	Yes	Yes
20	Percentage of pregnant women consuming iron/folic acid (IFA) supplement	Yes	Yes
21	Infant and young child feeding index	Data gap	Data gap
22	Incidence of low birth weight among newborns	Yes	Yes
23	Consumption of vitamin A-rich foods among children	Yes	Yes
24	Prevalence of iron deficiency in the population (cohorts)	Yes	Data gap
25	Children aged 6–59 months who received vitamin A supplementation (per cent)	Yes	Yes
26	Women's dietary diversity score	Data gap	Data gap
27	Minimum dietary diversity – women	Yes	Yes
28	Vitamin A deficiency in the population (cohorts)	Yes	Data gap
29	Compliance of fortified maize flour to fortification standards	Data gap	Data gap
30	Prevalence of undernourishment	Yes	Yes
31	Prevalence of moderate or severe food insecurity in the population, based on the food insecurity experience scale (FIES)	Yes	Yes
32	Prevalence of zinc deficiency in the population (cohorts)	Yes	Data gap
33	Percentage of households using adequately iodized salt	Yes	Yes
34	Consumption of iron-rich foods among pregnant and lactating women	Yes	Yes
35	Household hunger scale	Data gap	Data gap
36	Prevalence of anaemia in pregnant women (Hb<11g/dl)	Yes	Data gap
37	Prevalence of anaemia among the population (cohorts)	Yes	Data gap
38	Compliance of fortified wheat flour to fortification standards	Data gap	Data gap
39	Compliance of fortified fats/oils to fortification standards	Data gap	Data gap
40	Unhealthy food consumption by children	Yes	Data gap
41	Mean coping strategy index	Yes	Yes
42	Prevalence of folate deficiency among women of reproductive age	Yes	Data gap
43	Proportion of the population with raised blood pressure or currently on medication	Yes	Data gap

No.	Sector/Indicator	Data available at the national level	Data available at the county level
Health			
44	Continued breastfeeding 12-23 Months	Yes	Data gap
45	Percentage of children aged 12-59 months correctly de-wormed twice in the year	Data gap	Data gap
46	Percentage of school children correctly de-wormed at least once in the year	Data gap	Data gap
47	Cure/recovery rate per cent of children discharged from the treatment programme as successfully recovered	Data gap	Data gap
48	Death rate per cent of children who died from any cause while registered in the treatment programme	Data gap	Data gap
49	Proportion of adults - women and men with normal waist: hip ratio (per cent)	Yes	Data gap
50	Percentage of under-five years children consuming multiple micronutrient powder	Yes	Yes
51	Proportion of men with normal waist: hip ratio (per cent)	Yes	Data gap
52	Introduction of solid, semi-solid, or soft foods	Yes	Data gap
53	Mean intake of sodium salt (g/ day)	Data gap	Data gap
54	Prevalence of insufficient physical activity in adults 18–64 years of age (per cent)	Yes	Data gap
55	Defaulter rate per cent of children who were absent for two consecutive weightings	Data gap	Data gap
56	Percentage of caregivers receiving nutrition counselling	Data gap	Data gap
57	Individual dietary diversity score (women)	Yes	Yes
Water			
1	Percentage of population using an improved drinking water source	Yes	Yes
2	Percentage of population using basic drinking water service	Yes	Yes
3	Percentage of population using safely managed sanitation services	Yes	Yes
4	Percentage of population using safely managed drinking water services	Yes	Yes
5	Percentage of population using basic sanitation services	Yes	Yes
6	Customers' connections to sewerage – renamed	Yes	Yes
7	Percentage of utilities meeting drinking water quality standards	Yes	Yes
8	Time and distance to a water source	Yes	Yes
9	Customers' connections to water supply – renamed	Yes	Yes

No.	Sector/Indicator	Data available at the national level	Data available at the county level
Water			
10	Population practicing irrigation agriculture	Yes	Data gap
11	Area under irrigation	Yes	Data gap
12	Hours of water supply (hrs/day) – WASREB	Data gap	Data gap
13	Proportion of wastewater safely treated – GAP	Data gap	Data gap
14	Percentage of population using limited drinking water service	Yes	Yes
15	Yield in irrigated area (rice, potatoes, maize, fish, horticulture, cotton, fodder)	Yes – rice	Data gap
16	Distance to a water source	Yes	Yes
Agriculture			
1	Food insecurity experience scale (FIES)	Yes	Yes
2	Minimum dietary diversity (women of reproductive age and young children 6-59 (MDD-W)	Yes	Yes
3	Household dietary diversity score (HDDS)	Yes	Data gap
4	Diversity of foods produced on-farm	Data gap	Data gap
5	Vitamin A-rich food consumption	Yes	Yes
6	Iron-rich food consumption	Yes	Yes – counties
7	Food consumption score (FCS)	Yes	Yes
8	Food prices	Yes	Data gap
9	Cost of a healthy diet	Data gap	Data gap
10	Consumption of specific target foods	Yes	Yes
11	Production volume, by value chain, that is, for crops, livestock, fish	Yes	Yes
12	Proportion of agricultural area under productive and sustainable agriculture	Data gap	Data gap
13	Individual consumption of 400g of fruits and vegetables per day	Yes	Yes
14	Mean coping strategies index (CSI)	Yes	Yes
15	Post-harvest losses (crops, livestock products, and fish)	Data gap	Data gap
16	Number of SMEs engaged in agricultural food processing and distribution	Yes	Data gap
17	Women's time use and labour	Data gap	Data gap
18	Women's empowerment in agriculture index (WEAI)	Data gap	Data gap
19	Asset ownership by gender	Yes	Yes
20	Value of agricultural produce marketed	Yes	Data gap
21	Self-sufficiency ratio	Yes	Data gap
22	Food price volatility/food CPI (proxy)	Yes	Data gap

No.	Sector/Indicator	Data available at the national level	Data available at the county level
Agriculture			
23	Import dependency ratio	Yes	Data gap
24	Per caput daily supply	Yes	Data gap
25	Per caput calorific daily supply	Yes	Data gap
26	Quantity of agricultural produce marketed (food crops + milk +eggs+ fish)	Data gap	Data gap
27	Indicator of nutrition and food safety-related knowledge - GAP (Implementation of GAP for food safety) - The indicator is very key but at the moment the indicator has not been identified. What we have is an area of interest.	Data gap	Data gap
Education			
1	Number and percentage of learners in school meals programme (By type of programme)	Yes	Yes
2	Educational attainment of household population: Females/males	Yes	Yes
3	Quantity of food commodities released from stores per school	Data gap	Data gap
4	Attendance rates (gender disaggregated)	Yes	Yes
5	Enrolment rates (gender disaggregated)	Yes	Yes
6	Proportion of primary schools providing deworming services to children (6-14 years)	Data gap	Data gap
7	Proportion of primary and secondary schools with functional school gardens – GAP	Data gap	Data gap
Social protection			
1	Number of beneficiaries receiving nutrition-sensitive cash transfer	Yes, 2021,2022	Data gap
2	Number of HH receiving nutrition-sensitive cash transfer top-ups	Yes, 2021,2022	Data gap
3	Number of NICHE beneficiaries receiving nutrition-counselling	Yes,2021,2022, 2023	Data gap
4	Number of households receiving GoK cash transfer every two months (CT-OVC, OPCT, PWSD-CT, HSNP)	Yes, 2019,2020	Data gap
5	Number of beneficiaries receiving GoK cash transfer every two months (CT-OVC, OPCT, PWSD-CT, HSNP)	Yes, 2021,2022	Data gap
6	Proportion of the population covered by social protection programmes	Yes	Yes
National Droughts Management Authority (NDMA)			
1	Food consumption score (FCS)	Yes	Yes
2	Population in need of food assistance	Data gap	Yes-23 counties
3	Rainfall performance	Data gap	Data gap

No.	Sector/Indicator	Data available at the national level	Data available at the county level
National Droughts Management Authority (NDMA)			
4	Number of cash transfer beneficiaries under regular and emergency (HSNP)	Data gap	Data gap
5	Household milk production	Data gap	Yes-23 counties
6	Household milk consumption (Ltr)	Data gap	Yes-23 counties
7	Distance to household drinking water source (km)	Data gap	Yes-23 counties
8	Proportion of under-five (5) years children at risk of malnutrition (MUAC)	Data gap	Yes-23 counties
9	Maize prices (ASAL)	Data gap	Data gap
10	Pasture and browse conditions	Data gap	Data gap
11	Goat prices	Data gap	Data gap
12	Reduced coping strategy index (RCSI)	Data gap	Yes-23 counties
13	Livestock body condition- PET methodology	Data gap	Data gap
14	Vegetation condition index	Data gap	Yes-23 counties
15	Livestock deaths (for drought)	Data gap	Data gap
16	ToT- Terms of Trade	Data gap	Yes-23 counties
17	Livestock migration pattern	Data gap	Data gap

Source: Kihiu et al. (2023)

2.2 Food Security and Nutrition Index

The Food Security and Nutrition Index was computed to assess the performance of various sectors across various counties in Kenya. Six distinct sectors were considered. These sectors included health, water, agriculture, education, social protection, ASALs under NDMA. The purpose was to evaluate the food security and nutrition status of different counties in Kenya, in alignment with global humanitarian indicators of food security.¹

Scaled values for positive indicators were constructed using the formula:

$$S_i = \frac{X_i - \text{Minimum Value}}{\text{Maximum value} - \text{Minimum value}} \quad 2.1$$

Where S_i = Scaled value for positive indicator and X_i = Data value of the indicator

1 Indicators of food security [https://humanitarianglobal.com/indicators-of-food-security/#:~:text=Nutrition%20indicators,Chronic%20malnutrition%20\(stunting\)](https://humanitarianglobal.com/indicators-of-food-security/#:~:text=Nutrition%20indicators,Chronic%20malnutrition%20(stunting))

Scaled values for negative indicators were computed using the formula:

$$Si = \frac{\text{Maximum value} - Xi}{\text{Maximum value} - \text{Minimum value}} \quad 2.2$$

Where Si = Scaled value for negative indicator and Xi = Data value of the indicator

The composite indicator was computed using the formula:

$$\text{Weighted Index} = \frac{\sum Wi \times Si}{\sum Wi} \quad 2.3$$

Where Wi represents the unique weights associated with the scaled value Si.

All indicators included in the study do not have equal importance in improving nutritional status. Therefore, the indicators were assigned an arbitrary weight (Wi) based on their impact on the nutritional status.

Principal Component Analysis (PCA) was used to determine the preliminary weights for each indicator. PCA is a statistical technique that is used for dimensionality reduction. The approach finds the principal components, which are the dataset's orthogonal directions of maximum variance. The weights associated with the principal components are computed using linear algebra. PCA works by first centering the data, before computing the covariance matrix. Eigenvectors and eigenvalues of the covariance matrix are then computed. The top k-eigenvalues (principal components) associated with the largest eigenvalues are selected to form the projection matrix.

Since PCA gives weights that maximize the variance of the units, the computed weights are best for discriminating between units and capturing as much information as possible from the underlying indicators. To address the issue of the relative importance of the indicators, input from stakeholders from the various sectors was sought to ensure a balanced weight. Table 2.2 provides the values of weights given to each indicator for calculating the final score and ranking of the counties.

Table 2.2: List of weights for food security and nutrition indicators

No.	Health indicators	Weight
1	HT-Early breastfeeding	7.00%
2	HT-FCS	2.00%
3	HT - Iodized salt	1.22%
4	HT - Iron/ folic acid	7.00%
5	HT-Iron-rich food 6-23 months	7.00%
6	HT-Iron-rich food lactating women	7.23%
7	HT-MDD – Women	5.36%
8	HT-Overweight	4.16%
9	HT-Percentage of population with BMI < - 1SD - Adolescent female	2.23%

No.	Health indicators	Weight
10	HT-Percentage of the population with BMI <18.5 - Adult female	1.00%
11	HT-Percentage of the population with BMI <18.5 - Adult male	0.50%
12	HT-Percentage of the population with BMI >=30 - Adult female	2.00%
13	HT-Percentage of population with BMI >=30 - Adult male	0.50%
14	HT-Children aged 6–59 months who received vitamin A supplementation (%)	2.00%
15	HT-Proportion of children consuming vitamin-rich foods	3.00%
16	HT-Wasting	5.00%
17	HT-MicroNutrient powder	1.20%
18	HT-Stunting	7.00%
19	HT-Underweight	4.00%
20	HT-Deworming	3.00%
21	HT-Prevalence of children under five (5) years with diarrhoea receiving oral rehydration solution (ORS) and Zinc	3.00%
22	HT-Prevalence of diarrhoea among under five (5) years children	4.00%
23	HT-Prevalence of low birth weight among newborns	2.00%
24	HT-Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)	2.00%
25	HT-Mean Coping Strategy Index	2.00%
26	HT-Individual Consumption of 400g of fruits and vegetables per day (2015/16 KIHBS) – below 400	4.00%
27	HT-Proportion of households with latrines using improved sanitation facilities (%)	3.80%
28	HT-Percentage of population using safely managed drinking water services	3.80%
29	HT-Proportion of the population who have consumed target foods	0.00%
30	HT-MUAC	3.00%
	Agriculture indicators	Weight
1	AGR-Individual consumption of 400g of fruits and vegetables per day (2015/16 KIHBS) – below 400	3.97%
2	AGR - proportion of the population who have consumed target foods	5.13%
3	AGR - Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)	4.05%
4	AGR - MDD – Women	3.90%
5	AGR - Proportion of children consuming Vitamin A rich foods	8.57%
6	AGR-Mean Coping Strategy Index	0.56%
7	AGR-Percent distribution of women aged 15–49 who own land (agricultural or non-agricultural)	7.81%
8	AGR-Iron-rich food 6-23 months	0.16%

	Agriculture indicators	Weight
9	AGR-Iron-rich food lactating women	1.54%
10	AGR-Production volume, by value chain, that is, for beans (Tons)	11.01%
11	AGR-Production volume, by value chain, that is, for cattle (number)	10.12%
12	AGR-Production volume, by value chain, that is, for goats (number)	9.87%
13	AGR-Production volume, by value chain, that is, for maize (tons)	11.32%
14	AGR-Production volume, by value chain, that is, for potatoes (tons)	5.54%
15	AGR-Production volume, by value chain, that is, for poultry (number)	6.26%
16	AGR-Production volume, by value chain, that is, for sheep (number)	9.00%
	Education indicators	Weight
1	ED-Number of learners in school meals programme (By type of programme)	2.00%
2	ED-Percentage of learners in school meals programme (By type of programme)	18.00%
3	ED-Proportion of Males with Secondary education or higher	30.00%
4	ED-Proportion of Females with Secondary Education or higher	30.00%
5	ED-pre-primary school attendance rates	5.00%
6	ED-Primary school attendance rates	5.00%
7	ED-Secondary school attendance rates	5.00%
8	ED-Tertiary school attendance rates	5.00%
	Social protection indicator	Weight
1	SP-Proportion of the population in Households receiving Cash transfers from the government (Both national and county)	100.00%
	NDMA indicators	Weight
1	NDMA-Days water source expected to last	13.53%
2	NDMA-Households trekking distance to water sources	7.82%
3	NDMA-Milk production (litres)	15.68%
4	NDMA-Household milk consumption (litres)	3.43%
5	NDMA-MUAC	14.28%
6	NDMA-Terms of trade	12.54%
7	NDMA-Vegetation condition index	11.80%
8	NDMA-Reduced coping strategy index	11.72%
9	NDMA-Population in need of food assistance	9.20%

2.2.1 Sensitivity Analyses

Sensitivity analysis was performed to assess the robustness of the index to changes in model specifications or data assumptions. This involved testing alternative weights to ensure the stability of the findings.

The use of varying weights presents an element of uncertainty. Therefore, the most robust index is the one that is least sensitive to changes in the sources of uncertainty. To have a reliable and consistent index, dominance analyses were conducted followed by statistical inference.

Dominance analyses involved checking the effect of changing indicator weights on the county rankings, while statistical inference involved estimating the unknown population parameters such as testing for equality of means and variances under alternative choices of weights. The weights scheme used in this study was compared to assuming equal weights for all indicators and sectors.

To test if the ranking of two or more counties remains the same when the weights are altered, the robustness of the indices was evaluated by conducting the rank correlation coefficient between the weights applied and assuming equal weights for all indicators and sectors. Three alternative rank correlation coefficients were considered: Pearson's correlation coefficient, Spearman's Correlation coefficient, and Kendall's rank correlation coefficient (Tau-b). Spearman's rank correlation and Kendall's rank correlation are the most common methods used to assess ranking robustness in development research (Alkire et al. 2015; UNDP and OPHI, 2019). An underlying assumption in both coefficients is that there is no single tie in the ranking of any single pair of counties. Spearman's rank correlation coefficient is given by the formula:

$$R^p = 1 - \frac{6 \sum_{i=1}^m (r_i - r'_i)^2}{m(m^2 - 1)} \quad 2.4$$

Kendall's tau correlation coefficient is preferred in cases where the sample size is small with a possibility of many tied ranks. The approach also considers elements of discordant and concordant pairs in reflecting the consistency of the index. The formula for computing Kendall's tau is given by:

$$R^\tau = \frac{\# \text{Concordant pairs} - \# \text{Discordant Pairs}}{m(m-1)/2} \quad 2.5$$

2.2.2 Relationship between Sectoral Performance and Nutrition

Ordinary Least Squares (OLS) regression was used to investigate the relationship between food poverty and stunting, and the county performance in the six sectors. The model is specified as:

$$Y_n = \sum_{i=0}^k \beta_i x_{ni} + \varepsilon_n \quad 2.6$$

Where x_i is the k explanatory variables and Y is the dependent variable. The coefficients β are found by minimizing the errors of prediction ϵ .

2.3 Robustness Analyses

The robustness analysis findings show a strong correlation between the rankings of the counties under the two weighting schemes for all indices. For the overall food security and nutrition index, Kendall's tau of 0.745 indicated that 74.5 per cent of the pairwise county comparisons were concordant and robust, while 25.5 were discordant.

Table 2.3: Correlation coefficients

Sector		Correlation Coefficient (Score)	Correlation Coefficient (Rank)
Health	Spearman	0.957	0.957
	Pearson	0.964	0.957
	Kendall's tau	0.843	0.843
Social protection	Spearman	1.000	1.000
	Pearson	1.000	1.000
	Kendall's tau	1.000	1.000
Education	Spearman	0.775	0.775
	Pearson	0.796	0.775
	Kendall's tau	0.604	0.604
Water	Spearman	0.999	0.999
	Pearson	0.999	0.999
	Kendall's tau	0.980	0.980
Agriculture	Spearman	0.894	0.894
	Pearson	0.916	0.894
	Kendall's tau	0.719	0.719
NDMA	Spearman	0.923	0.923
	Pearson	0.939	0.923
	Kendall's tau	0.802	0.802
Nutrition Index	Spearman	0.909	0.909
	Pearson	0.916	0.909
	Kendall's tau	0.745	0.745

An independent sample t-test was used to study the equality of means and variances between the two weighting schemes. Lavene's tests of equality of variances revealed that the variances of the means under the two schemes were not significantly different from each other ($p > 0.05$) for all indices. The means of the food and nutrition index under the two alternative weighting schemes was not significantly different, $t(92) = -1.309$, $p=0.194$. This confirmed that the index was robust.

Table 2.4: Equality of means and variance

Independent samples test				
	Levene's test for equality of variances		t-test for equality of means	
		Sig.		Sig. (2-tailed)
Nutrition index	1.637	204	-1.309	0.194
Health		0.222	-0.115	0.909
Social protection	0.000	1.000	0.000	1.000
Education	1.071	0.304	-2.851	0.005
Water	0.004	0.947	0.101	0.920
Agriculture	1.196	277	-5.128	0.000
NDMA	0.097	0.757	-1.617	0.113



Food Security and Nutrition Index

This section provides a detailed analysis of the food security and nutrition index in Kenya, highlighting significant disparities across various counties. The index, integrating data from multiple sectors, unveils a broad spectrum of nutritional outcomes. It constituted a total of six sectors namely: health, agriculture, social protection, education, water, sanitation, and hygiene (WASH), and environment. Food security and nutrition indicators were tracked by the respective sectors apart from the indicators under the environmental sector, which were tracked by the National Drought Management Authority (NDMA).

3.1 Overall Food Security and Nutrition Score

The Food Security and Nutrition Index – a comprehensive measure of food security and nutritional status – unveils a diverse landscape of nutritional outcomes across various counties in Kenya. This index, derived from an intricate analysis of food and nutrition indicators from multiple sectors including health, agriculture, water, social protection, education, and NDMA, offers valuable insights into the intricacies of food security challenges in Kenya. The average food security and nutrition index score was 0.44, ranging from as low as 0.27 in Marsabit to as high as 0.56 in Kiambu. This underscores the significant disparities in nutritional wellbeing across the country. Counties such as Nakuru (0.53), Murang'a (0.53), Embu (0.52), and Uasin Gishu (0.54) exhibit relatively higher food security and nutrition index scores, indicating better food security and nutrition status. Notably, these counties reflect significant progress made across the sectors to promote the status of food and nutrition in the country. Sectors driving better performance in these counties include health, water, agriculture, and education. The counties reflect better agricultural diversification, sustainable farming practices, and access to quality inputs. The performance is also an indication of robust investments in water management practices to promote conservation and optimize water use, ensure access to clean drinking water, and a well-managed sanitation to prevent water-borne diseases. The health sector plays a key role in promoting nutrition in these counties. Notably, nutrition programmes implementing community-based nutrition education and interventions, ensuring accessible healthcare, and focusing on maternal and child health play a key role in promoting the nutritional and overall health status of these counties. Also, the higher educational attainment levels in these areas, coupled with higher net enrollment rates improved the ability of citizens to adopt new technologies and practices, fostering innovation in food production and distribution.

Conversely, counties such as Samburu (0.29), Mandera (0.34), Tana River (0.31), and Wajir (0.29) grapple with considerably lower food security and nutrition performance,

highlighting the urgent need for targeted interventions aimed at mitigating the underlying drivers of food insecurity and malnutrition. Food security and nutrition in Kenya's arid and semi-arid lands is driven by several interrelated factors. Frequent droughts, erratic rainfall, and soil degradation challenge agricultural productivity, while water scarcity and inadequate infrastructure hinder effective resource management. High poverty levels, limited market access, and reliance on livestock further exacerbate food insecurity. Additionally, malnutrition and limited healthcare services impact health outcomes, compounded by low education levels and lack of nutrition awareness. Cultural practices and occasional conflicts over resources also contribute to food insecurity in these areas. Addressing these issues requires climate-resilient agricultural practices, improved water management, economic empowerment, expanded healthcare and nutrition education, better access to education, and strong policy support and coordination among stakeholders.

Urban-rural disparities were noted; counties with cities including Nairobi (0.52), Mombasa (0.44), and Kisumu (0.46) exhibited moderate nutrition index scores, reflecting mixed food security and nutrition outcomes. Rural-urban disparities in food security and nutrition in Kenya stem from differences in income, and access to food, healthcare services, education, water, and sanitation. Rural areas often face low agricultural productivity, poor infrastructure, limited market access, and lower levels of education and healthcare, leading to higher rates of malnutrition and food insecurity. In contrast, urban areas benefit from diverse employment opportunities, better infrastructure, healthcare, and greater access to varied food markets, although urban poverty still poses significant challenges. Addressing these disparities requires improving rural infrastructure, expanding education and healthcare services, strengthening social protection programmes, and promoting sustainable agricultural practices to ensure equitable access to food and nutrition across both rural and urban populations.

Table 3.1: Food and nutrition security index scores by sector

County	Health score	Social protection score	Education score	Water score	Agriculture score	NDMA score	Nutrition index
Kiambu	0.726	0.121	0.716	0.815	0.335		0.562
Uasin Gishu	0.737	0.099	0.625	0.727	0.408		0.551
Nyeri	0.693	0.220	0.738	0.774	0.316	0.381	0.545
Nakuru	0.693	0.060	0.614	0.635	0.499		0.541
Murang'a	0.763	0.207	0.548	0.690	0.340		0.530
Nairobi	0.674	0.000	0.876	0.893	0.159		0.525
Embu	0.721	0.522	0.553	0.642	0.275	0.423	0.522
Homabay	0.671	1.000	0.438	0.423	0.363	0.327	0.520
Machakos	0.714	0.207	0.565	0.620	0.372		0.515
Kirinyaga	0.730	0.091	0.592	0.768	0.276		0.514
Nyandarua	0.738	0.142	0.518	0.645	0.334		0.502
Trans Nzoia	0.695	0.052	0.470	0.609	0.449		0.500
Bungoma	0.709	0.203	0.459	0.468	0.445		0.487

County	Health score	Social protection score	Education score	Water score	Agriculture score	NDMA score	Nutrition index
Kisumu	0.722	0.164	0.529	0.623	0.269		0.478
Vihiga	0.749	0.237	0.503	0.593	0.253		0.477
Kajiado	0.673	0.004	0.636	0.589	0.337		0.476
Bomet	0.676	0.233	0.418	0.631	0.316		0.475
Taita Taveta	0.662	0.358	0.506	0.636	0.208	0.497	0.469
Meru	0.636	0.194	0.418	0.586	0.378	0.433	0.467
Kericho	0.726	0.138	0.489	0.512	0.286		0.451
Makueni	0.633	0.263	0.545	0.440	0.324	0.507	0.449
Mombasa	0.686	0.091	0.580	0.617	0.191		0.445
Narok	0.641	0.086	0.373	0.373	0.524	0.282	0.439
Laikipia	0.694	0.211	0.401	0.546	0.279	0.301	0.437
Kakamega	0.694	0.073	0.478	0.499	0.296		0.434
Elgeyo Marakwet	0.670	0.078	0.443	0.549	0.285		0.432
Busia	0.693	0.280	0.378	0.468	0.282		0.432
Tharaka-Nithi	0.720	0.108	0.352	0.605	0.235	0.418	0.431
Nandi	0.633	0.013	0.527	0.525	0.293		0.425
Isiolo	0.646	0.315	0.274	0.559	0.219	0.472	0.415
Kisii	0.654	0.112	0.569	0.364	0.300		0.414
Baringo	0.641	0.095	0.410	0.419	0.313	0.264	0.395
Kilifi	0.581	0.121	0.427	0.539	0.203	0.466	0.392
Siaya	0.660	0.078	0.350	0.430	0.281		0.389
Lamu	0.607	0.086	0.430	0.539	0.194	0.400	0.388
Migori	0.620	0.039	0.400	0.386	0.330		0.387
Turkana	0.512	0.595	0.141	0.242	0.441	0.224	0.380
Kitui	0.586	0.203	0.433	0.291	0.303	0.470	0.379
Nyamira	0.610	0.134	0.484	0.374	0.233		0.377
Garissa	0.540	0.121	0.150	0.573	0.269	0.509	0.373
West Pokot	0.565	0.319	0.210	0.310	0.294	0.525	0.361
Mandera	0.491	0.612	0.208	0.362	0.208	0.361	0.354
Kwale	0.631	0.060	0.385	0.391	0.185	0.357	0.349
Tana River	0.560	0.138	0.216	0.398	0.180	0.352	0.319
Wajir	0.491	0.254	0.247	0.243	0.250	0.289	0.304
Samburu	0.493	0.190	0.273	0.185	0.227	0.354	0.286
Marsabit	0.524	0.289	0.110	0.257	0.177	0.214	0.275

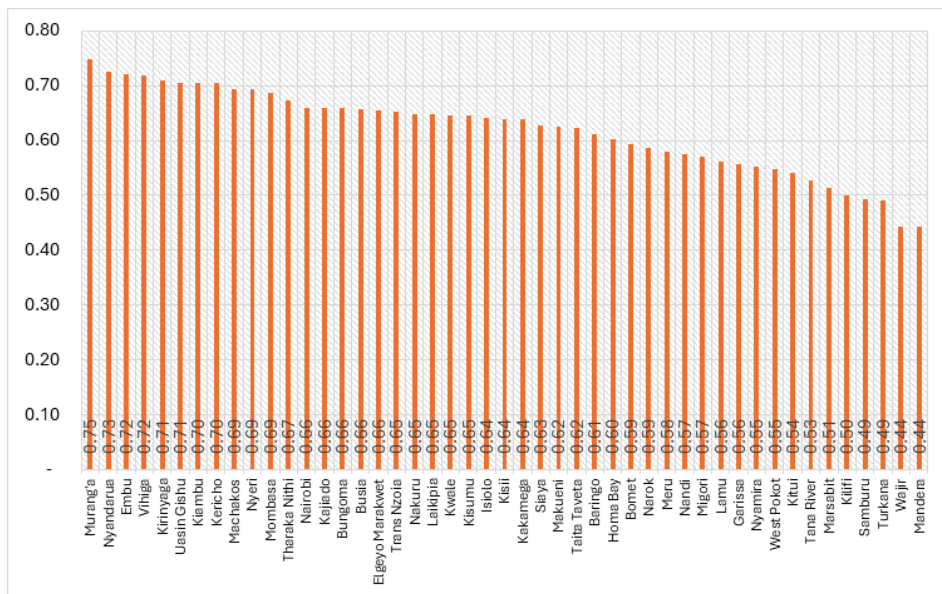
Source: Authors' Computation



Health Sector and Food Security and Nutrition in Kenya

The health sector significantly contributes to food security and nutrition in Kenya, as evidenced by the health sector-related food security and nutrition index scores across various counties. The average health sector index was 0.65, ranging from 0.44 to 0.75. This reflects the state of health systems and healthcare access in the country, which are fundamental determinants of nutritional outcomes.

Figure 4.1: Health sector performance food security and nutrition performance



Source: Authors' Computation

4.1 Anthropometric Trends

Sustainable Development Goal Number Two (SDG 2) on zero hunger seeks to end all forms of malnutrition, including achieving the internationally agreed targets on stunting and wasting in children under five years of age by 2025. The country has made significant progress in reducing the prevalence in improving the child's

nutritional status. For instance, the prevalence of stunting reduced from 40 per cent in 1993 to 18 per cent in 2022. The prevalence of wasting also reduced from 7.0 per cent in 1993 to 5.0 per cent in 2022, while the prevalence of underweight children reduced from 19 per cent in 1993 to 10 per cent in 2022. However, stunting levels remain higher in rural areas and among children of less-educated mothers, indicating disparities that need to be addressed. Additionally, underweight prevalence is significantly higher among the poorest households, highlighting inequality. Sustainable Development Goal Number Three (SDG 3) on good health and wellbeing targets to end preventable deaths of newborns and children under five years of age by 2030. Reduction in malnutrition-related metrics (stunting, wasting, underweight) contributes to lower child mortality and improved health outcomes. Persistent malnutrition, particularly stunting, still poses a risk to child health and survival.

The Government of Kenya has implemented various policy initiatives to combat child malnutrition, including the National Nutrition Action Plan (NNAP), Kenya Vision 2030, the National Food and Nutrition Security Policy (NFNSP), and the Kenya Health Policy. These efforts have led to significant reductions in stunting, wasting, and underweight prevalence among children. However, gaps persist, such as higher malnutrition rates in rural areas, among children of less-educated mothers, and in the poorest households. To address these disparities, the government need to strengthen community-based nutrition programmes, implement targeted education campaigns, expand social protection programmes, enhance monitoring and evaluation, and adopt an integrated approach to rural development.

4.2 Micronutrients Deficiency

The data reveals gaps in micronutrient deficiency in the country. Vitamin A deficiency is a significant public health issue in many low- and middle-income countries, including Kenya (WHO, 2009). Whereas there was an improvement in the prevalence of the consumption of vitamin A-rich foods from 38 per cent in 2016 to 41 per cent in 2022, vitamin A supplementation among children under five (5) years declined from 72 per cent in 2014 to 64 per cent in 2022. The decrease in supplementation rates may be due to factors such as programmatic challenges, access issues, or changes in policy focus. Kenya has had national programs focusing on vitamin A supplementation through campaigns targeting children under five. The decrease in supplementation rates suggests a need for policy adjustments to ensure sustained coverage and effectiveness of these programmes.

Iron-rich foods consumption among pregnant and lactating mothers was high at 90 per cent, while folate deficiency was at 32 per cent among pregnant mothers, and 31 per cent among non-pregnant women. Iron deficiency remains a concern globally, particularly among children and women of reproductive age. Iron-rich foods and supplementation are critical to combat anaemia and ensure optimal health. The high consumption of iron-rich foods among pregnant and lactating mothers indicates positive policy impacts but also highlights the need for continued support and monitoring. Folate is crucial for preventing neural tube defects in infants and reducing the risk of anaemia in women, and its deficiency can lead to serious health issues. Notably, only 14 per cent of children aged between six (6) and 59 months received multiple micronutrient powder supplementation, suggesting low coverage.

The Government of Kenya has implemented various initiatives to address micronutrient deficiencies, such as the National Micronutrient Deficiency Control Guidelines, which sought to provide a framework for addressing micronutrient deficiencies through supplementation, food fortification, and dietary diversification. Initiatives such as vitamin A supplementation campaigns, iron and folic acid supplementation for pregnant women, and the promotion of fortified foods have played a major role in reducing micronutrient deficiency in Kenya. In addition, the health sector goals of the Kenya Vision 2030 seek to improve maternal and child health through enhanced nutrition programmes by strengthening antenatal care services, integrating nutrition education into healthcare, and promoting the consumption of nutrient-rich foods. Despite these efforts, significant gaps persist, including a decline in vitamin A supplementation among children, high folate deficiency rates among women, and low coverage of multiple micronutrient powder supplementation for children. To address these issues, policy alternatives include strengthening supplementation programmes, scaling up food fortification, expanding community-based nutrition education, integrating micronutrient efforts with primary healthcare, and enhancing monitoring and evaluation frameworks. These measures aim to improve the reach and effectiveness of micronutrient interventions, ensuring better nutrition and health outcomes for children and women.

4.3 Optimal Infant and Young Child Feeding (IYCF) Practices

The percentage of children put to the breast within the first hour of birth decreased from 72 per cent in 2014 to 60 per cent in 2022. This is a cause for concern because early initiation of breastfeeding is critical for newborn health and reducing infant mortality (WHO). The proportion of children exclusively breastfed for the first six (6) months remained stagnant at 60 per cent from 2014 to 2022. Exclusive breastfeeding for the first six (6) months of life is crucial for optimal growth, development, and health outcomes. The stagnation indicates a need for targeted interventions to promote exclusive breastfeeding. The prevalence of continued breastfeeding for children aged 12-23 months increased from 53 per cent in 2014 to 65 per cent in 2022. Continued breastfeeding up to two (2) years of age or beyond is beneficial for child nutrition and health. The increase is positive and suggests that efforts to promote continued breastfeeding have been somewhat effective. Despite high initiation rates, the decline in early breastfeeding initiation and stagnant exclusive breastfeeding rates suggest gaps in policy implementation and healthcare service delivery.

The Government of Kenya has implemented various policies and initiatives to promote optimal Infant and Young Child Feeding (IYCF) practices, including the National Maternal, Infant, and Young Child Nutrition (MIYCN) Policy Guidelines that provide a comprehensive framework for promoting breastfeeding and appropriate complementary feeding practices. The initiatives encouraged early initiation of breastfeeding, exclusive breastfeeding for the first six months, and continued breastfeeding up to two years or beyond. The Baby-Friendly Hospital Initiative also supported breastfeeding in hospitals and maternity units by training healthcare workers on breastfeeding support, implementing policies that support breastfeeding, and creating a breastfeeding-friendly environment in health facilities.

Despite these efforts, there are concerning trends such as a decline in early breastfeeding initiation rates and stagnant exclusive breastfeeding rates at 60 per cent from 2014 to 2022. However, continued breastfeeding rates for children aged 12-23 months improved to 65 per cent in 2022. These trends indicate gaps in policy implementation and healthcare service delivery. To address these challenges, the government needs to focus on enhancing healthcare worker training, strengthening community-based support systems, improving maternity leave and workplace policies, launching public awareness campaigns, and ensuring access to safe and adequate complementary foods. These efforts are crucial for improving breastfeeding practices, enhancing child nutrition, and achieving better health outcomes for infants and young children in Kenya.

4.4 Food Consumption Trends

The Food Consumption Score (FCS) is a composite measure assessing dietary diversity, food consumption frequency, and nutritional value of food groups. The increase in households with a poor FCS, from 1.5 per cent in 2014 to 4.0 per cent in 2022, is concerning. This suggests a decline in food security and potentially in the nutritional quality of diets at the household level, which reflects shifts in food access, affordability, and dietary habits over time. It could be indicative of various factors such as economic challenges, climate variability affecting agriculture, or other socio-economic factors. The trend calls for a review of existing food security policies. This could involve strengthening safety nets, improving agricultural productivity, and enhancing access to nutritious foods. The MAD is crucial for the proper growth and development of infants and young children. It includes minimum dietary diversity and meal frequency. MAD trends reveal that the proportion of children receiving the minimum acceptable diet has decreased from 41 per cent in 2014 to 31 per cent in 2022, while that of children meeting the minimum meal frequency has increased from 51 per cent in 2014 to 71 per cent in 2022. The decrease in the proportion of children receiving the minimum acceptable diet is concerning, as it indicates a regression in dietary diversity, which is crucial for proper nutrition and development. The proportion of children receiving minimum dietary diversity also declined from 41 per cent in 2014 to 31 per cent in 2022. The decline may be linked to challenges in accessing a variety of nutritious foods, potentially due to economic constraints or lack of awareness.

Some of the existing policy initiatives focusing on the issue include the Agricultural Sector Transformation and Growth Strategy (2019-2029), which seeks to enhance agricultural productivity and food security through investing in agricultural research and technology, improving irrigation systems, and supporting smallholder farmers. Social protection programmes such as cash transfers and school feeding programmes provide food assistance during emergencies. Despite these efforts, the increase in households with poor Food Consumption Scores (FCS) from 1.5 per cent in 2014 to 4.0 per cent in 2022 highlights persistent challenges in ensuring adequate food access and nutritional quality for all segments of the population. To bridge this gap, the government needs to enhance social protection programmes to reach vulnerable households, promote climate-resilient agriculture practices, strengthen food distribution systems, expand nutrition education efforts, and establish robust monitoring and evaluation frameworks. These actions are essential to improve food security and enhance dietary diversity.

4.5 Other Health Sector Indicators

The health index score also highlighted other critical issues in child health and nutrition that are significant in the context of the existing literature and Kenya's policy environment. These included the prevalence of low birth weight, diarrhoea, and deworming practices. Low birth weight is a well-documented risk factor for child mortality, poor growth, and development. It can result from inadequate maternal nutrition, infections, and other factors. About 9.0 per cent of births had low birth weight (<2.5 kg), with a slight increase from 8.0 per cent in 2014. Additionally, based on maternal estimates, 2.0 per cent of children were very small, and 11 per cent were smaller than average at birth. This highlights the need for health policies to focus on improving maternal nutrition, antenatal care, and the quality of care during childbirth to reduce the incidence of low birth weight. Increasing coverage of maternal health services in rural and marginalized areas would also help in addressing the issue. The statistics also showed that 66 per cent of children aged 12-59 months were dewormed in the six months before the survey. Coverage was higher in urban areas (72%) compared to rural areas (61%). Significant disparities were noted based on maternal education and household wealth. Given the significance of the practice in reducing soil-transmitted helminth infections, efforts should focus on increasing the coverage and equity of deworming programmes, particularly targeting rural and poorer communities. This could involve targeted campaigns, school-based deworming programmes, and integrating deworming with other health interventions.

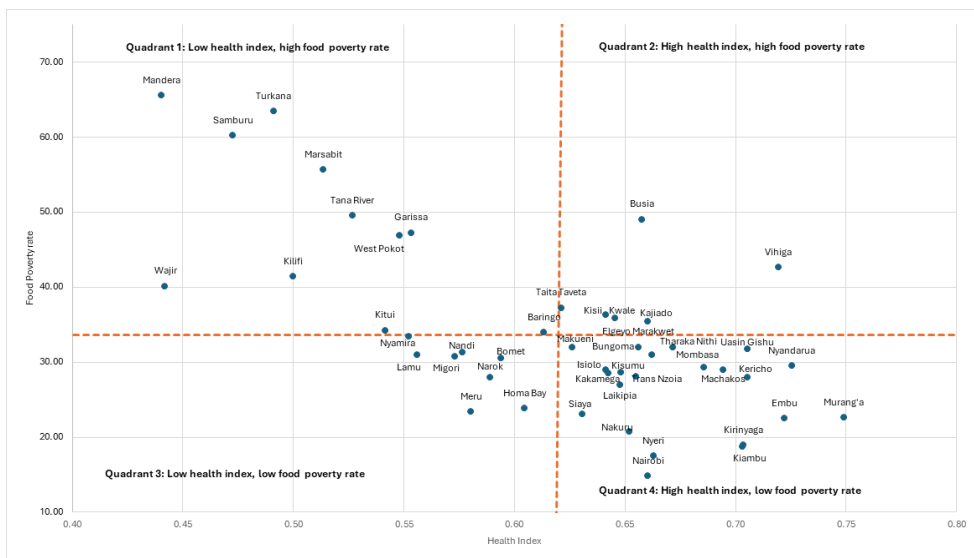
The prevalence of diarrhoea among children under five (5) years was 58 per cent in 2022. However, the proportion of children with diarrhoea symptoms receiving oral rehydration therapy (ORT) and zinc supplementation was 32 per cent. This was a decline from 47 per cent in 2016. Given that diarrhoea is a major cause of morbidity and mortality among children under five (5) years, and it is exacerbated by inadequate water, sanitation, and hygiene (WASH) conditions, there is a need to improve access to ORS and zinc supplementation, especially in rural areas, and to strengthen WASH interventions to prevent diarrhoeal diseases. Policies should focus on promoting ORT and zinc through community health workers, health facilities, and mass media campaigns.

The Government of Kenya has enacted various policies to address child health and nutrition challenges, including the Maternal and Child Health Policy Framework, National Deworming Programme, and National Strategy for Water, Sanitation, and Hygiene (WASH). Despite these efforts, disparities persist in deworming coverage, with rural areas and disadvantaged populations receiving inadequate attention. To bridge this gap, the country should enhance outreach programmes through mobile clinics and community health workers, expand school-based deworming programmes nationwide, and prioritize community education on deworming benefits. Strengthening monitoring and evaluation systems will be essential to track progress and ensure equitable access to deworming services. Additionally, improving access to oral rehydration therapy (ORT) and zinc supplementation for diarrhoea management, particularly in rural areas, is crucial, necessitating enhanced integration with healthcare services and community outreach efforts to effectively tackle these child health challenges.

4.6 Relationship between Food Poverty and Health Index Score

There was a significant relationship between food poverty and the health index score, with a tendency towards high food poverty associated with lower health index scores ($p < 0.05$). These were in counties such as Mandera, Marsabit, Samburu, and Turkana, which exhibited high food poverty rates and low scores in the health sector ranging from 0.44 to 0.51. These counties face significant challenges in healthcare access and infrastructure. Inadequate healthcare facilities, limited access to healthcare professionals, and poor health outcomes contribute to higher rates of malnutrition and food insecurity in these regions. For example, limited access to healthcare services may result in higher rates of preventable diseases and untreated health conditions, which can exacerbate nutritional deficiencies and weaken resilience to food insecurity.

Figure 4.2 Relationship between food poverty and health index score by county



Conversely, counties with high health index scores such as Kiambu (0.70), Kirinyaga (0.70), Nairobi (0.66), and Nyeri (0.66) were associated with low food poverty rates of 18.7, 18.9, 14.8, and 17.5 per cent, respectively. Counties with higher health index scores are more likely to have comprehensive healthcare programmes addressing nutrition-related issues, such as micronutrient deficiencies, maternal and child malnutrition, and nutrition-sensitive interventions. These programmes play a crucial role in improving dietary diversity, promoting breastfeeding practices, and preventing and managing malnutrition at the community level (Musinguzi et al., 2018). Access to healthcare services, such as maternal and child health, nutrition counselling, and preventive care, is crucial for promoting healthy eating habits and combating malnutrition. Counties with high health indexes are more likely to have better access to healthcare facilities, leading to improved health outcomes for residents (Musinguzi

et al., 2018). This includes access to healthcare infrastructure such as hospitals, clinics, and health centres, which are essential for providing nutrition and food security interventions. Counties with high health indexes may have a larger network of healthcare facilities, equipped with trained staff and resources to effectively address health and nutrition challenges (Al-Worafi, 2024). counselling. They are also more likely to attract and retain qualified healthcare professionals – such as doctors, nurses, nutritionists, and community health workers – resulting in better health and nutrition outcomes for residents since skilled healthcare professionals play a critical role in promoting healthy behaviours, providing medical treatment, and offering nutrition education (DiMaria-Ghalili et al., 2013).

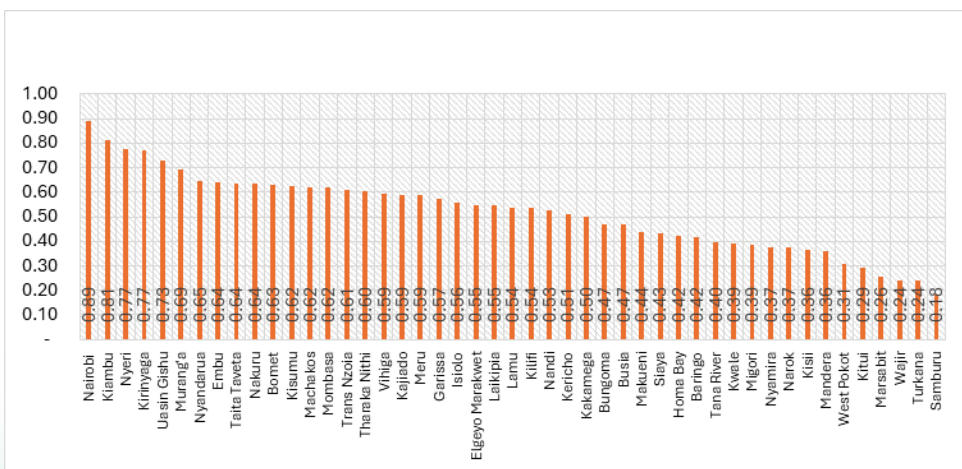
The relationship provides compelling evidence that food and nutrition security can be promoted through health sector interventions such as nutritional improvement, which improves economic productivity, fosters equity, and supports sustainable development. Government policies and investments in the health sector, such as budget allocations, infrastructure development, and healthcare workforce training, have a significant impact on health service delivery and population health outcomes. Counties with high health indexes may benefit from supportive policy environments and increased healthcare investments, resulting in improved health and nutrition outcomes (Macharia et al., 2020).

5

Water Sector and Food Security and Nutrition in Kenya

Water, sanitation, and irrigation are interlinked elements that significantly influence food security and nutrition. Their role ranges from enhancing agricultural productivity, and mitigating climate variability, to preventing contamination and improving health and nutritional status. The water, irrigation, and sanitation average index was 0.52, ranging from 0.18 to 0.89. This reflects a moderate average index suggesting that there is substantial room for improvement in the water, sanitation, and irrigation sector. The wide range in scores indicates significant disparities between different regions or communities. Areas with low scores (0.18) are likely to face severe challenges related to water access, irrigation efficiency, and sanitation, which can severely impact food security and health. Conversely, areas with high scores (0.89) are relatively better off but still have room for enhancement. The key indicators driving the water sector performance include access to improved sources of drinking water, safely managed drinking water, access to improved sanitation services, and connectivity to sewerage services.

Figure 5.1: Water, sanitation and irrigation sector food security and nutrition performance



5.1 Water Access

Studies have consistently shown that access to safe drinking water reduces the incidence of water-borne diseases, leading to improved health and reduced mortality rates, especially among children under five years old (Prüss-Ustün et al., 2019). The national access to improved drinking water in Kenya increased from 67 per cent in 2016 to 77 per cent in 2022. The population with access to at least basic drinking water services was 68 per cent in 2022, while those who had access to limited water were 9.0 per cent, and 8.0 per cent of the population used unimproved sources of water. These findings align with previous studies, suggesting significant potential health benefits. Further, literature has highlighted the socioeconomic benefits of improved water access, such as enhanced productivity, reduced healthcare costs, and better educational outcomes (Fewtrell et al., 2005). The increase in access to improved water sources in Kenya can be expected to have similar effects, fostering economic growth and improving living standards. The disparity between urban (94%) and rural (71%) access to improved water sources in Kenya is consistent with global trends documented in various studies (Hutton and Haller, 2004). Research often emphasizes the need for targeted interventions in rural areas to ensure equitable access to resources and services. This urban-rural gap in water access can exacerbate inequalities and hinder overall national development. However, the proportion of households connected to water supply reduced from 27 per cent in 2014 to 25.3 per cent in 2022. These findings suggest that while progress has been made, particularly in urban areas, there are still challenges in achieving these targets, especially given the reduction in household water connections (UNDP, 2006).

Access to clean water is a critical component of Kenya's Vision 2030, which seeks to provide a high quality of life to all its citizens by 2030. Therefore, the findings on improved water access are a positive indicator of progress towards these goals. Government policies such as the National Water Policy 2021, which aims at addressing water issues by promoting sustainable resource management and equitable access to water services, emphasized the need for safely managed drinking water services and infrastructure development targeting underserved areas. The decrease in household connections underscores the importance of sustained investment and effective policy implementation (Joint Monitoring Programme, 2020). Devolution in Kenya, as per the 2010 Constitution, has placed significant responsibility for water services on county governments. This decentralization aims to tailor water services to local needs. However, the findings suggest that some counties may be facing challenges in managing and expanding water infrastructure, as indicated by the reduction in household connections and the reliance on basic or unimproved water sources.

To address the decline in household water connections and expand access to safely managed drinking water, there is a need for increased investment in water infrastructure. This includes not only constructing new facilities but also maintaining and upgrading existing ones. Public-private partnerships can play a crucial role in addressing infrastructure deficits. By leveraging private sector investment and expertise, the government can enhance service delivery and infrastructure development. Given the disparities in access, targeted interventions are necessary to improve water services in rural and underserved areas. This can be achieved

through tailored policies, increased funding, and capacity-building initiatives aimed at local governments. Engaging communities in water management and educating them about the importance of safely managed water services can enhance the sustainability and effectiveness of water programmes. Community participation ensures that water services meet local needs and fosters a sense of ownership.

The Government of Kenya has implemented various policies and initiatives to address water access and management, including the National Water Policy 2021, and the devolution of water services to county governments as provided for in the fourth schedule of the Constitution of Kenya. Despite progress in increasing national access to improved drinking water, with 77 per cent having access in 2022, disparities persist between urban (94%) and rural (71%) areas. A notable challenge is the decline in household water connections from 27 per cent in 2014 to 25.3 per cent in 2022, indicating difficulties in maintaining and expanding infrastructure, especially in rural regions. To bridge this gap, Kenya should prioritize increased investment in water infrastructure, foster public-private partnerships for financing and expertise, strengthen monitoring and evaluation systems, engage communities in water management, and implement targeted interventions to address urban-rural disparities. These efforts are crucial for achieving sustainable water management and ensuring equitable access to safe drinking water across Kenya.

5.2 Sanitation Facilities

From 2016 to 2022, Kenya witnessed an increase in access to improved sanitation facilities from 65 per cent to 72 per cent, indicating significant progress in sanitation infrastructure. This improvement means that seven out of ten people in Kenya now have access to facilities that are crucial for maintaining hygiene and preventing disease. A number of households (12%) used Ventilated Improved Pit Latrines (VIPs). These latrines are designed to reduce odours and flies, making them a more sanitary option compared to traditional pit latrines (World Bank, 2021). About 34 per cent of the households used pit latrines slabs, which provide a safer and more hygienic alternative to basic pit latrines by including a slab that covers the pit, reducing the risk of contamination. Composting toilets, although used by only 0.1 per cent of households, are a sustainable option, converting waste into compost and reducing environmental impact (WHO, 2020). Rural-urban disparities were noted as 93 per cent of the urban population had access to improved sanitation, reflecting better infrastructure and investment in urban regions. However, only 58 per cent of the rural population had access to improved sanitation, highlighting a significant gap. Rural areas face challenges such as lower investment in infrastructure, geographic isolation, and socioeconomic barriers (UNICEF, 2021). Open defecation remains a problem, practiced by 5.0 per cent of households nationwide. The practice is more prevalent in rural areas (10%) compared to urban areas (1.0%), posing serious public health risks such as contamination of water sources and the spread of diseases (WHO, 2020). The increase in sewerage connections from 8.5 per cent in 2014 to 9.7 per cent in 2022 shows a slow but positive trend towards better public health infrastructure. Sewer systems are crucial for managing waste effectively, reducing the prevalence of water-borne diseases, and improving overall sanitation (UN-Habitat, 2022).

The findings align with Kenya's Vision 2030, which aims to provide equitable access to quality water and sanitation services. The progress also reflects efforts under the Kenya Environmental Sanitation and Hygiene Policy 2016-2030, which seeks to eliminate open defecation and improve sanitation in rural areas (Government of Kenya, 2016). These improvements contribute to Sustainable Development Goal Number six (SDG 6), which aims to ensure the availability and sustainable management of water and sanitation for all by 2030 (United Nations, 2015). The significant urban-rural divide suggests a need for targeted interventions in rural areas. Investments in rural sanitation infrastructure and community-led total sanitation programmes can help bridge this gap (World Bank, 2021). Addressing open defecation requires more than infrastructure; as it involves community engagement and behavioral change campaigns to promote the use of sanitary facilities (UNICEF, 2021). Encouraging the use of composting toilets and other sustainable sanitation options can mitigate environmental impact and provide long-term solutions, particularly in rural and peri-urban areas (WHO, 2020).

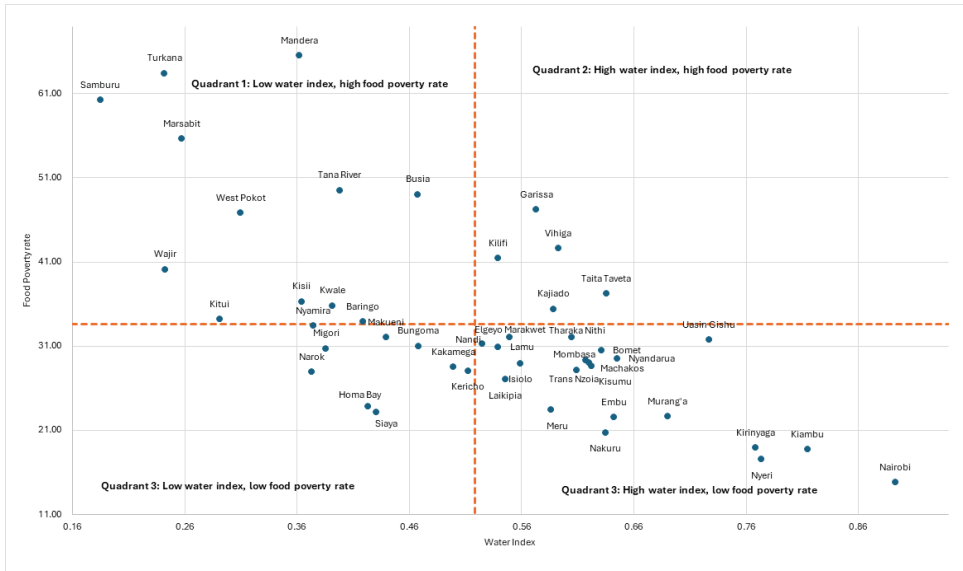
Some of the policy initiatives implemented by the Government of Kenya that have contributed to the improvement in sanitation infrastructure in Kenya include the Kenya Environmental Sanitation and Hygiene Policy 2016-2030, which seeks to Promote community-led total sanitation (CLTS) programmes, encourage the use of improved sanitation technologies such as VIP latrines and pit latrine slabs, and enhance rural sanitation infrastructure development. Despite progress, disparities persist between urban areas with 93 per cent access to improved sanitation, and rural areas at 58 per cent. These gaps highlight the unequal distribution of infrastructure and services, particularly in rural communities where open defecation remains a significant issue. To bridge these disparities, the government need to focus on enhancing investment in rural sanitation infrastructure, expanding community-led total sanitation programmes, promoting sustainable sanitation technologies such as composting toilets, strengthening monitoring systems, and fostering public-private partnerships for infrastructure development. These measures aim to improve sanitation coverage, reduce open defecation, and ultimately enhance public health outcomes across the country.

5.3 Relationship between Food Poverty and Water Index Score

There was a significant relationship between food poverty and the water index score, with a tendency towards high food poverty associated with lower water index scores ($p < 0.05$). This was in counties such as Samburu (0.18) Turkana (0.24), Wajir (0.24), Marsabit (0.26), and Kitui (0.29), which had high food poverty rates of 60.2, 63.4, 40.1, 55.6, and 34.2 per cent, respectively. This suggests that areas with higher food poverty tend to have poorer access to clean water and sanitation facilities, contributing to lower water index scores. Addressing water access issues could have profound impacts on health outcomes, economic development, and social equity in these regions. On the other hand, counties which had high water indexes such as Nairobi (0.89), Kiambu (0.81), Nyeri (0.77), Kirinyaga (0.77), and Uasin Gishu (0.73) exhibited lower food poverty scores of 14.8, 18.7, 17.5, 18.9, and 31.7 per cent, respectively. This highlights the importance of prioritizing investment in water infrastructure in regions with high food poverty. Improving water access and quality can be an effective strategy to reduce food poverty and enhance overall

wellbeing. The successful models of water management in counties such as Nairobi and Kiambu can be studied and potentially replicated in counties with higher food poverty and lower water index scores. This could involve adopting best practices in water resource management, sanitation, and distribution.

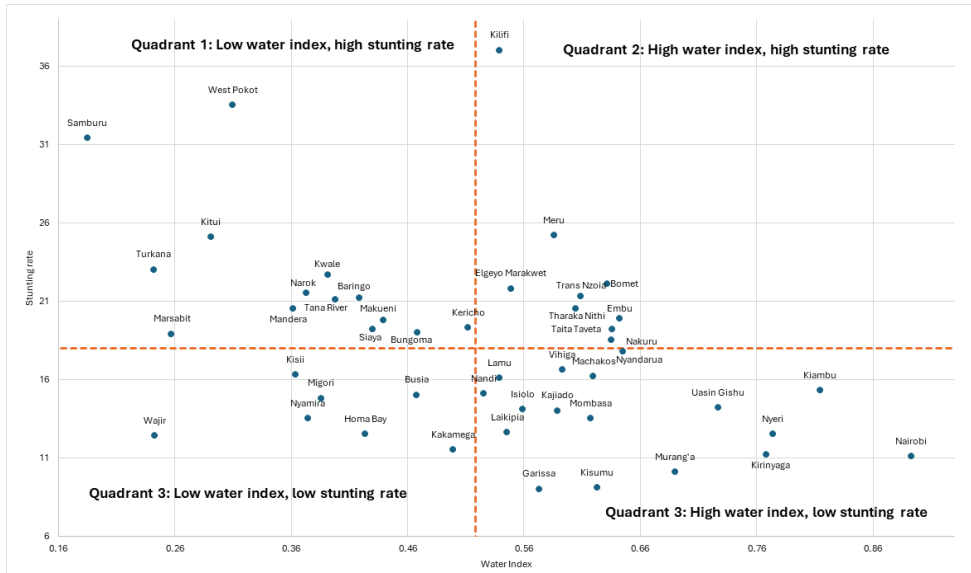
Figure 5.2: Relationship between food poverty and water index score by county



5.4 Relationship between Stunting and Water Sector Index

There was a significant relationship between stunting and the water index score, with a tendency towards a high stunting rate associated with lower water index scores ($p < 0.05$). This was the case for counties such as Samburu (0.18) Turkana (0.24), Wajir (0.24), Marsabit (0.26), and Kitui (0.29), which had stunting rates of 31.4, 23, 12.4, 18.9, and 25.1 per cent, respectively. Conversely, counties with high water index such as Nairobi (0.89), Kiambu (0.81), Nyeri (0.77), Kirinyaga (0.77), and Uasin Gishu (0.73) exhibited lower stunting rates of 14.8, 18.7, 17.5, 18.9, and 31.7 per cent, respectively. The findings suggest that improving water quality and access in counties with low water index scores is crucial for reducing high stunting rates. Targeted health and nutrition interventions, along with investments in water infrastructure, are necessary for counties such as Samburu, Turkana, Wajir, Marsabit, and Kitui. Adopting integrated approaches that combine water, health, and nutrition policies can help to achieve better health outcomes. Additionally, engaging local communities and considering broader socioeconomic factors can enhance the effectiveness of these interventions.

Figure 5.3 Relationship between water index score and stunting rates by county

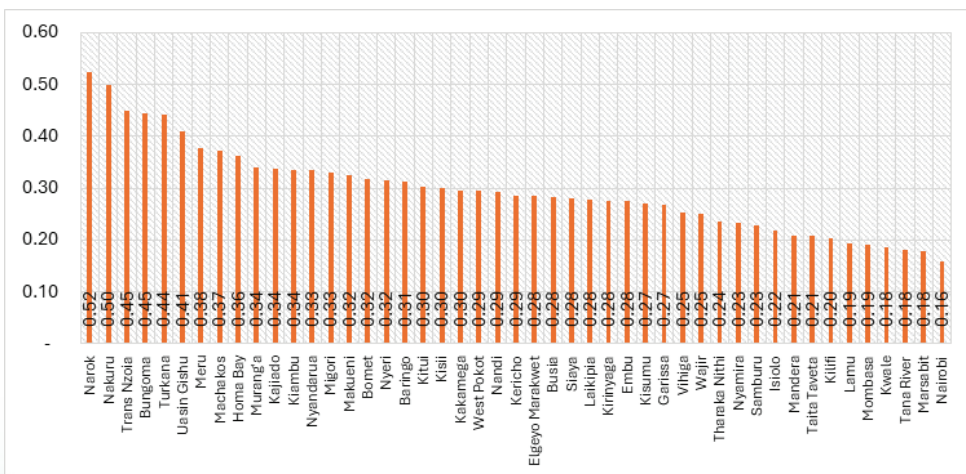


6

Agriculture Sector and Food Security and Nutrition in Kenya

The agriculture sector continues to play a critical role in Kenya’s economy accounting for 20 per cent of the Gross Domestic Product (GDP) (CBK, 2022). The sector recorded a low average national index of 0.30, ranging from 0.16 to 0.52. The index indicates that agricultural productivity in Kenya is suboptimal. This affects the country’s overall economic performance since agriculture is a major component of Kenya’s GDP and employs a large number of the population. With low agricultural productivity, the country would struggle to produce sufficient food to meet the needs of its growing population, leading to reliance on food imports and vulnerability to global food price fluctuations. The key indicators driving the agriculture sector performance include food consumption indicators, land ownership, and crops and livestock production volumes.

Figure 6.1: Agriculture sector food security and nutrition performance



6.1 Food Insecurity and Dietary Diversity

The prevalence of moderate or severe food insecurity population in the country, based on the Food Insecurity Experience Scale (FIES) increased from 52 per cent in 2016 to 60 per cent in 2020. This trend aligns with global concerns, particularly in Sub-Saharan Africa, where food insecurity has been exacerbated by climate change, economic instability, and political conflicts. This could be attributed to factors such as drought, inflation, and socio-political factors as significant contributors to increasing food insecurity. The findings on the Minimum Dietary Diversity for Women (MDD-W) revealed that only 49 per cent of women in Kenya met the minimum dietary diversity standard in 2022. Nearly half of the women did not consume a sufficiently diverse diet, which has significant implications for nutrition and health. This can be linked to nutritional deficiencies, particularly in micronutrients, which are essential for health and development. Inadequate dietary diversity is associated with higher risks of malnutrition, anaemia, and other health issues. Policy initiatives implemented to address the issue include the National Nutrition Action Plan (NNAP) 2018-2022, which aims to improve nutritional outcomes by addressing dietary diversity, particularly among vulnerable groups such as women and children. The plan includes education programmes on nutrition and dietary diversity and initiatives to fortify staple foods with essential nutrients. Home Grown School Feeding Programme also encourages the consumption of diverse, locally produced foods in school meals, promoting both dietary diversity and local agricultural production. While the interventions have been successful in addressing issues of food insecurity and dietary diversity, the coverage is still insufficient, due to limited outreach of education programmes, and sustainability issues due to fluctuations in funding. The link between agricultural policies and nutritional outcomes is still weak, leading to missed opportunities for integrated approaches. Policy alternatives could involve expanding and strengthening nutrition education through community health workers, implementing robust monitoring systems for food fortification, and promoting the cultivation of nutrient-rich crops by providing targeted agricultural extension services and market support. Programmes can also be expanded to include supplements where necessary. Promoting the cultivation and consumption of diverse food crops through agricultural policies that support smallholder farmers and diversify food production is also important.

6.2 Food Price Index and CPI

The food price index has consistently increased from 64.14 in 2014 to 143.26 in 2022. While this suggests rising food prices over the period, it also indicates inflationary pressures in the food market, thus affecting food affordability among many households in the country. The food CPI increased steadily from 155.44 in 2014 to 238.13 in 2018. This was a period of significant food price inflation. Households experienced high costs of food during the period. However, there was a notable decline between 2018 and 2019 indicating food affordability by consumers. However, gradual food inflation was also noted between 2019 and 2022 signaling the return of inflationary pressures. These trends mirror global patterns where food prices have been rising due to factors such as climate change, economic instability, and global

market dynamics. Persistent increases in food prices can exacerbate food insecurity by reducing the ability to afford nutritious food among low-income households. The consistent increase in the food price index aligns with theories of cost-push inflation, where rising costs of production inputs such as fuel, fertilizers, and labour drive up food prices. Interventions implemented by the government to address food price stability and food inflation include maintaining reserves of key staple foods such as maize to stabilize food prices during periods of scarcity. This policy helps buffer against inflationary pressures and ensures food affordability. The Agricultural Sector Development Strategy (ASDS) 2010-2020, also focuses on increasing productivity and improving market access for farmers, thereby helping to stabilize food prices through enhanced supply.

However, mechanisms to protect against global food price shocks are insufficient, and there is limited infrastructure for efficient storage and distribution to minimize post-harvest losses. Additionally, targeted subsidies or safety nets for the most vulnerable populations during high inflation periods are inadequate. Policy alternatives could include creating a strategic reserve fund to buffer against global food price shocks, investing in modern storage and distribution infrastructure, and developing social safety nets and cash transfer programmes targeting vulnerable populations during inflationary periods.

6.3 Crop Production

The crop production volumes showed varied trends. While maize production is crucial for food security, its production largely remained constant between 2013 and 2021, with peak production of about 3.99 million tonnes observed in 2019. Similar trends were noted for Irish potatoes and beans. Maize and beans are staple foods in many regions of the country, and crucial for food security. However, the stable trend might not be sufficient to meet the demands of a growing population. With the population increase, there is a risk of food shortages unless production is scaled up or alternative sources of food are introduced. The increasing trend in Irish potato production, from 1.7 million tonnes in 2013 to 2.1 million tonnes in 2021, is a positive sign suggesting that this crop could play a more significant role in food security and possibly in the agricultural economy. Encouraging further growth in potato farming could be beneficial, given its upward trend and potential as an alternative staple food.

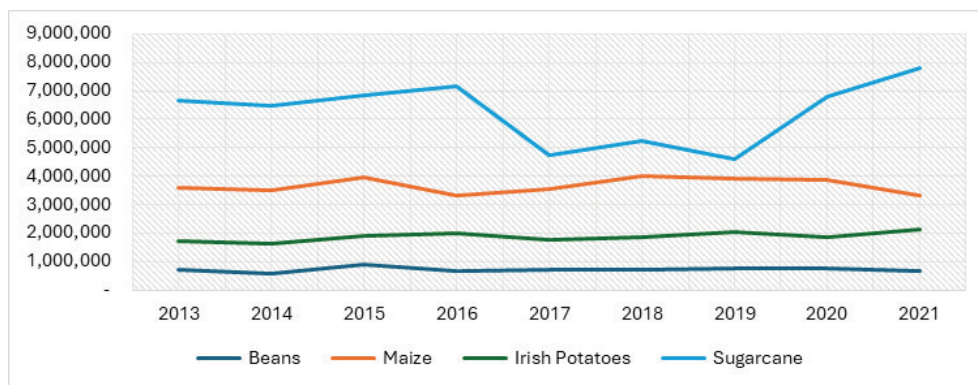
Sugarcane production declined between 2013 and 2017 before increasing from 4.7 million tonnes in 2017 to 7.8 million tonnes in 2021. The fluctuations indicate volatility in this sector, which might be due to various factors such as weather conditions, pest infestations, or economic challenges. The recent recovery in production is promising, but the industry needs to stabilize to ensure a consistent contribution to the economy and possibly for export purposes.

Policies aimed at enhancing crop production include providing subsidized seeds and inputs, investing in agricultural research, and extension services. Expansion of irrigation infrastructure like the Galana Kulalu food security project, which serves to reduce reliance on rain-fed agriculture, thereby stabilizing crop production volumes and mitigating the impact of droughts. However, the quality and availability of these

subsidized inputs are inconsistent, research investment is insufficient, and extension services are limited. Policy alternatives could enhance quality control for subsidized seeds, increase investment in agricultural research to improve crop varieties and farming practices, and strengthen extension services by employing more officers and providing them with adequate training and resources.

With an increasing population growth in Kenya, the demand for staple foods such as maize and beans will increase. The current stable trends might lead to shortages if not addressed. There should be efforts to boost productivity through improved farming techniques, better-quality seeds, and sustainable agricultural practices. Diversifying crops and increasing the production of Irish potatoes and other high-yield crops can help mitigate the risk of food insecurity. Promoting diversified diets can also improve nutrition. The agriculture sector's stability and growth are vital for Kenya's economy, providing employment and livelihoods for a large portion of the population. Ensuring stable and increased production of key food crops can contribute to economic stability.

Figure 6.2: Production of food crops (tonnes)



Source: KNBS (Various), Economic Survey

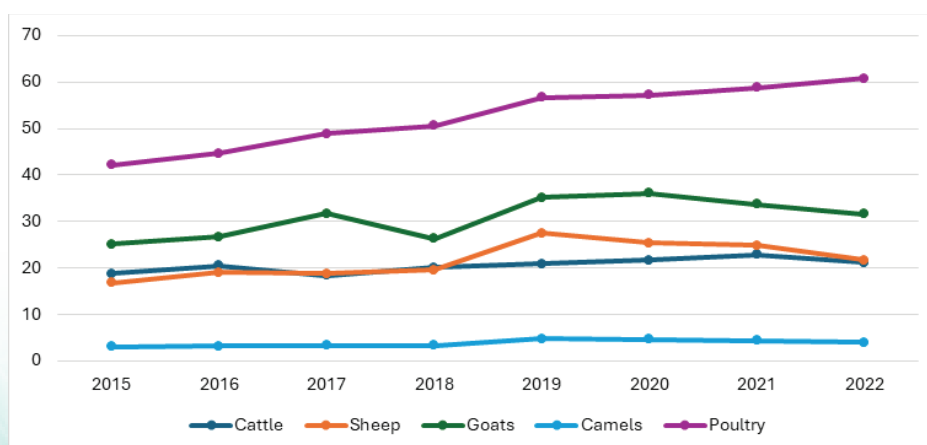
6.4 Livestock Production

Livestock production also exhibited varied trends. Poultry production showed a consistent and significant increase from 42.1 million in 2015 to 60.8 million in 2022, indicating a rising demand and production. This is a positive indicator of the availability of chicken meat and eggs, which are vital for nutrition. However, the production of cattle, sheep, goats, and camels remained relatively constant with increases of 13 per cent, 29 per cent, 26 per cent, and 32 per cent, respectively, between 2013 and 2022. Despite the positive trajectories, there were fluctuations in cattle, sheep, and goats' populations with slight declines noted between 2020 and 2022. This highlighted the need for strategies to stabilize these important food sources. Increasing poultry and cattle populations suggest economic opportunities for farmers, with potential benefits in income and contribution to the GDP. Sustainable livestock farming practices would be necessary to prevent environmental degradation due to increasing cattle and poultry populations. Kenya's increasing population will demand more livestock products, necessitating efficient and sustainable livestock management practices to ensure food security. Camels maintained the smallest

and most stable population with minor increases and slight stability towards 2022. Their stability is beneficial for ASAL regions where they provide essential nutrition and economic resilience. The growing poultry and cattle populations will ensure the availability of essential proteins, supporting better nutrition and health outcomes. However, declines in sheep and goat populations need to be addressed to maintain diverse dietary options, especially in rural areas. Policies targeting livestock production and management include the Kenya Livestock Insurance Programme (KLIP), which offers insurance to pastoralists to protect them against losses from drought, aiming to stabilize livestock populations and enhance resilience, and the National Livestock Policy that focuses on improving livestock breeds, animal health services, and market access, thus supporting sustainable growth in livestock production. These policies seem to have registered notable successes in enhancing livestock production in the country. However, veterinary services and disease control programmes are inadequate, support for the diversification of livestock breeds is limited, and there is insufficient infrastructure for livestock markets and processing facilities. Policy alternatives could establish mobile veterinary clinics, promote the diversification of livestock breeds through breeding programmes and subsidies, and invest in livestock markets and processing facilities equipped with modern technology.

Enhancing poultry farming through targeted support for technological advancements and improved breeding practices will help sustain the steady growth observed. For cattle, sheep, goats, and camels, where production remained stable but with moderate increases, interventions should focus on improving productivity through better breeding programmes, disease control, and infrastructure development to support value addition and market access. There is also a need to address challenges such as climate change impacts, land use conflicts, and access to finance and inputs for smallholder farmers, particularly in marginalized areas where camel and goat production are significant. Furthermore, policies should encourage sustainable farming practices to mitigate environmental degradation and promote resilience in the face of climate change.

Figure 6.3: Production volume by value chain (numbers, '000,000)



Source: KNBS (Various), Economic Survey

6.5 Mean Coping Strategies Index (CSI)

Kenya's Mean CSI increased from 18.9 in 2014 to 20.1 in 2022. This implies that Kenyan households can better cope with various shocks and stresses, such as economic downturns, food insecurity, health crises, and environmental disasters. This can be associated with improved livelihoods and standards of living among the population. It is also an indication of reduced vulnerabilities to economic and social risks. This could reflect the impact of government policies, development interventions, and social programmes whose aim is to improve household resilience and reduce poverty. This includes agriculture, healthcare, social safety nets, and employment generation initiatives. While improvements in the CSI are crucial for long-term development and sustainable growth, it is important to note that many households in Kenya continue to face challenges in coping with shocks and stresses. Therefore, there is a need for continued support and investment in social protection, infrastructure, healthcare, education, and employment opportunities to further improve resilience and wellbeing. A more resilient population is able to contribute to and benefit from economic growth, leading to broader social and economic stability.

6.6 Land Ownership

An assessment of land ownership by women sought to identify gender disparities in access to and control over land resources. Such disparities not only affect economic wellbeing and empowerment but also have significant implications on food security and nutrition. Women's access to and control over land directly impacts their ability to cultivate crops, raise livestock, and engage in other agricultural activities critical for household food production. Additionally, women often play a central role in managing household food resources and nutrition, making their access to land a crucial determinant of overall food security. About 27.2 per cent of women owned land either alone or jointly with their husbands in 2022. About 25 per cent of women owned agricultural land, and 7.0 per cent owned non-agricultural land. This indicates a significant gap in land ownership between men and women. Despite progress, the ownership percentage among women remains low compared to men. This is consistent with existing literature that highlights gender disparities in land ownership across Africa and globally (UN Women, 2013; Doss, 2018). The fact that 25 per cent of women own agricultural land suggests their role in agricultural production. This aligns with research that shows women's substantial contributions to agricultural production and food security in rural areas (FAO, 2011; Lastarria-Cornhiel, 2006). Women's ownership of agricultural land has been linked to improved agricultural productivity and household food security (Deininger and Jin, 2006). The results suggest a need for continued reform efforts in land policy to enhance gender equality in land ownership. Strengthening laws that protect and promote women's land rights is critical. Kenya has made strides in recognizing women's rights to land. For instance, the Land Reforms policies have guaranteed the right to property ownership for every person regardless of gender. Implementation of these policies has enhanced women's rights to land ownership, including joint ownership and legal reforms to ensure women's inheritance rights. Furthermore, Kenya's Women Empowerment Programme supports women's access to land and resources, empowering them to engage in productive agricultural activities. It is important to

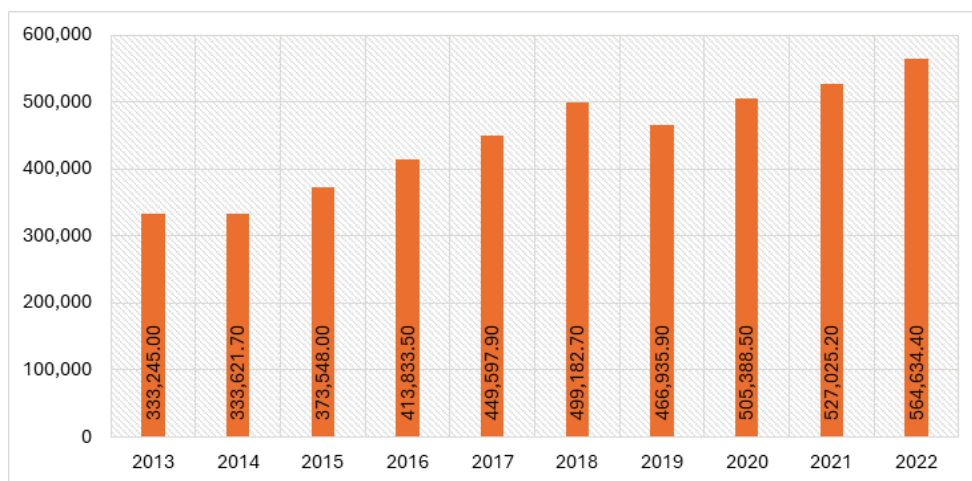
note that the implementation and enforcement of these laws have been uneven. The findings underscore the need for policy that effectively translates into practice at the community level. Interventions may include strengthening law enforcement through community-based monitoring, launching widespread awareness campaigns to inform women of their rights, and engaging community leaders in gender sensitivity training to promote acceptance of women's land ownership.

6.7 Value of Agricultural produce marketed

The value of agricultural produce marketed is a crucial economic metric that quantifies the total monetary worth of agricultural products sold or exchanged in Kenya for a given period. The metric encompasses a wide range of agricultural goods, including crops, livestock, and various commodities. The value of agricultural produce marketed revealed an increasing trend from 2013 to 2022, suggesting growth and expansion in the agriculture sector. Despite the overall increasing trend, there were fluctuations in the values from year to year with some years such as 2017, 2018, and 2022 showing more significant increases while others such as 2014, 2015, and 2019 revealed moderate increases. Given the role played by the agriculture sector in the country's GDP growth and in ensuring food and nutrition security, the trend shows growth in the agriculture sector, which is a crucial component of Kenya's economy. Kenya has made significant strides in enhancing agricultural value addition and promoting markets. Some of the initiatives in this area include the Kenya Agricultural Value Chain Enterprises Project (KAVES), which aims to increase the productivity and incomes of smallholder farmers through improved market access and value chain development. The Agri-business and Agro-industry Alliance also encourages value addition through agro-processing and improving the marketability and profitability of agricultural products. These policies support small and medium enterprises in the agriculture sector.

However, as the population grows, the demand for food and agricultural products will continue to rise. Therefore, long-term planning is crucial to ensure sustainable agricultural development. The country could focus on policies that promote sustainable agriculture, such as conservation agriculture, water management strategies, and climate-smart agricultural practices. While the increasing trend in the value of agricultural produce marketed in Kenya from 2014 to 2022 provides a positive outlook for the sector, it also highlights the need for continued policy support to sustain this growth, address challenges, and ensure inclusive development across the agricultural value chain. Future initiatives could involve developing agro-processing zones with necessary infrastructure, enhancing market information systems using mobile technology, and supporting SMEs through grants, low-interest loans, and business development services.

Figure 6.4: Value of agricultural produce marketed



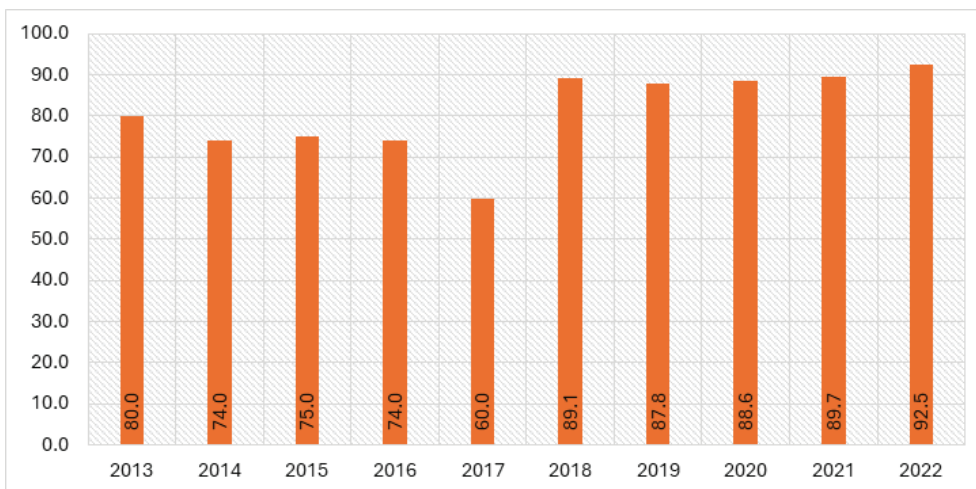
Source: KNBS (Various), Economic Survey

6.8 Self-Sufficiency Ratio

Self-Sufficiency Ratio (SSR) is expressed as a percentage and reflects a region's self-reliance in meeting its food and agricultural needs. The SSR indicates a sector's ability to produce enough of the food domestically to meet its own needs. Between 2014 and 2016, the SSR remained relatively stable on average at above 70 per cent but decreased to 60 per cent in 2017. This decline could be attributed to various factors such as adverse weather conditions (droughts or floods), pest outbreaks, or economic challenges affecting the agricultural sector. The ratio increased to above 90 per cent between 2017 and 2022 suggesting a recovery and improvement in domestic production capacity, thus reducing dependency on imports.

Kenya has implemented several policy initiatives to improve its Self-Sufficiency Ratio in agriculture and food production. Key efforts include significant investments in agricultural infrastructure and technology adoption to boost productivity and reduce post-harvest losses. Capacity building through farmer training and extension services has improved knowledge and skills, while policies to enhance market access and support agricultural trade have strengthened the agriculture sector. The country also focuses on diversification, resilience against climate change, and sustainable land management, supported by agricultural research and development. These measures led to an SSR increase to above 90 per cent between 2017 and 2022, demonstrating progress in enhancing domestic production capacity and reducing dependency on imports. Ongoing investment and policy support remain essential to sustain and further improve Kenya's food self-sufficiency. Continued investment is crucial to sustaining and further increasing self-sufficiency. Efforts should be focused on future challenges such as Kenya's growing population, ensuring sustainability through focusing on soil health, water conservation, and biodiversity conservation, and policies that support farmers in accessing markets.

Figure 6.5: Self-sufficiency ratio



Source: KNBS (Various), Economic Survey

6.9 Import Dependency Ratio

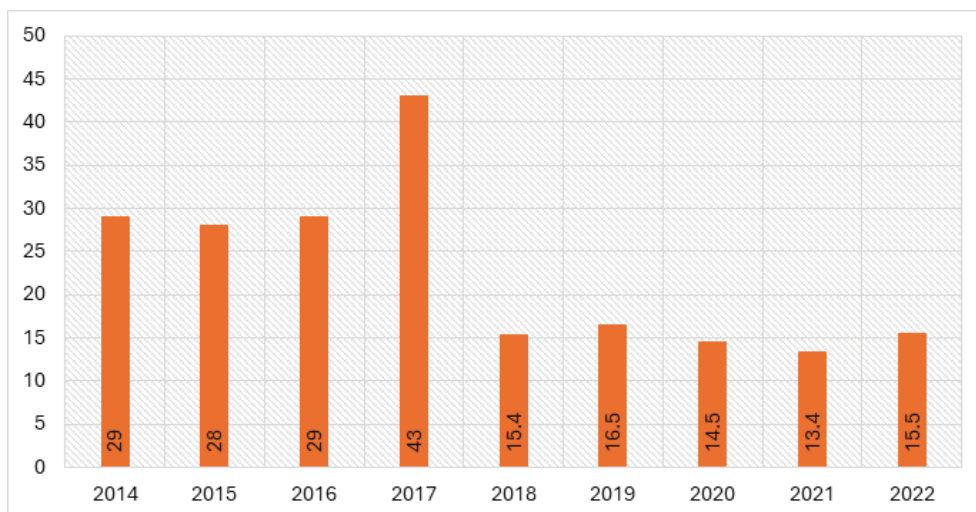
The import dependency ratio remained relatively stable between 2014 and 2016 at 29 per cent before increasing to 43 per cent in 2017. This indicates a spike in reliance on imports to meet the increasing demand, likely due to a decrease in domestic production capacity during the same period. However, the import dependency ratio reduced steadily from 2018 to 2022 with values falling to 15 per cent, thus suggesting improvements in the ability to meet domestic food demand through increased production.

Kenya has implemented a variety of policy initiatives to reduce import dependency and boost domestic production. These include support for the manufacturing sector through incentives and subsidies, industrialization policies aimed at enhancing local industries and infrastructure, adjustments to trade policies to favour local producers, investments in agriculture to increase food security and reduce food imports, support for SMEs through access to finance and business development services, and efforts to promote research and development. These initiatives collectively aim to make Kenya's economy more self-reliant, competitive, and resilient against external economic shocks. However, challenges remain in infrastructure development, access to finance for SMEs, skills development, effective policy implementation, research and development, market access, and agricultural diversification. Addressing these gaps is essential to create a more competitive and resilient economy, capable of reducing import reliance sustainably and fostering long-term economic growth.

Policy interventions and improvements in the agricultural sector might have contributed to this reduction. These could include investments in irrigation, improved agricultural practices, better access to agricultural inputs, and supportive policies for smallholder farmers. Continued investment is crucial to sustain and further improve domestic production capacity. A lower import dependency ratio enhances

food security by reducing reliance on external sources for food supply. This stability in food supply helps stabilize prices and ensures availability during times of global market volatility.

Figure 6.6: Kenya's import dependency ratio



Source: KNBS (Various), Economic Survey

6.10 Per Caput Calorific Daily Supply

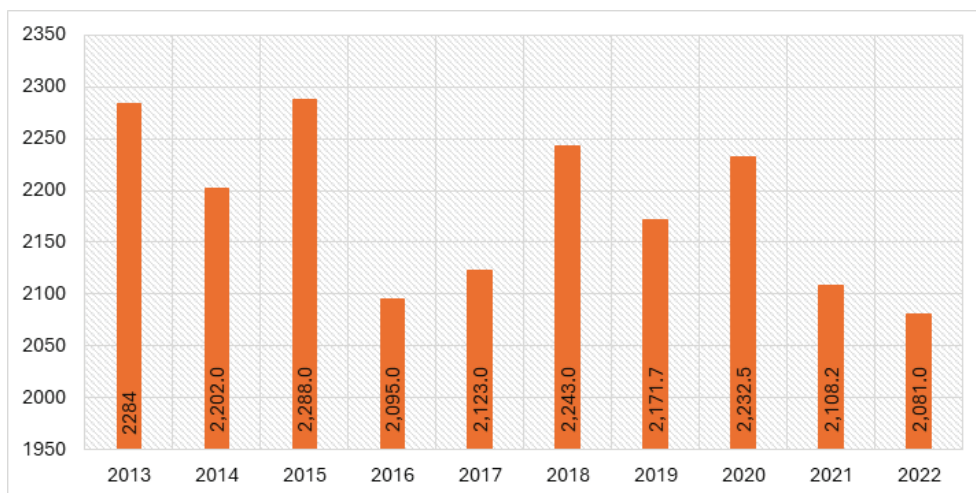
Per Caput Calorific Daily Supply, often referred to as 'Per Capita Caloric Intake' is a measure that assesses the average daily supply of calories or energy available for each person within a specific population. The per capita calorific intake has declined over the years with a decreasing trend between 2015 and 2016, followed by a slight increase between 2016 and 2018. Subsequently, the calorific intake reduced from 2232 kcal/day in 2019 to 2081 kcal/day in 2022.

Kenya has implemented a range of specific policy initiatives to combat the declining trend in per capita calorific intake and enhance food security. Key initiatives include the National Food and Nutrition Security Policy, which promotes sustainable agriculture and ensures access to nutritious food. Climate-smart agricultural initiatives, irrigation development, and food fortification programmes have been prioritized to improve crop yields and address nutrient deficiencies. The government has also implemented targeted nutrition programmes for vulnerable groups and school feeding programmes to enhance children's nutrition. Safety net programmes, including cash transfers and food assistance, further support vulnerable households during economic shocks. These initiatives collectively aim to improve food security and nutrition outcomes across Kenya, ensuring access to adequate and diverse diets for all citizens.

Nonetheless, the declining trend suggests that current policies might not be sufficient to maintain or increase food security and nutritional standards. Policies should focus on ensuring that the population has access to an adequate and diverse diet. To achieve this, strengthening agricultural production and productivity is crucial. This

includes investing in sustainable agriculture, irrigation, and improving crop yields to ensure food availability. Enhancing public health programmes that promote nutrition, especially among vulnerable populations such as children and pregnant women is also crucial. Other measures include promoting nutritional education and awareness to encourage healthier food choices and consumption habits and strengthening safety net programmes to protect vulnerable groups during economic shocks or food price fluctuations.

Figure 6.7: Per caput daily supply

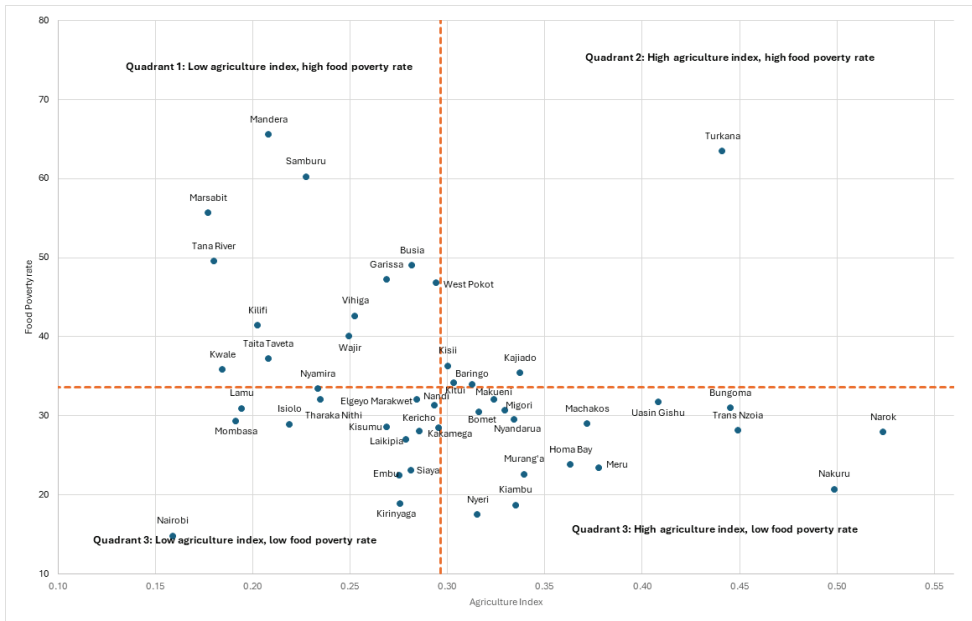


Source: KNBS (Various), Economic Survey

6.11 Relationship between Food Poverty and Agriculture Index

The relationship between food poverty and the agriculture index was not statistically significant ($p=0.088$). Counties with high agricultural indexes exhibited moderate food poverty rates. This included counties such as Nakuru, Narok, and Trans Nzoia with higher agriculture scores (0.50-0.52) and moderate food poverty rates (20.7%-31.0%). This suggests that agricultural productivity is relatively high, but food poverty remains a concern, albeit less severe compared to other counties. However, urban counties like Nairobi, and Mombasa exhibited low agricultural index scores of 0.16 and 0.19, respectively, and relatively low food poverty rates of 14.8 per cent and 29.3 per cent, respectively. Urban counties typically have lower agriculture scores due to limited agricultural activities and reliance on trade and services. Food poverty rates can be lower due to better access to diverse economic opportunities and services. ASAL counties such as Turkana, Garissa, and Mandera had low agriculture scores (0.18-0.44) and very high food poverty rates (46.8%-65.5%). This could be attributed to the challenges related to climate and water scarcity, which severely limit agricultural productivity. This results in higher food poverty rates due to low food production and limited income-generating opportunities. Counties such as Marsabit and Wajir exhibited moderate agriculture index scores (0.18-0.25) and varied food poverty rates (40.1%-55.6%). While these counties face similar challenges to other ASAL counties, they have slightly better agricultural conditions, influencing slightly lower but still high food poverty rates.

Figure 6.8: Relationship between food poverty and agriculture index by county

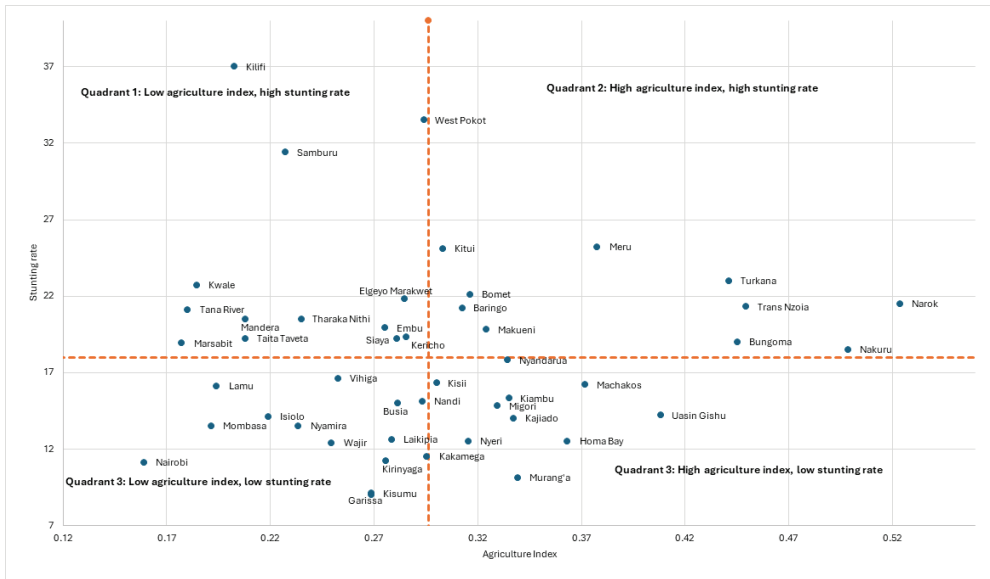


Source: Authors' computation

6.12 Relationship between Stunting and Agriculture Index

The relationship between stunting and the agriculture index was not statistically significant ($p=0.929$). Agricultural Counties such as Narok, Nakuru, and Trans Nzoia had higher agriculture scores (0.45-0.52) and varying levels of stunting rates (18.5%-25.2%). These counties generally have better agricultural productivity, which may contribute to improved access to nutritious food and lower stunting rates. Counties such as Meru, Machakos, and Bomet had moderate agriculture scores (0.32-0.38) and varying stunting rates (16.2%-22.1%). These counties also benefit from agricultural activities, but other factors such as poverty, healthcare, and access to clean water may have influenced stunting rates. Urban counties, for example, Nairobi, with a low agriculture index of 0.16, have a relatively low stunting rate of 11.1 per cent. This could be attributed to the fact that urban counties rely less on agriculture and more on non-agricultural economic activities, leading to generally lower stunting rates. ASAL counties, for example, Marsabit, Tana River, and Mandera had low agriculture index (0.18-0.25) and high stunting rates (18%-37%). Such counties face challenges due to climatic conditions, limiting agricultural productivity hence contributing to high stunting rates.

Figure 6.9: Relationship between agriculture index and stunting by county



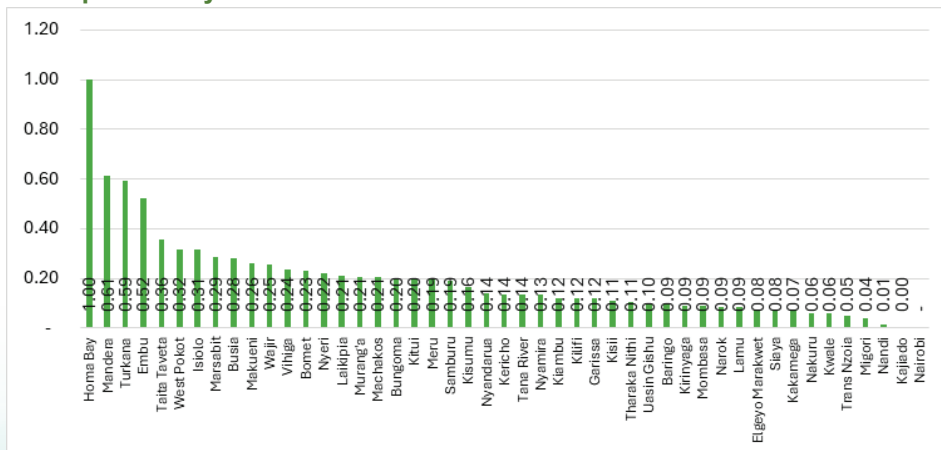
Source: Authors' computation

7

Social Protection Sector and Food Security and Nutrition in Kenya

Social protection programmes such as food distribution, grants, and cash transfers play a significant role in addressing food security and nutrition challenges in Kenya. The sector recorded a low national average index of 0.20. This reveals that the level of social protection provided to the population is still very low and a large portion of the population does not have access to basic social safety nets such as healthcare, education, unemployment benefits, or social assistance. It also reveals high levels of vulnerability as many individuals and families are likely to be highly vulnerable to economic shocks, health crises, and other risks. This lack of social protection can exacerbate poverty and inequality, as those who are most in need have little support. The key indicators driving the social protection sector performance include cash transfers and safety net programmes that help stabilize and enhance food access.

Figure 7.1: Social protection sector food security and nutrition index performance per county



7.1 Cash Transfers and Safety Net Programme

Social protection makes a significant contribution to the four dimensions of food security; food availability, food access, food utilization, and food stability. Social protection plays a crucial role in addressing food and nutrition security by supporting households in various dimensions. Cash transfers and food vouchers help stabilize and enhance food access. These transfers enable households to consume more and diverse food, contributing to better nutrition. Nationally, only 5.0 per cent of households received government cash transfers in 2022, highlighting the need for expanded social protection measures. The Hunger Safety Net Programme (HSNP) is a government-led and financed safety net programme, that supports some of the most vulnerable and poor households in the northern counties of Kenya including Turkana, Marsabit, Mandera, and Wajir. In the 2021/22 financial year, a total of 2.688 billion was disbursed through the HSNP programme. However, the amount of funds disbursed reduced in 2022/23 to 984 million. This meant that fewer people received support through the HSNP. This could potentially leave many vulnerable households without the financial assistance they depend on. The reduction could increase vulnerability among those who were previously receiving support, especially during times of economic hardship and natural disasters (droughts and floods) in the region. A lower budget might affect the quality and availability of services provided under the programme, potentially impacting its overall effectiveness.

Nationally, about 17 per cent of households received cash transfers or social assistance from the government, friends, and relatives in 2022. The proportion of households that received cash transfers from the government was 11 per cent, while that of households that received cash transfers from friends, relatives, and neighbours was 6.0 per cent. This shows that a significant portion of the population depends on government support for their livelihoods. The government's cash transfer programmes are a critical component of the social safety net, especially for vulnerable groups, and any changes in these programmes could have far-reaching implications. The 6.0 per cent of households that received cash transfers from friends, relatives, and neighbours highlights the importance of informal support networks in fostering strong communities and promoting resilience in times of economic hardship. Therefore, it is important to ensure the sustainability of cash transfers for long-term poverty reduction.

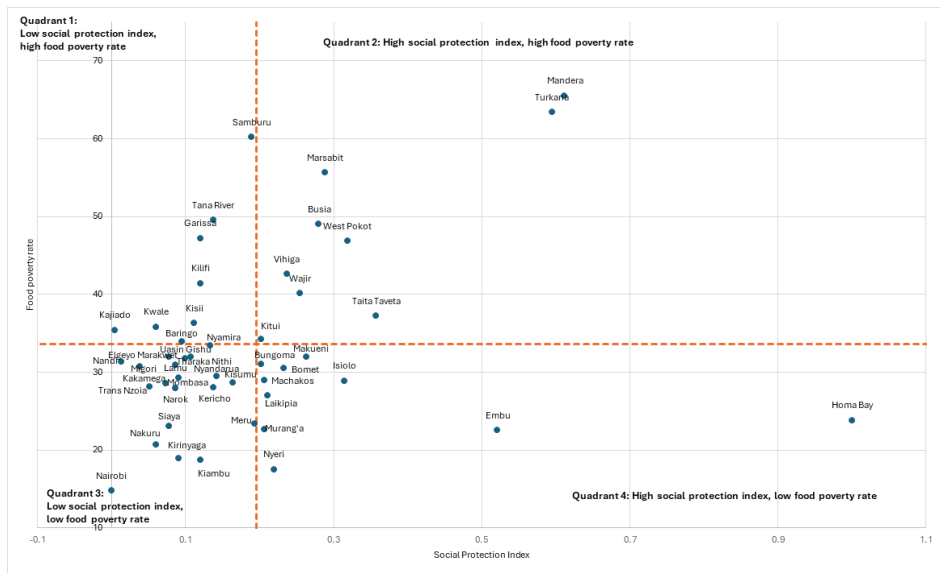
7.2 Relationship between Social Protection Index and Food Poverty

There was a significant relationship between food poverty and the social protection index, with a tendency towards high food poverty associated with a lower social protection index ($p=0.040$). ASAL counties generally reported higher food poverty rates, with Mandera and Turkana having the highest rates of 65.5 per cent and 63.4 per cent, respectively. While the social protection scores vary, many ASAL counties demonstrated moderate scores, indicating some level of social protection, but not as high as other regions. These counties face significant challenges related to food insecurity due to their arid and semi-arid conditions and targeted social protection

programmes would help support vulnerable groups in the region. Agricultural counties such as Trans-Nzoia, Uasin-Gishu, Nakuru, and Narok revealed low food poverty rates ranging from 20 per cent to 31 per cent, and low social protection index ranging from 0.05 to 0.09. This indicates that a smaller proportion of their population faces challenges in accessing adequate and nutritious food. These counties are known for their significant agricultural activities. They produce a substantial amount of food crops, which contributes to better food availability and access locally. Agricultural activities provide income and employment opportunities, which might improve food security for households. The findings suggest a need to balance investments between agricultural development and social protection programmes. While food poverty rates are low, social protection measures can still benefit vulnerable populations. There could be an opportunity to design targeted social protection programmes that support specific vulnerable groups – for example, the elderly, disabled, or those in remote areas.

Urban counties such as Nairobi and Mombasa had low food poverty rates of 14.8 per cent and 29.3 per cent, respectively, which could be due to better economic opportunities and infrastructure. However, despite the low food poverty rate, the counties demonstrated low social protection scores below 0.1, suggesting unique economic and social conditions.

Figure 7.2: Relationship between social protection index and food poverty by county



Source: Authors' computation

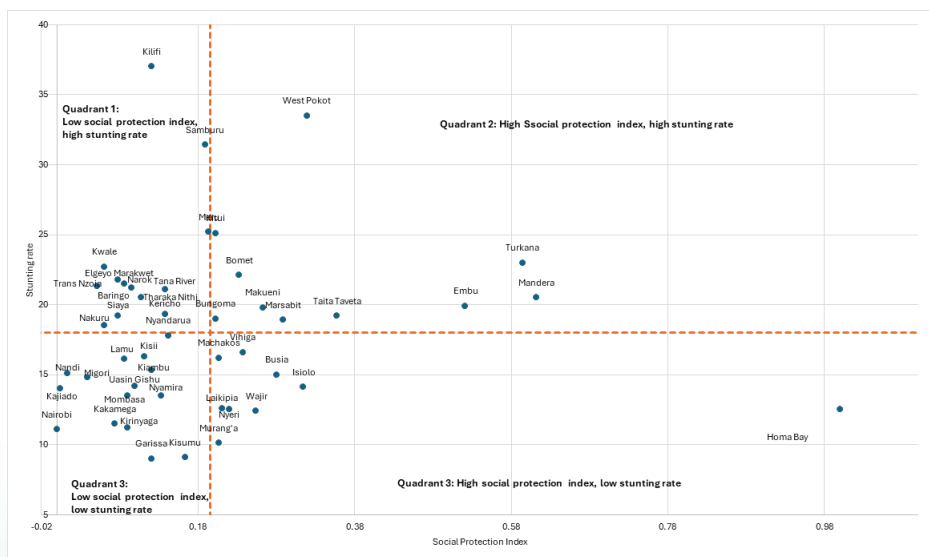
The low social protection scores indicate that social protection programmes, such as cash transfers, food assistance, and other safety nets, are not well-developed or accessible in these urban areas. In addition, implementing effective social protection programmes in urban settings can be challenging due to the high cost of living,

population density, and mobility of residents. A significant portion of the population in urban areas is engaged in the informal sector, which may make them less visible and harder to reach with formal social protection programmes. Therefore, there is a need to enhance social protection programmes tailored to the unique challenges of urban poverty, such as targeting vulnerable groups in the informal sector.

7.3 Relationship between Stunting and Social Protection Index

The relationship between stunting and the social protection index was not statistically significant ($p=0.673$). The social protection index varied significantly across ASAL counties with counties such as Mandera (0.61) and Turkana (0.59) having high social protection scores, while others such as Tana River (0.14) and Baringo (0.09) had lower scores. Stunting levels in arid counties were relatively high, with West Pokot at 33.5 per cent, Samburu at 31.4 per cent, and Turkana at 23 per cent. Garissa had the lowest stunting level among arid counties at 9.0 per cent. Urban counties – Nairobi and Mombasa – had low social protection scores and low stunting levels of 11.1 per cent and 13.5 percent, respectively, indicating that the urban environment likely provides better access to healthcare and nutrition, hence reducing stunting. Agricultural counties such as Uasin Gishu, Kiambu, and Narok counties showed a low social protection index (0.05-0.12) and low stunting levels ranging from 14.2 per cent to 21.5 per cent. This suggests that agricultural productivity and local economic conditions may play a significant role in child nutrition and health outcomes. Continued support of agricultural productivity through subsidies, training, and infrastructure improvements can help in ensuring that these efforts are sustainable in the long term.

Figure 7.3: Relationship between stunting and social protection index by county



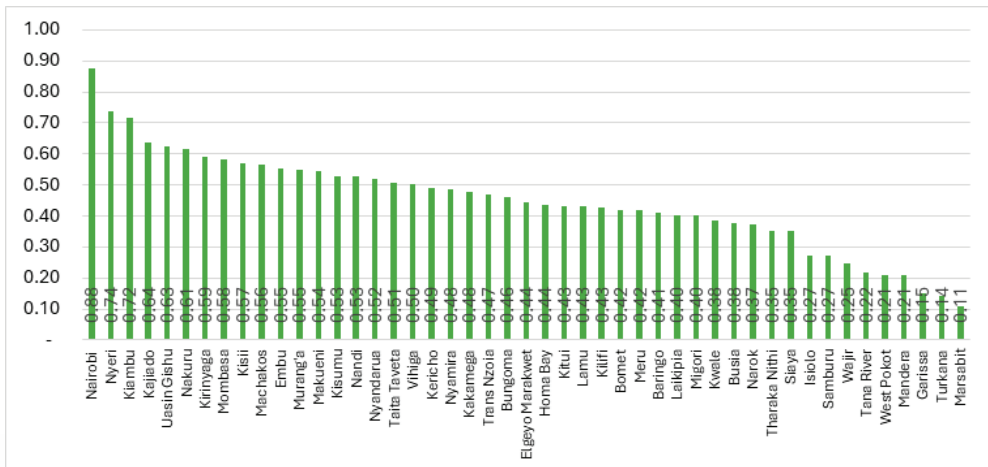
Source: Authors' computation

8

Education Sector and Food Security and Nutrition in Kenya

The education sector is key in the implementation of the Framework for harmonizing nutrition indicators in Kenya. The sector recorded a moderate national average score of 0.45 ranging from 0.11 to 0.88. The wide range (0.11 to 0.88) suggests significant disparities in the quality of education across different regions or institutions. Some areas or schools are performing exceptionally well, while others are lagging considerably. The key indicators driving the education sector performance include educational attainment rate, school attendance rates, and participation in school meal programmes.

Figure 8.1: Education sector food security and nutrition performance



8.1 Educational Attainment

Formal education in Kenya is categorized into pre-primary, primary, secondary, and tertiary levels. Educational attainment improved steadily between 2003 and 2022 with the proportion of people aged six (6) years and above without education reducing from 23 per cent to 13 per cent among females, and 16 per cent to 10 per cent among males. Despite the improvement, the proportion of men and women without education remains high. This indicates a critical need for interventions in early childhood education. Strategies might include increasing access to pre-primary education and implementing awareness programmes to emphasize the importance of early education. In 2022, the proportion of females with more than secondary school education was 11.5 per cent, which was higher in urban areas (22.4%) compared to rural areas (6.0%). People in the highest wealth quintile reported the highest numbers of females with more than secondary school education (32.9%) while those in the lowest wealth quintile reported the smallest proportion of females with more than secondary school education (0.5%). The males with more than secondary school education were more (12.8%), which was highest among males in the highest wealth quintile (37.5%) as compared to those in the lowest wealth quintile (1.2%). About 24.2 per cent of men in rural areas had more than secondary school education, as compared to 11.7 per cent of those in rural areas. People living in urban areas had a higher median number of years in education compared to those in rural areas. It is important to note that among boys and girls aged between six (6) and nine (9) years, 37 per cent of girls and 40 per cent of boys had no education at all.

The Government of Kenya has implemented policies such as Free Primary Education (FPE) and Free Secondary Education (FSE) to enhance educational attainment, particularly among marginalized populations. Despite improvements, significant gender disparities persist, especially in higher education access for women in rural and low-income areas. Challenges include cultural barriers, inadequate infrastructure in rural schools, and limited resources for low-income families. Efforts should be intensified to remove barriers to education for girls, for example, by addressing cultural norms, providing safe school environments, and ensuring access to sanitary facilities. The significant differences in educational attainment between urban and rural areas highlight the need for more equitable resource allocation. This includes building more schools, improving infrastructure, and incentivizing teachers to work in rural areas. The stark differences in educational attainment between the highest and lowest wealth quintiles suggest the need for targeted support for low-income families. Policies could include scholarships, school feeding programmes, provision of school supplies, and conditional cash transfers to keep children in school. Increasing the proportion of students completing secondary school and higher education should be a priority. This can involve expanding secondary schools, providing vocational training opportunities, and ensuring pathways to higher education for all socioeconomic groups.

8.2 School Attendance

The net attendance ratio (NAR) for primary school children aged 6-13 years improved from 85 per cent in 2014 to 89 per cent in 2022. The NAR for primary school was

higher for girls (90%) than boys (87%). The net attendance ratio for secondary school children in 2022 was 59 per cent. The increase in the net attendance ratio for primary school children is a positive development, indicating that more children are attending school regularly. The higher attendance rate for girls suggests progress towards gender parity in primary education. The relatively low NAR for secondary school children (59%) indicates a significant drop-off after primary school. This highlights the need for policies and interventions aimed at improving transition rates from primary to secondary school and retaining students in secondary school. However, the Gross Attendance Ratios (GAR) for primary schools in rural areas was higher (108%) compared to those in urban areas (104%). The high GARs implied that the system had both underage and overage learners. The higher GAR in rural areas for primary schools suggests the presence of both underage and overage learners, which could be due to late school entry, repetition of grades, or early enrollment. This situation calls for better age-appropriate enrollment policies and monitoring. The differences in GARs between urban and rural areas is an indication of ongoing disparities that need to be addressed. Ensuring equitable access to quality education in both settings is crucial. The GAR for secondary schools was slightly higher for girls (84%) compared to boys (81%), but the figures suggest that a significant number of children aged 14-17 were not in school.

The Government of Kenya has implemented Free Primary Education (FPE) and Free Secondary Education (FSE) policies to enhance school attendance. This is reflected in improved Net Attendance Ratios (NAR) for primary school children from 85 per cent in 2014 to 89 per cent in 2022. Despite these gains, disparities persist, particularly in secondary school, where the NAR was 59 per cent. The challenges include gender disparities favouring girls in primary school but showing gaps in secondary school attendance, especially in rural areas. The Gross Attendance Ratios (GAR) indicate higher enrollment rates in rural primary schools compared to urban areas, suggesting age-appropriate enrollment issues. The government's focus on expanding school infrastructure and promoting secondary school transition and retention programmes aims to address these gaps, but more targeted efforts are needed to ensure equitable access and improve overall educational outcomes across the country.

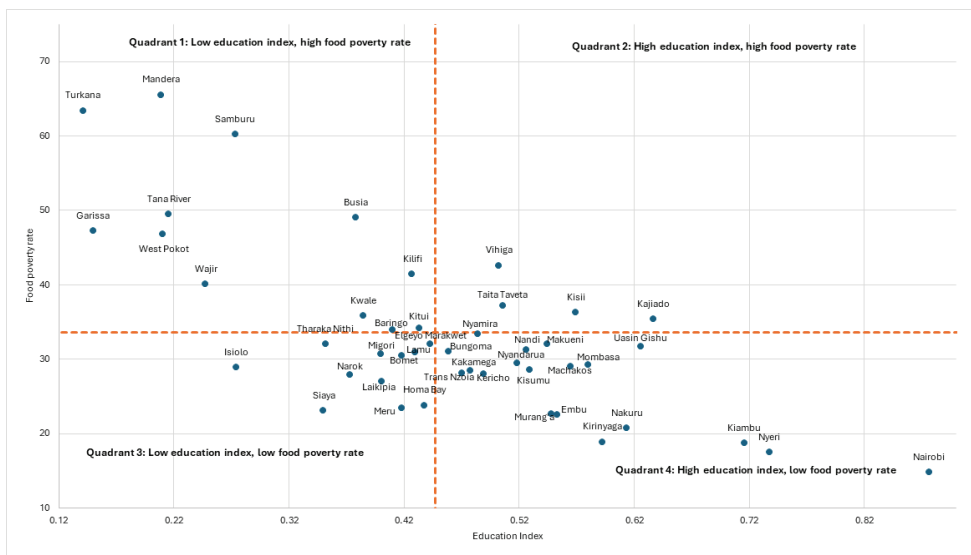
8.3 School Meals Programmes

School feeding programmes help in retaining children in school by reducing absenteeism and improving performance. In Kenya, only 20 per cent of learners were enrolled in schools offering school feeding programmes in 2016. Despite the government's implementation of the National School Meals and Nutrition Strategy and promotion of Home-Grown School Feeding Programmes, coverage remains limited, particularly in rural and vulnerable communities. To address this gap, initiatives should focus on scaling up programme coverage to reach more schools and children across the country. Enhancing the effectiveness of existing programmes through regular assessments and community involvement is crucial to ensuring that school feeding contributes effectively to educational outcomes and nutritional needs. Partnering with international organizations and donors can also provide additional resources to expand and sustain these initiatives, thereby improving overall educational equity and child development in Kenya.

8.4 Relationship between Food Poverty and Education Index

There was a significant relationship between food poverty and the education index, with a tendency towards high educational attainment associated with lower food poverty rates ($p < 0.05$). Counties such as Nairobi, Nyeri, and Kiambu, which reported the highest education scores ranging from 0.71 to 0.88, also reported the lowest food poverty scores ranging from 14.8 per cent to 18.7 per cent. The counties are among the more economically developed counties in Kenya, with higher levels of economic development generally leading to better infrastructure, including schools, healthcare, and social services, which contribute to higher educational scores and lower food poverty rates. They also have higher average income levels compared to other counties. Higher household incomes enable families to invest more in education and afford better nutrition, thereby reducing food poverty.

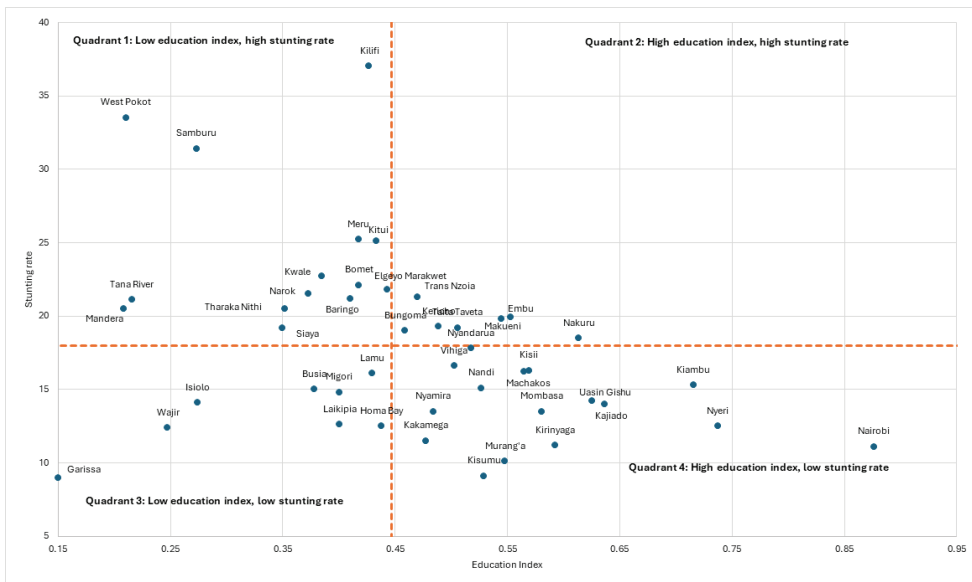
Figure 8.2: The relationship between food poverty and education index



8.5 Relationship between stunting and education index

There was a significant relationship between the levels of stunting and the education index, with a tendency towards high educational attainment associated with lower stunting levels ($p=0.011$). Counties with the highest education index such as Nairobi (0.88), Nyeri (0.74), Kiambu (0.71), and Uasin Gishu (0.62) exhibited the lowest proportion of stunted children ranging from 11.1 percent to 15.3 per cent. The socioeconomic status of these counties as reflected by higher household incomes, better access to healthcare, improved sanitation, and better overall nutrition contributes to lower rates of stunting among children. Conversely, counties such as West Pokot, Samburu, and Turkana, which reported low education index (0.14-0.27) reported high stunting prevalence ranging from 23 per cent to 34 per cent). These counties often experience higher levels of poverty and food insecurity, which limit access to nutritious foods and contribute to higher rates of stunting. The gender inequalities and cultural practices often practiced further restrict women's access to education and decision-making power within households, affecting children's nutrition and health.

Figure 8.3: The relationship between stunting and education index



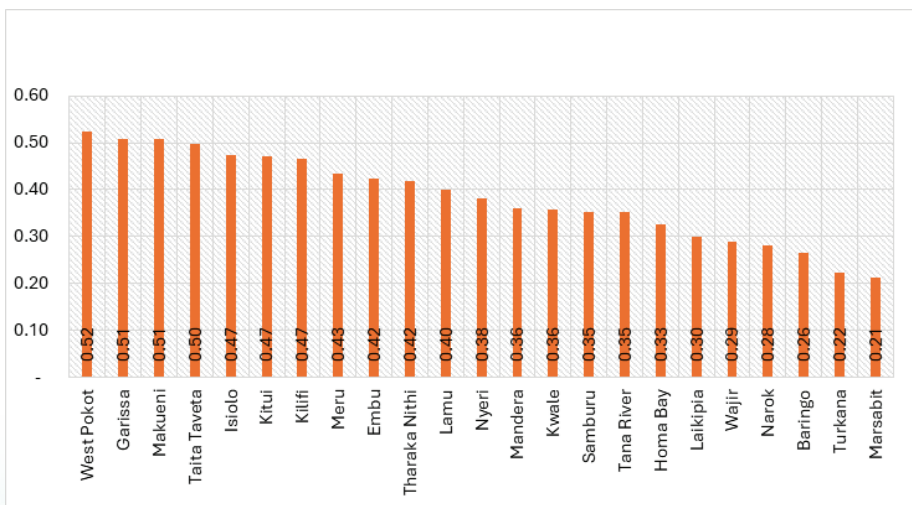
Source: Authors' computation

9

The Environment Sector and Food Security and Nutrition in Kenya

The NDMA index offers crucial insights into the environmental conditions directly impacting food security and nutrition across the 23 ASAL counties in Kenya. The average national index for the NDMA pillar was 0.38, ranging from 0.21 to 0.52. These scores indicate varying levels of vulnerability to environmental shocks such as droughts and floods, highlighting the need for targeted interventions and resource allocation. The key indicators driving the environment sector performance include food consumption and nutrition indicators such as household milk production, household milk consumption, the proportion of children under five (5) years at risk of malnutrition, and reduced coping strategy index (rCSI). Others include livestock and agricultural conditions such as the average vegetation condition index (VCI) and terms of trade.

Figure 9.1: NDMA food security and nutrition performance



9.1 Food Consumption and Nutrition Status

The NDMA assesses the milk production and consumption in the 23 ASAL counties. Milk is a rich source of essential nutrients such as calcium, protein, vitamins (A, B12, D), and minerals, which are vital for growth, bone health, and overall development, especially in children. The average milk production in the 23 counties declined from 2.6 litres per household in 2018 to 1.8 litres per household in 2022. Similarly, household milk consumption decreased from 1.54 litres per household in 2018 to 1.02 litres per household in 2022, thus affecting pastoral communities that rely on milk not only for nutrition but also as a source of income through sales. Reduced household milk consumption from 1.54 liters per household in 2018 to 1.02 liters per household in 2022 exacerbates nutritional challenges among pastoralists, especially children and pregnant women who depend on milk for essential nutrients. Given that milk is a vital source of protein, calcium, vitamins (A, B12, D), and minerals are essential for growth, bone health, and overall wellbeing, particularly in children, the decline in milk consumption can lead to increased malnutrition and micronutrient deficiencies among pastoral communities. Poor nutrition further impacts the health and productivity of both livestock and community members, perpetuating a cycle of vulnerability and poverty.

The proportion of children under five (5) years at risk of malnutrition as measured by Mid-upper arm circumference (MUAC) remained relatively constant throughout the period, averaging 10 per cent. This indicates a persistent level of malnutrition risk among young children in pastoral communities. Malnutrition in early childhood can lead to stunted growth, compromised immune systems, and developmental delays, affecting long-term health and productivity. Also, the population in need of assistance reduced from 246,000 in 2019 to 89,000 in 2020, before increasing to 290,000 in 2022. These fluctuations reflect the variable impact of climate shocks – such as droughts – on food security and livelihoods in pastoral areas. The increase in 2022 suggests heightened vulnerability due to climatic factors, which impact food availability and access. The average Reduced Coping Strategy Index (rCSI) for the 23 counties reduced from 9.49 in 2018 to 7.94 in 2022. This indicates a reduction in the use of stress and crisis coping mechanisms. However, it could also imply that households are experiencing more severe food insecurity, as they exhaust coping mechanisms and become more vulnerable to shocks.

Specific policy initiatives by the Government of Kenya on food consumption and nutrition status include efforts to strengthen nutrition-specific interventions in ASALs, for example, supplementary feeding programmes, and nutrition education. The government also promotes sustainable agriculture and livestock management practices to enhance food production and income stability, particularly in pastoral communities, which are heavily reliant on milk. This is entrenched in the role of the National Drought Management Authority (NDMA), which coordinates efforts of various stakeholders including government agencies to ensure a cohesive approach to address the problem of food security in Kenya's ASAL counties. Improving access to water and implementing pasture management strategies are additional measures aimed at mitigating the impact of climate variability on both livestock and food security. Social protection programmes are expanded to target ASAL counties during periods of food insecurity, aiming to build community resilience. However, a significant gap

remains in sustaining and scaling these interventions effectively across all ASAL regions, which are consistently affected by climatic shocks.

Food security and nutrition interventions such as strengthening nutrition-specific interventions targeting children under five (5) years and pregnant women in ASALs, such as supplementary feeding programmes and nutrition education. Promotion of sustainable agriculture and livestock management practices to enhance food production and income stability. Improving access to water and pasture management strategies to mitigate the impact of climate variability on livestock and food security. Social protection strategies including expanding social protection programmes targeting ASALs, especially during periods of food insecurity can help build community resilience. Communities should also be supported to diversify livelihoods, improve access to markets, and promote savings and credit mechanisms. Fostering partnerships between government, NGOs, and communities to co-design and implement interventions that address local needs and build long-term resilience.

9.2 Livestock and Agricultural Conditions

The NDMA focuses on 23 ASALs, which generally face food insecurity, water scarcity, and livestock health issues due to harsh climatic conditions. The average vegetation condition index (VCI) for these 23 counties decreased from 57.03 in 2018 (indicating above-normal vegetation greenness) to 38 in 2022 (indicating normal vegetation greenness). A decrease in VCI indicates reduced vegetation greenness, which could be a result of droughts and adverse weather conditions. This directly affects the availability of pasture and water for livestock, impacting their health and productivity. About three animals died per county due to drought in 2022. Livestock deaths worsen the food insecurity situation by reducing the availability of milk and meat for households, and by disrupting livelihoods that depend on livestock. Reduced availability of these products directly impacts the dietary diversity and nutritional intake of households, especially children and pregnant women who rely on these nutrients for growth and health.

The terms of trade declined from 95.44 in 2018 to 56.81 in 2022. This decline implies a reduction in the purchasing power of many pastoralists. A lower term of trade means that pastoralists receive fewer goods or services for the same number or amount of livestock and livestock products sold, for example, milk. This decline is driven by high prices for food and other commodities compared to the prices received for livestock products. This can be attributed to the high prices of food and commodities. The impassable roads due to flooding incidences also contributed to the decline in the food supply, hence the increase in food prices at the household level. As a result, pastoralists have fewer resources to invest in their livelihoods and meet basic needs, further perpetuating poverty and vulnerability.

The Government of Kenya, through initiatives led by the National Drought Management Authority (NDMA), addresses the challenges faced by arid and semi-arid lands (ASALs) by focusing on drought management, livestock health, market access, and social protection. NDMA employs strategies that include early warning systems, water infrastructure development, and livestock health programmes aimed at enhancing resilience. Despite these efforts, gaps persist in coordination,

sustainable climate resilience investments, and the coverage of social protection programmes. To bridge these gaps, there is a need for improved coordination at national and county levels, increased investment in climate-resilient infrastructure, and promotion of diversified livelihoods beyond livestock. Community-based natural resource management and climate-smart agricultural practices are also important in enhancing resilience and improving food security in ASAL counties.

10

Conclusion and Policy Recommendations

The Food Security and Nutrition Index is a comprehensive measure of food security and nutritional status in Kenya. The overall food security and nutrition index average score was 0.44, ranging from 0.28 to 0.56. Among the pillars that made up the index, the highest average scores were in health (0.65), water (0.52), and education (0.45), while the lowest average scores were in social protection (0.20), agriculture (0.30), and the National Drought Management Authority (0.38). Table 10.1 highlights the key findings and policy recommendations across all the food security and nutrition pillars.

Table 10.1: Key findings and policy recommendations

Sector	Findings	Policy recommendations	Responsibility
Health	<ul style="list-style-type: none"> The average health sector index was 0.65, ranging from 0.44 to 0.75 The status of health improved between 2014 and 2022 based on most of the health indicators monitored, although it remained the same or declined in some key indicators 	<ul style="list-style-type: none"> Expand the nutritional supplementation programmes and food fortification programs for children, pregnant women, and other vulnerable groups 	

<p>Health</p> <ul style="list-style-type: none"> The proportion of children under five (5) years who were wasted increased from 4.0 per cent in 2014 to 4.9 per cent in 2022. The proportion of underweight female adolescents also increased from 8.9 per cent in 2014 to 17.6 per cent in 2022, while the proportion of overweight adult females increased from 32.8 per cent to 44.8 per cent during the same period Prevalence of diarrhoea increased marginally from 57.6 per cent in 2014, to 58.1 per cent in 2022 The proportion of the population consuming iron-rich foods declined from 33.3 per cent in 2014 to 23 percent in 2022 The proportion of children receiving the minimum acceptable diet declined from 40.9 per cent in 2014 to 30.7 per cent in 2022. The proportion of children receiving the minimum dietary diversity also declined from 40.9 per cent to 36.9 per cent during the same period Early initiation to breastfeeding reduced from 71.9 per cent in 2016 to 60.1 per cent in 2022, while the proportion of children exclusively breastfed during the first six months declined from 61 per cent in 2014 to 59.9 per cent in 2022 Incidents of low birth weights increased marginally from 8.0 per cent in 2014 to 8.5 per cent in 2022. Prevalence of vitamin A supplementation among children under five (5) years declined from 71.7 per cent in 2014 to 63.6 per cent in 2022 	<ul style="list-style-type: none"> Expand the school feeding programmes to ensure adolescents receive balanced and nutritious meals. Promote public health and education campaigns to raise awareness about healthy diets, physical activities, and proper hygiene practices Integrate health and nutrition education programmes into the school curriculum and community outreach efforts Strengthen healthcare services and access through regular health check-up programmes, nutritional counselling, and maternal health services; train healthcare workers to support breastfeeding practices and provide comprehensive antenatal care Invest in infrastructure to provide clean water and adequate sanitation facilities and educate communities on hygiene practices to prevent diarrhoea diseases Promote early initiation to breastfeeding through public campaigns and healthcare support services and implement breastfeeding-friendly policies in workplaces and public spaces Enhanced monitoring and surveillance are crucial to help in the identification and response to malnutrition trends promptly 	<p>Ministry of Health</p>
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<p>Water</p>	<ul style="list-style-type: none"> The average water sector index was 0.52, ranging from 0.18 to 0.89 The status of water improved between 2014 and 2022 based on most of the water indicators monitored, although it remained the same or declined in some key indicators. The percentage of households with improved sources of drinking water increased from 73 per cent in 2014 to 80 per cent in 2022 The proportion of households with water on their premises increased from 38 per cent in 2014 to 53 per cent in 2022. The proportion was much higher in urban areas (73%) than rural areas (40%). The proportion of households with piped water to dwellings declined from 27.8 per cent in 2014 to 25.3 per cent in 2022 Only one-third of the population reported using appropriate methods to treat their water before drinking About 70 per cent of the population had access to improved sanitation facilities in 2022. This was an improvement from 65 per cent in 2014. Among the improved sanitation facilities, 12 per cent had toilets that flush water to a piped sewer system. This was an increase from 8.0 per cent in 2014 	<ul style="list-style-type: none"> Expansion and upgrading of the water infrastructure. These include investments in the expansion of the water supply systems, focusing on underserved rural areas, and the maintenance and upgrading of the existing piped water infrastructure to prevent deterioration Promote water conservation and treatment through public education campaigns on water-saving practices and treatment methods and distribution of water treatment kits to households Encourage public-private partnerships to expand piped water systems and sanitation facilities. Invest in the expansion and maintenance of sanitation infrastructure, and provide subsidies or financial support for households to install improved sanitation facilities Implement the Integrated Water Resource Management (IWRM) to ensure sustainable water resource management, and establish robust monitoring and evaluation systems to track progress and address emerging water sanitation-related issues 	<p>Ministry of Water</p>
<p>Agriculture</p>	<ul style="list-style-type: none"> The average score for the agriculture sector index was 0.30, ranging from 0.16 to 0.52. Food insecurity increased significantly with 60 per cent of the population experiencing moderate to severe food insecurity in 2020, from 52 per cent in 2016 	<ul style="list-style-type: none"> Boosting agricultural production through investing in and promoting the adoption of agricultural technologies such as advanced farming techniques, improved seed varieties, and irrigation systems to increase crop yields and livestock productivity Encourage practices that enhance resilience to climate change, such as conservation agriculture, agroforestry, and integrated pest management 	<p>Ministry of Agriculture, Ministry of Water, National Drought Management Authority (NDMA)</p>

<p>Agriculture</p>	<ul style="list-style-type: none"> • In 2022, only 49 per cent of women met the minimum dietary diversity criteria, indicating that a substantial portion of women are not consuming a sufficiently varied diet, impacting their nutrition. • Food prices and rose steadily from 2014 to 2022, affecting food affordability hence leading to economic pressure on households • Key crops such as maize, Irish potatoes, and beans showed stable or fluctuating production levels, while livestock production had moderate increases, indicating varied trends and potential vulnerabilities in agricultural output • The Self-Sufficiency Ratio (SSR) improved to above 90 per cent between 2017 and 2022, while the import dependency ratio decreased to 15 per cent by 2022, reflecting better domestic food production and reduced reliance on imports 	<ul style="list-style-type: none"> • Mitigate food price inflation by subsidizing key commodities including essential food items to stabilize food prices and make food affordable for low-income households • Strengthening market regulation through enhanced regulatory frameworks to prevent price gouging and improve market transparency • Implement policies that promote and protect women's land rights, including legal reforms and awareness campaigns to address gender disparities in land ownership • Provide training and resources to optimize land use, focusing on sustainable agricultural practices and efficient resource management to maximize output • Promote dietary diversity among women through nutrition education campaigns and support women farmers by providing them with resources, training, and access to markets to help them diversify crop production • Prioritize investments in water infrastructure for crop and livestock production to improve water availability in drought-prone areas and promote sustainable agricultural production and management practices • Enhance monitoring and early warning systems for droughts. For example, having a network of weather stations and sensors across drought-prone areas to collect real-time data on rainfall, temperature, and humidity • Empower local communities through education on water conservation and sustainable agriculture 	
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Education			Ministry of Education
<ul style="list-style-type: none"> The average education sector index was 0.45, ranging from 0.11 to 0.88 from 2003 to 2022. The percentage of women without education decreased from 23 per cent in 2003 to 13 per cent in 2022, and for men, from 16 per cent to 10 per cent, respectively. On average, people in urban areas are more educated compared to those in rural areas Despite overall improvements in education for young children, 37 per cent of girls and 40 per cent of boys aged 6-9 had no education at all The primary school net attendance ratio (NAR) rose to 89 per cent in 2022, with girls at 90 per cent and boys at 87 per cent The secondary school NAR was 59 per cent in 2022 In 2016, only 20 per cent of learners enrolled in schools with feeding programmes 		<ul style="list-style-type: none"> Expand access to education through targeted interventions, especially in rural areas Implement programmes to reach underserved populations and ensure equitable access to education for all children regardless of gender or location Improve the quality of education in both urban and rural schools to ensure that the increased attendance translates into improved learning outcomes. The provision of professional development opportunities for teachers will enhance teaching quality and effectiveness Address the disparities in education access and quality between urban and rural areas by investing in rural infrastructure and ensuring equitable distribution of educational resources Expand school feeding programmes to more schools and ensure that a higher percentage of learners benefit from these programmes; this will help in retaining children in school, reduce absenteeism, and improve academic performance. Develop strategies to monitor and address coverage and underage learners and implement policies to ensure that all children aged between 6-17 years are enrolled in school and have access to appropriate educational opportunities. Prioritized investments in education infrastructure in counties with lower education sector index scores, are crucial because they will lay the foundation for improving educational access, quality, and equity, which in turn influences better nutrition outcomes 	Ministry of Education

Social protection		<ul style="list-style-type: none"> • Expand the coverage of the cash transfer programmes to target vulnerable groups including women, children, and the elderly population to ensure households benefit from enhanced food and nutrition security • Ensure that the design of the programmes is inclusive and sensitive to the needs of the specific population • Strengthen the institutional capacity and coordination among institutions through training and development of staff to leverage technology for efficient and transparent allocation of resources to minimize wastage and corruption • Increase funding and financial sustainability by diversifying funding sources through public-private partnerships, international aid, and innovative funding models • Promote community engagement and public awareness in the identification and implementation of programmes to enhance awareness of the program benefits. • Enhance monitoring and evaluation of social protection programmes to enable policy makers to assess the effectiveness of the programmes in improving food security and nutrition outcomes • Development of a comprehensive legal framework for social protection, which could aim at bringing on board key stakeholders in the social protection sector • The implementation of all-inclusive financial transfers that include productive elements; as opposed to a stand-alone project, a multifaceted cash transfer scheme is likely to have a wider impact on the lives of beneficiaries 	The Ministry of Labour and Social Protection
<ul style="list-style-type: none"> • The average social protection sector index was 0.20 • In 2022, only 5.0 per cent of households received government cash transfers, indicating a need for expanded social protection measures • The Hunger Safety Net Programme (HSNP) is a government-led safety net programme that supports vulnerable and poor households in four Northern Counties; Turkana, Marsabit, Mandera, and Wajir. • In the 2021/22 financial year, a total of 2.688 billion was disbursed through the HSNP programme • The amount of funds disbursed reduced in 2022/23 to 984 million, suggesting a decrease in funding for the programme 			

<p>National Droughts Management Authority (NDMA)</p>	<ul style="list-style-type: none"> • The average NDMA index was 0.38, ranging from 0.21 to 0.52 • Average household milk production decreased from 2.6 litres in 2018 to 1.8 litres in 2022 per household • Household milk consumption decreased from 1.54 litres in 2018 to 1.02 litres in 2022, driven by climate variability, water scarcity, and poor pasture conditions • The proportion of children under five (5) years at risk of malnutrition (measured by MUAC) remained steady at around 10 per cent • The population in need of assistance dropped from 246,000 in 2019 to 89,000 in 2020 but rose to 290,000 in 2022 • The Vegetation Condition Index (VCI) for the 23 counties decreased from 57.03 in 2018 to 38 in 2022, with drought causing about three animal deaths per county in 2022 • The terms of trade for pastoralists dropped from 95.44 in 2018 to 56.81 in 2022 due to high food prices and impassable roads from flooding, reducing their purchasing power and increasing food insecurity 	<ul style="list-style-type: none"> • Invest in sustainable water management systems to improve water availability for livestock and agriculture • Develop and maintain irrigation infrastructure to ensure consistent water supply, particularly in arid and semi-arid regions, to mitigate the impacts of droughts • Implement programmes to improve pasture quality and availability, such as reseeded and controlled grazing practices • Provide veterinary services and vaccinations to maintain livestock health, and reduce mortality rates during drought periods • Expand nutritional programmes targeting vulnerable populations, especially children below five (5) years, to address and reduce malnutrition risks • Increase the distribution of fortified foods and supplements in drought-prone areas to ensure adequate nutrient intake • Establish and support market linkages to improve the terms of trade for pastoralists, ensuring fair prices for livestock and related products • Develop and promote alternative livelihood programmes to diversify income sources and reduce dependence on livestock alone • Create comprehensive disaster management plans that include early warning systems, rapid response teams, and emergency food reserves • Strengthen infrastructure to prevent and manage flooding, ensuring roads remain passable to maintain food supply chains and reduce price surges 	<p>Ministry of Environment</p>
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