Zimbabwe Livelihoods Assessment Committee (ZimLAC)

2024 URBAN NUTRITION ASSESSMENT

TECHNICAL REPORT

March 2024

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Recommended citation: Kembo George D., Kairiza Terrence., Dembedza Mavis P., Nyadenga Perpetual, Mavhunga Yvonne., Macheka Lesley. Food and Nutrition Council, Zimbabwe Livelihoods Assessment Committee - Urban Nutrition Assessment Technical Report 2024.

FOREWORD

The national policy documents including the Food and Nutrition Security Policy commit the Government of Zimbabwe to "ensuring a national integrated food and nutrition security information system that provides timely and reliable information on the food and nutrition security situation and the effectiveness of programmes and informs decision making". In addition, the Multisectoral Food and Nutrition Security Strategy (MFNSS 2023-2025) further affirms the vision to avail credible, timely information for evidence-based decision making and programming.

The survey was conducted during a period the country is currently experiencing the El Niño phenomenon, which is associated with below-average rainfall. The overall purpose of the 2024 Urban Nutrition Survey was to provide an annual update on nutrition status of the urban population for the purposes of informing policy formulation and programming appropriate interventions and programming for better nutrition outcomes.

This report focuses on thematic areas which include household demographics; water, sanitation and hygiene; household consumption; child, adolescent, and adult health and nutrition; non-communicable diseases and their potential risk factors for adolescents and adults; and provides practical recommendations on each thematic area. Through this report, we endeavour to provide Government and its Development Partners with evidence for planning and decision making as well as effective targeting of interventions and efficient use of resources to address the various forms of malnutrition and the underlying drivers for the urban population in Zimbabwe.

Our sincere appreciation goes to the Zimbabwe Livelihoods Assessment Committee for successfully conducting this survey. The active participation of all food and nutrition security structures at National, Provincial and District level as well as the urban community at large is greatly appreciated. Financial support from the Government of Zimbabwe and its Development Partners provided all the impetus required to meet the cost for this exercise. We submit this report to you all for your use and reference as you champion actions towards addressing priority issues aimed at preventing malnutrition in all its forms and reducing the related risk factors throughout the life cycle

George D. Kembo (Dr.)
DIRECTOR GENERAL/ ZIMLAC CHAIRPERSON

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ACRONYMS

EA	Enumeration Area
FCS	Food Consumption Score
FNSP	Food and Nutrition Security Policy
HDDS	Household Dietary Diversity Score
HHS	Household Hunger Score
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MFNSS	Multisectoral Food and Nutrition Security Strategy (2023-2025)
MMF	Minimum Meal Frequency
UNA	Urban Nutrition Assessment
ZimLAC	Zimbabwe Livelihoods Assessment Committee

EXECUTIVE SUMMARY

The Zimbabwe Livelihoods Assessment Committee (ZimLAC) successfully carried out an Urban Nutrition Assessment in February 2024 under the overall coordination of the Food and Nutrition Council (FNC). This technical report provides an update on pertinent urban household nutrition issues such as demographics, health, nutrition, and WASH.

The assessment results can be used to guide the following:

a) Evidence based planning and programming for targeted interventions.
b) Development of interventions that address immediate-to-long term needs as well as building resilient livelihoods.
c) Early warning for early action.
d) Monitoring and reporting progress towards commitments within the guiding frameworks of existing national and international food and nutrition policies and strategies such as the National Development Strategy 1, the Food and Nutrition Security Policy, Sustainable Development Goals and the Zero Hunger strategy.

Purpose and objectives

The overall purpose of the assessment was to provide an annual update on nutrition issues in Zimbabwe's urban areas, for the purposes of informing policy formulation and programming appropriate interventions.

Specific objectives of the assessment were:

a) To assess the nutritional status of the urban population and their geographic distribution.
b) To describe the socio-economic profiles of urban households in terms of such characteristics as their demographics, access to basic services (water, sanitation and hygiene services) and food consumption patterns and consumption coping strategies.
c) To provide practical recommendations to inform humanitarian and developmental interventions for enhanced nutrition status.

Methodology

The 2024 Urban Nutrition Assessment (UNA) was informed by the multi-sectorial objectives generated by a multi-stakeholder consultation process. The assessments employed a structured household questionnaire as the primary data collection instrument. ZimLAC national supervisors and enumerators were recruited from Government Ministries /departments, local authorities, United Nations and Non-Governmental Organizations. The Ministry of Local Government, through the Provincial Development Coordinators' offices coordinated the recruitment of district level enumerators and mobilisation of provincial and district enumeration vehicles. Three enumerators and one anthropometrist were selected from each district for data collection.

The sample design was such that key nutrition indicators, such as Global Acute Malnutrition (GAM), could be reported at domain level with at least 95% confidence. The sample was drawn from 44 reporting domains made up of cities, towns, service centres and growth points. It focused on urban households residing in the medium-density, high density, and peri-urban areas of Zimbabwe. It covered Urban Council Areas, Administrative Centers, Growth Points and other Urban Areas. The 2022 ZimSTAT master sampling frame was used to draw 30 Enumeration Areas (EAs) for each domain using the Probability Proportional to Population Size (PPS) method.

The survey data was collected using android devices installed with CSPro software and the data was uploaded to the server at FNC. Various secondary data sources and field observations were used to contextualise the analysis and reporting. Data analysis and report writing were based on thematic areas of interest to all stakeholders.

Assessment context

The assessment was conducted in an environment where urban livelihoods are influenced by various complex factors, such as socioeconomic conditions and environmental challenges (shocks). Understanding this context is crucial to effectively address the current obstacles that urban populations face in accessing sufficient nutrition and improving their overall well-being. Commendably, the Government of Zimbabwe, through its National Development Strategy 1, has implemented a range of measures to mitigate and reduce the impact of macroeconomic and social challenges on the livelihoods of people in both urban and rural areas.

While the Government of Zimbabwe has successfully implemented several mitigation programmes, climate change-induced challenges, such as long dry spells, droughts, and heatwaves, continue to impact negatively on both rural and urban livelihoods. The country is currently experiencing the El Niño phenomenon, which is associated with below-average rainfall. Its impact is already being felt in both urban and rural areas. The prolonged dry spells and heatwaves have affected urban agriculture and access to water, which in turn affected food access, water and sanitation conditions (WASH). Urban residents, who often rely on informal markets and food imports, are particularly vulnerable to disruptions in the food supply chain, affecting their nutritional status.

Assessment findings

This section presents the findings of the survey.

The major findings are presented in the box below.

A total of 13 479 households, were surveyed.

Household Nutrition Status

- Nationally, the majority (79.4%) of households consumed more than five food groups.
- About 71.2% of the sampled households had good access to food as indicated by their food consumption score which was within the acceptable range.
- A significant proportion of households (64.1%) had consumed vitamin A-rich foods daily in the seven days leading up to the survey.
- Consumption of iron-rich foods was high with 82% of households indicating that they had consumed these foods in the 7 days leading up to the survey.

Child Nutrition Status (6-23 months)

- The national average stunting level was 23.2%, classified as high.
- Female-headed households had a 4.4% higher probability of having underweight children, *ceteris paribus*.
- Households experiencing hunger had a higher chance of having stunted and wasted children, with the likelihood increasing by 1.1% and 1% respectively, at the 10% and 1% significance.
- A high proportion of children were breastfed, with 89.8% having been breastfed at some point in the last 24 months and 74.4% being breastfed within the first hour after birth.
- There was no association between support from the government, UN/NGOs, churches, or remittances from the diaspora, and children's diet quality.

Adolescent Nutrition

- Larger households had a higher propensity for having stunted, underweight, wasted, and overweight/obese adolescents, with increases of 1.53%, 0.68%, 1.2%, and 2.7% respectively, at 1% level of significance, *ceteris paribus*.
- Households that followed traditional religion/beliefs had a reduced likelihood of having stunted and wasted children, with decreases of 12.7% and 6.65% respectively, *ceteris paribus*.
- Food insecurity was associated with higher chances of stunting, underweight, wasting, and overweight/obesity, at the 1% level of significance.

Nutrition Status for Women of Childbearing Age (15–49 years)

- Female-headed households had a 94.1% chance of attaining the MDD-W, at the 1% significance level, *ceteris paribus*.

Adult Nutrition

- About 27.9% of adults aged 18-59 were overweight, while 22.1% were obese.
- About 30.9% of adults aged 60 and above were overweight, and 30.6% were obese.
- Female-headed households had a 9.6% higher likelihood of having overweight or obese adults, at the 1% level of significance.
- Households engaged in urban agriculture had a 6.6% increased risk of having overweight and obese members.
- Households receiving government social support had an 8.8% increased risk of having an overweight/obese member, while households receiving social support from UN/NGOs had a 17.7% increased risk, both at the 1% level of significance.

Interaction between chronic conditions, smoking and nutrition status

- Adults with a history of smoking and drinking had an increased risk of developing chronic conditions - 0.064% for smoking and 0.036% for drinking, with a significance level of 5%, *ceteris paribus*.

Water, Sanitation and Hygiene

- About 81.9% of the sampled households had access to water from ZINWA/Council.
- Households with basic sanitation conditions had reduced chances of experiencing incidences of diarrhoea, cough, and fever outbreaks in children under 5 years of age. The reductions were 0.29%, 0.55%, and 0.32% respectively, *ceteris paribus*.

Expanded Summary

An expanded summary of the survey findings is presented below.

i. Sample Size

A total of 13,479 households, consisting of 52,965 individuals, were surveyed.

ii. Household Nutrition Status

Household Dietary Diversity (HDD) for the Sampled Households

- Nationally, the majority (79%) of households consumed more than five (5) food groups.

Food Access and Diet Quality

- About 71.2% of the sampled households had good access to food, as indicated by their food consumption score, which was within the acceptable range.
- Only 6.5% of households had a poor food consumption score.
- A significant proportion of households (64.1%) had consumed vitamin A-rich foods daily in the seven days leading up to the survey.
- At least 48.7% of households reported having consumed protein-rich foods daily during the same period.
- Consumption of iron-rich foods was high as 82% of households indicated that they had consumed these foods in the 7 days leading up to the survey.

iii. Child Nutrition

Descriptives for child nutrition status (6 months to 59 months)

- The national average stunting level was 23.2%, classified as high.
- Matabeleland North had the highest stunting level at 29.7%, while Mashonaland West had the lowest at 19.2%.
- Matabeleland North also had the highest proportion of underweight children (16.7%), the second-highest proportion of wasted children (9.4%), and a high percentage of overweight (4.7%) and obese (6.1%) children.
- Harare province had the second-highest stunting level at 26.2%, along with the highest proportion of overweight (5%) and obese (7.7%) children.

Diet quality for children (6 months to 59 months)

- The proportion of children that attained minimum meal frequency was 34.1% and 23.6% attained the minimum dietary diversity.
- Nationally, 52.4% of children had a high intake of sweet beverages and Matabeleland South province had the highest proportion of children consuming sweet beverages at 61.8%.
- Nationally, 11.6% of children consumed unhealthy foods, with Harare having the highest proportion at 15.8%.
- About 87% of children 6 to 23 months had consumed vegetables and fruits 24 hours prior to the survey.
- About 35.6% of children consumed eggs or flesh meat 24 hours prior to the survey.

Determinants of child nutrition status (6 months to 59 months)

Stunting

- Households following the Pentecostal, Apostolic Sect, and Zion religions were more likely to have stunted children, all things being constant.
- Increasing household income by 1% was associated with a 4% decrease in the likelihood of having a stunted child, while increasing household size by one member was linked to a 2.3% increase in the probability of having a stunted child.

Underweight

- Age, sex, marital status of the household head, household income, size, and location were identified as determinants of underweight in children.
- Female-headed households had a 4.4% higher probability of having underweight children, *ceteris paribus*.
- Households with informally employed heads were 2.2% more likely to have underweight children.
- Increasing the number of household members by one was associated with a 1.2% increase in the likelihood of the household having underweight children, all things being equal.

Diet quality (Minimum Meal Frequency (MMF), Minimum Dietary Diversity (MDD), and Minimum Acceptable Diet (MAD) for children aged 6 months to 59 months.

- A 1% increase in the income of the household head was associated with a 9.3% increased likelihood of the household having a child who attained the MMF, at the 1% level of significance and other factors held constant.
- Increasing household income by 1% was likely to result in children in the household attaining MDD by 12% and MAD by 7.6%, at a 1% level of significance and all other things being equal.
- At the 1% level of significance and controlling for other variables, children in households belonging to Protestantism, Pentecostalism, the Apostolic Sect, Zionism, and Islam had a 12.2%, 11.9%, 12.7%, 18.8%, and 22% reduced probability of achieving MAD, respectively, *ceteris paribus*.

Relationship between food security indicators and the nutritional status of children aged 6 months to 59 months

- Households experiencing hunger had a higher chance of having underweight and stunted children, with the likelihood increasing by 1% and 1.1% respectively, at the 1% and 10% significance level.
- Urban agriculture was associated with a 1.6% decrease in wasting levels.
- At the 5% significance level, households employing reduced livelihood coping strategies had a slight increase of 0.1% in stunted and wasted children, all things being constant.

Relationship between diet quality for children (6-23 months) and food security indicators

- The results showed that for every point increase in FCS (Food Consumption Score), the chances of the children (6 to 23 months of age) achieving MDD increased by 0.1%, all other things being equal.
- A point increase in HDDS was associated with a 2.55% increase in the likelihood of children attaining MMF, a 3.72% increase in the likelihood of children achieving MDD, and a 2.52% increase in the likelihood of children attaining MAD, all significant at a 1% level.

- Children in households experiencing hunger had a 2.39% reduced chance of achieving MMF at a 1% level of significance and a 1.25% reduced chance of achieving MAD at the 5% level of significance, assuming all other factors remain constant.

iv. Exclusive Breast Feeding

- A high proportion of children were breastfed, with 89.8% having been breastfed at some point and 74.4% being breastfed within the first hour after birth.
- About 38% of infants under six months of age were exclusively breastfed.

Determinants of exclusive breast feeding

- Households headed by elderly persons and those that practiced traditional religion were more likely to practice exclusive breastfeeding than their counterparts, *ceteris paribus*.
- Cohabiting couples had a 26.75% lower probability of practicing exclusive breastfeeding.

Associations between food security indicators and practicing exclusive breast feeding

- Households experiencing hunger had a 4.3% higher likelihood of not practicing exclusive breastfeeding compared to households not facing hunger.
- Households employing reduced coping strategies had a 9.1% lower chance of practicing exclusive breastfeeding with a significance level of 5%.

Determinants for child diet quality (6-23 months)

- At the 1% level of significance, households in hunger were 2.3% less likely to have children who attain the MMF, *ceteris paribus*.
- Children in food insecure households had a 4.4%, 5.8%, and 4.6% reduced chance of attaining the MMF, MDD, and MAD at the 10% and 1% levels of significance, respectively.
- There was no association between urban agriculture and children's diet quality.
- Children from households with knowledge about climate changes had a 0.8% increased chance of achieving the MMF at a significance level of 1% and were 0.4% more likely to achieve the recommended MAD, all else being equal.
- Children from households with unimproved sanitation had a 13.4% reduced probability of achieving the age appropriate recommended MMF at a significance level of 1%, all else being equal.
- There was no association between support from the government, UN/NGOs, churches, or remittances from the diaspora, and children's diet quality.

v. Adolescent Nutrition

Determinants of adolescent nutrition status

- Households led by individuals who were never married or divorced/separated had a 8.2% and 5.89% higher likelihood of having a stunted adolescent, respectively, *ceteris paribus*.

- Larger households had a higher propensity for having stunted, underweight, wasted, and overweight/obese adolescents, with increases of 1.53%, 0.68%, 1.2%, and 2.7% respectively, at 1% level of significance, assuming all other factors are constant.
- Households that followed traditional religion/beliefs had a reduced likelihood of having stunted and wasted children, with decreases of 12.7% and 6.65% respectively, *ceteris paribus*.
- A 1% increase in household income level by 1% was associated with a 1.19% reduced chance of having underweight adolescents at the 1% level of significance, *ceteris paribus*.
- A 2.71% increased chance of having overweight/obese adolescents was observed for a 1% increase in income levels.

*Association between food insecurity and adolescent nutrition outcome**s***

- At the 1% level of significance, an increase in Food Consumption Score (FCS) was associated with overweight and obesity.
- Food insecurity was associated with increased chances of having stunted, underweight, wasted, and overweight/obese adolescents, at the 1% level of significance, *ceteris paribus*.

vi. Nutrition Status for Women of Childbearing Age (15–49 years)

Determinants of Minimum Dietary Diversity for Women (MDD-W)

- Women of childbearing age from households led by elderly members had a 0.58% lower chance of achieving the MDD-W.
- Female-headed households had a 94.1% chance of attaining the MDD-W, at the 1% significance level and with all other factors held constant.
- With the exception of spousal cohabitation, all other marital statuses were negatively associated with the household's ability to achieve the MDD-W, at a 1% significance level and all things being constant.
- Households headed by members who had attained graduate/postgraduate qualification had a 63.4% likelihood of achieving the MDD-W at a 1% significance level, while those led by members who had attained primary education as their highest level of education had a 29.6% lower chance of attaining the MDD-W, at a 5% significance level.

vii. Adult Nutrition

- About 27.9% of adults aged 18-59 were overweight, while 22.1% were obese.
- At least 30.9% of adults aged 60 and above were overweight, and 30.6% were obese.
- Female-headed households had a 9.6% higher likelihood of having overweight or obese adults, at a significance level of 1%.
- Households led by couples who were separated, divorced, or widowed had an increased probability of having thin adults and a decreased probability of having overweight or obese adults, at a significance level of 1%, *ceteris paribus*.

- An increase in household income was associated with a 8.3% higher probability of having overweight and obese adults.
- Households with chronically ill members had a 1% higher probability of having underweight individuals and a 12.5% higher probability of having overweight or obese individuals, at significance levels of 5% and 1%, respectively.

Association between adult nutrition status several livelihood variables

- Households experiencing hunger had a 0.7% higher chance of having underweight members.
- Food insecure households were more likely to have underweight members and less likely to have overweight or obese members.
- All indicators for Water, Sanitation, and Hygiene (WASH) - particularly, unimproved sanitation, unimproved water, and limited water - were significantly associated with a decreased likelihood of having obese members, at a 1% level of significance, *ceteris paribus*.
- Households engaged in urban agriculture had a 6.6% increased risk of having overweight and obese members.
- Households receiving government social support had an 8.8% increased risk of having an overweight/obese member, while households receiving social support from UN/NGOs had a 17.7% increased risk, both at a 1% level of significance.

viii. Interaction between chronic conditions, smoking and nutrition status

Associations between chronic conditions and current lifestyle in adults 18 years and above

- Adults with a history of smoking and drinking had a slightly higher risk of developing chronic conditions. The increase in risk was 0.064% for smoking and 0.036% for drinking, with a significance level of 5%, assuming all other factors remain constant.

ix. Water, Sanitation and Hygiene

- About 81.9% had access to water from ZINWA/Council.
- About 25.4% of the households accessing water from ZINWA/Council were satisfied with the water supply (availability), while 28.2% were satisfied with the quality of the water.
- Households with basic sanitation conditions had reduced had a reduced likelihood of experiencing incidences of diarrhoea (0.29%), cough (0.55%), and fever (0.32%) outbreaks in children under the age of 5 years.
- An increase in distance to the water source and a lack of hand washing facilities were associated with an increased risk of disease outbreaks among children under 5 years of age.

Recommendations

Based on the findings presented above, the following recommendations are put forward.

1. Improve diet quality

The results revealed high levels of overweight and obesity in the sampled urban population. The findings point to diets that are energy dense but lacking essential micronutrients. The following interventions are proposed.

i. *Nutrition education and awareness* - the ministry responsible for health needs to take aggressive action in nutrition education and awareness to prevent the increased rates of Non-Communicable Diseases (NCDs). More nutrition education campaigns, and awareness efforts are needed to educate the urban population about healthy nutrition behaviours.

ii. *Incorporating nutrition literacy into all levels of education* - the ministries responsible for primary and secondary education, as well as higher and tertiary education, should incorporate nutrition literacy into all levels of education. School-based approaches are uniquely positioned to drive positive change, as they have the power to shape lifelong eating habits, core food skills, and preferences for locally available nutritious foods. Nutrition literacy can lead to individuals adopting healthier eating habits and making conscious dietary choices, which can have significant positive impacts on overall health and well-being.

iii. *Incorporating traditional and cultural nutrition practices in nutrition education* **-** the results showed that households that followed traditional religion had a lower likelihood of having stunted and wasted children, with decreases of 12.7% and 6.65% respectively, compared to those who followed other forms of religion, all things being equal. These findings suggest potential benefits of incorporating traditional and cultural nutrition practices in nutrition education.

iv. *Increasing availability of healthy foods in school and work environments* **-** school and work environments can play an important role in promoting healthy eating by increasing the availability of nutritious foods and restricting less healthy options within these environments. There is need for a multisectoral approach where every stakeholder advocates for the provision of nutritious and healthy foods within one's environment, especially in schools and work places.

v. *Expanding the diet-related health tax to other unhealthy foods* - Zimbabwe introduced a sugar tax in December 2023, which is aimed at discouraging the consumption of sugar-sweetened beverages. There might be need to expand this tax to include other unhealthy foods as a way to discourage the consumption of such foods. The global trend towards diets high in sugar-sweetened beverages and energy-dense ultra-processed foods is linked to a higher incidence of obesity, diabetes, and other non-communicable diseases, and there is need to take action now. Globally, many countries are implementing diet-related health tax to encourage healthier eating habits (Pineda *et al.*, 2024).

2. Improve Infant and young child feeding practices (IYCF)

The results revealed that the national average prevalence of stunting was high at 23.2% and obesity levels were also high (5.2%). Efforts to address childhood undernutrition, micronutrient deficiencies, and overnutrition need to be integrated to achieve global nutrition targets. The following interventions are proposed.

i. *Extended nutrition education to all caregivers and not mothers only* – there is need to extend nutrition education to all caregivers, including baby minders and house helpers as in urban areas, these categories of caregivers tend to spend more time with children under the age of 5 years. Scientific evidence (Imdad et al., 2011 & Hossain et al., 2024) showed that caregivers' level of nutritional knowledge is a predictor of feeding practices and lack of nutritional knowledge on child feeding among caregivers contributes significantly to poor dietary practices of children under five years of age.

3. Improve Water, Sanitation and Hygiene

There is need for the ministry responsible for water, city councils/municipalities/local authorities and all the developmental organisations working in the WASH sector to establish a call to action to improve WASH conditions for maternal and newborn health and emphasis should be to i) integrate WASH into budget priorities for water supply and quality, ii) emphasize WASH in campaigns for maternal and child health, and iii) embed WASH into national and global targets and monitoring frameworks.

4. Improve targeting in social support programmes

i. There is a need for the ministry responsible for social welfare and the various organisations that provide social support to vulnerable groups to improve the identification and targeting of such households. The identification and targeting should be based on available data, e.g. census and ZimLAC data.

CHAPTER 1 INTRODUCTION

1.1 Zimbabwe Livelihoods Assessment Committee (ZimLAC)

ZimLAC is a consortium of Government, Development Partners, UN, NGOs, Technical Agencies, and the Academia which was established in 2002 and is led and regulated by Government. It is chaired by the Food and Nutrition Council, a department in the Office of the President and Cabinet whose mandate is to coordinate multi-sectoral response to food and nutrition security to ensure that every Zimbabwean is free from hunger and all forms of malnutrition.

FNC chairs the ZimLAC to support evidence-based programming and decision making in the Government. They achieve this through convening and coordinating national food and nutrition security issues in Zimbabwe; charting a practical way forward for fulfilling legal and existing policy commitments in food and nutrition security; advising Government on the strategic direction in food and nutrition security; undertaking a "watchdog role" and supporting and facilitating action to ensure sector commitments in food and nutrition are kept on track through a number of core functions such as (i) undertaking food and nutrition assessments, analysis and research, (ii) promoting multi-sectoral and innovative approaches for addressing food and nutrition insecurity, and (iii) supporting and building national capacity for food and nutrition security including at sub-national levels.

ZimLAC plays a significant role in operationalising Commitment Six, of the Food and Nutrition Security Policy (GoZ, 2012), in which the "Government of Zimbabwe is committed to ensuring a national integrated food and nutrition security information system that provides timely and reliable information on the food and nutrition security situation and the effectiveness of programmes and informs decision-making". The information system is critical in informing decision making as it provides evidence for timely response by Government.

Results of the ZimLAC livelihood assessments continue to be an important tool for informing and guiding policies and programmes that respond to the prevailing food and nutrition security situation with 11 urban and 23 rural livelihoods updates having been produced to date.

1.1.1 Rationale of the 2024 ZimLAC Urban Nutrition Assessment

The assessment results will be used to guide the following:

e) Evidence based planning and programming for targeted interventions.
f) Development of interventions that address immediate to long term needs as well as building resilient livelihoods.
g) Early warning for early action.
h) Monitoring and reporting progress towards commitments within the guiding frameworks of existing national and international food and nutrition policies and strategies such as the

National Development Strategy 1, the Food and Nutrition Security Policy, Sustainable Development Goals and the Zero Hunger strategy.

1.1.2 Purpose

The overall purpose of the assessment was to provide an annual update on nutrition issues in Zimbabwe's urban areas, for the purposes of informing policy formulation and programming appropriate interventions.

1.1.3 Specific objectives

Specific objectives of the assessment were:

(a) To assess the nutritional status of the urban population and their geographic distribution.

(b) To describe the socio-economic profiles of urban households in terms of such characteristics as their demographics, access to basic services (water, sanitation and hygiene services) and food consumption patterns and consumption coping strategies.

(c) To provide practical recommendations to inform humanitarian and developmental interventions for enhanced nutrition status.

1.2 Context

The 2024 ZimLAC Urban Nutrition Assessment was conducted in an environment where urban livelihoods are influenced by various complex factors, such as socioeconomic conditions and environmental challenges (shocks). Understanding this context is crucial for effectively addressing challenges that urban populations face in accessing sufficient nutrition and improving their overall well-being. The Government of Zimbabwe, through its National Development Strategy 1, has implemented a range of measures to mitigate and reduce the impact of macroeconomic and social challenges on the livelihoods of people in both urban and rural areas.

Some of the interventions that have been implemented to minimize the impact of socioeconomic conditions and environmental challenges (shocks) on urban livelihoods include the provision of safe and portable water in urban areas through borehole drilling and the repair and rehabilitation of roads, especially in high-density suburbs. As of 4 February 2024, the Government of Zimbabwe had drilled 83 boreholes through the Presidential Borehole Drilling Scheme, out of a target of 250 to be drilled by 2025 in Bulawayo City alone, as part of the short to medium-term intervention to alleviate water shortages in urban areas. A total of 50 solar-powered boreholes are being targeted for the Mbare suburbs, which will help control waterborne diseases such as typhoid and cholera.

While the Government of Zimbabwe has implemented several mitigation programmes, climate change-induced challenges, such as long dry spells, droughts, and heatwaves continue to impact negatively on both rural and urban livelihoods in Zimbabwe. The country was experiencing the El Niño phenomenon, which was associated with below-average rainfall. Its impact was already being felt in both urban and rural areas. The prolonged dry spells and

heatwaves have affected urban agriculture and access to water, which in turn affects food access, and water and sanitation conditions (WASH). Urban residents, who often rely on informal markets and food imports, are particularly vulnerable to disruptions in the food supply chain.

Addressing the impact of climate change on food and nutrition security requires a comprehensive approach that tackles issues of poverty and sustainability to ensure that all urban residents have access to adequate and nutritious food. Collaboration between government agencies, city councils, civil society organizations, and the private sector is essential for implementing policies and programmes that promote food security, improve livelihoods, and enhance the nutritional status of urban residents in Zimbabwe.

CHAPTER 2 LITERATURE REVIEW

2.1 Nutrition Security in Urban Areas

The continuous increase in urban population worldwide has led to the rapid expansion of urban settlements. The global population is projected to reach nine billion by 2050, with a concentration of individuals in metropolitan areas (Filippini et al., 2019). According to the 2022 census data for Zimbabwe, 61.4% of the population lives in rural areas compared to 38.6% in urban areas (ZIMSTAT, 2022). This represents an increase in urban population in Zimbabwe from 33% in 2012 (ZIMSTAT, 2012). This growth presents both opportunities and challenges. This growth means there will be increasing competition for land, water, and other resources that are necessary for food production (Godfray *et al.*, 2010).

As people move to towns in search of better opportunities, there is a need to provide more food, goods, services, and employment. One of the primary nutrition challenges in urban areas is the existence of food deserts. Food deserts are areas with limited access to affordable and nutritious food options. Urban areas, compared to rural areas, offer greater social and economic development, more job opportunities, and access to diverse and better essential services (Ren *et al.*, 2021). However, economic growth alone is insufficient to improve diets and enhance nutrition in urban areas (de Bruin *et al.*, 2021). Low-income households not only lack the income and resources needed for adequate well-being but also frequently experience limited access to basic services, job opportunities, and social development (Vilar-Compte *et al.*, 2021). Urban environments pose a particular risk for poor nutrition outcomes because access to food depends on the commercial supply, which is linked to income level (Ziso *et al.*, 2022). While urban areas generally have fewer food access challenges compared to rural areas, this "urban advantage" does not benefit low-income households who face disproportionate barriers to accessing healthy food and have an increased risk of malnutrition (Siddiqui *et al.*, 2020).

2.2 Food Systems in Urban Areas

Urbanization is having a significant impact on the food system, leading to a growing dependence on purchased food for a larger proportion of the urban population (Satterthwaite *et al.*, 2010). This shift is worsened by the high cost of fresh and organic produce in urban areas, which contributes to food insecurity and nutritional deficiencies. Low-income earning urban households struggle to afford nutritious foods within their limited budgets and end up choosing cheaper, calorie-dense options that lack essential vitamins, minerals, and other important nutrients. Moreover, urban populations are constantly bombarded with advertisements and promotions for processed foods, sugary beverages, and fast-food items, which heavily influence their food preferences and consumption habits (Amanzadeh *et al.*, 2015). Without proper nutrition education and guidance, individuals may not be aware of the negative consequences of these unhealthy food choices on their overall health and well-being.

On one hand, it has been acknowledged that the urban populations are vulnerable to macroeconomic shocks that affect their income-generating capacity, subsequently leading to the consumption of less healthy diets. On the other hand, a study by Vilar-Compte et al. (2021) found that, on average, urban diets are better than rural diets due to their greater diversity and access to products such as animal proteins facilitated by the food distribution systems. However, this supposed urban advantage is not evenly distributed and does not extend to the poorest socioeconomic strata (Siddiqui *et al.*, 2020). Research has shown that geographic disparities in food access, linked to income level, exist. Consequently, individuals with lower incomes do not have access to diets that are rich in healthy foods like fresh fruits and vegetables, tubers, and legumes. Instead, they have more access to and consume higher amounts of sugars, fats, and highly processed or ultra-processed foods. Ultra-processed products are characterized by their high energy density, long shelf life, convenience, and relatively low cost. All these factors make such foods appealing to urban residents, particularly those with limited resources such as heating and cooking supplies, safe drinking water, and sanitation, among other basic needs (Vilar-Compte *et al.*, 2021).

2.3 Nutrition and Non-Communicable Diseases

In Sub-Sahara Africa, due to urban lifestyle and nutrition transition, it is projected that NCDs, such as cardiovascular diseases, diet-related diseases, chronic kidney, respiratory diseases, and cancers, will overtake infectious disease cases by 2030 (Casari *et al.*, 2022). The ongoing expansion of supermarkets and fast-food chains in urban area is expected to improve food availability and food diversity. However, there is higher likelihood of consumption of processed or prepared food, or to dine out and these factors are often related to a poor dietary quality, such as through higher intakes of energy and sodium (Ren *et al.*, 2021).

While infectious diseases continue to be a significant burden in many rural areas, there is a rapid increase in obesity and Non-Communicable Diseases (NCDs) related to diet in urban areas. These NCDs account for almost half of all deaths and disability in low-to-middle-income countries (Popkin *et al.*, 2012; Casari *et al.*, 2022). It is projected that in Sub-Sahara Africa, NCDs such as cardiovascular diseases, diet-related diseases, chronic kidney and respiratory diseases, and cancers will surpass infectious diseases by 2030 due to the urban lifestyle and nutrition transition (Casari et al., 2022). A study by the Institute of Health Metrics and Evaluation at the University of Washington (Chong *et al.*, 2023) found that diet is the second highest risk factor for early death, following smoking. Other high-risk factors include high blood glucose (leading to diabetes), high blood pressure, high body mass index (BMI) as a measure of obesity, and high total cholesterol. All these risk factors can be attributed to consuming the wrong foods, although there may be other causes as well (**Figure 1**).

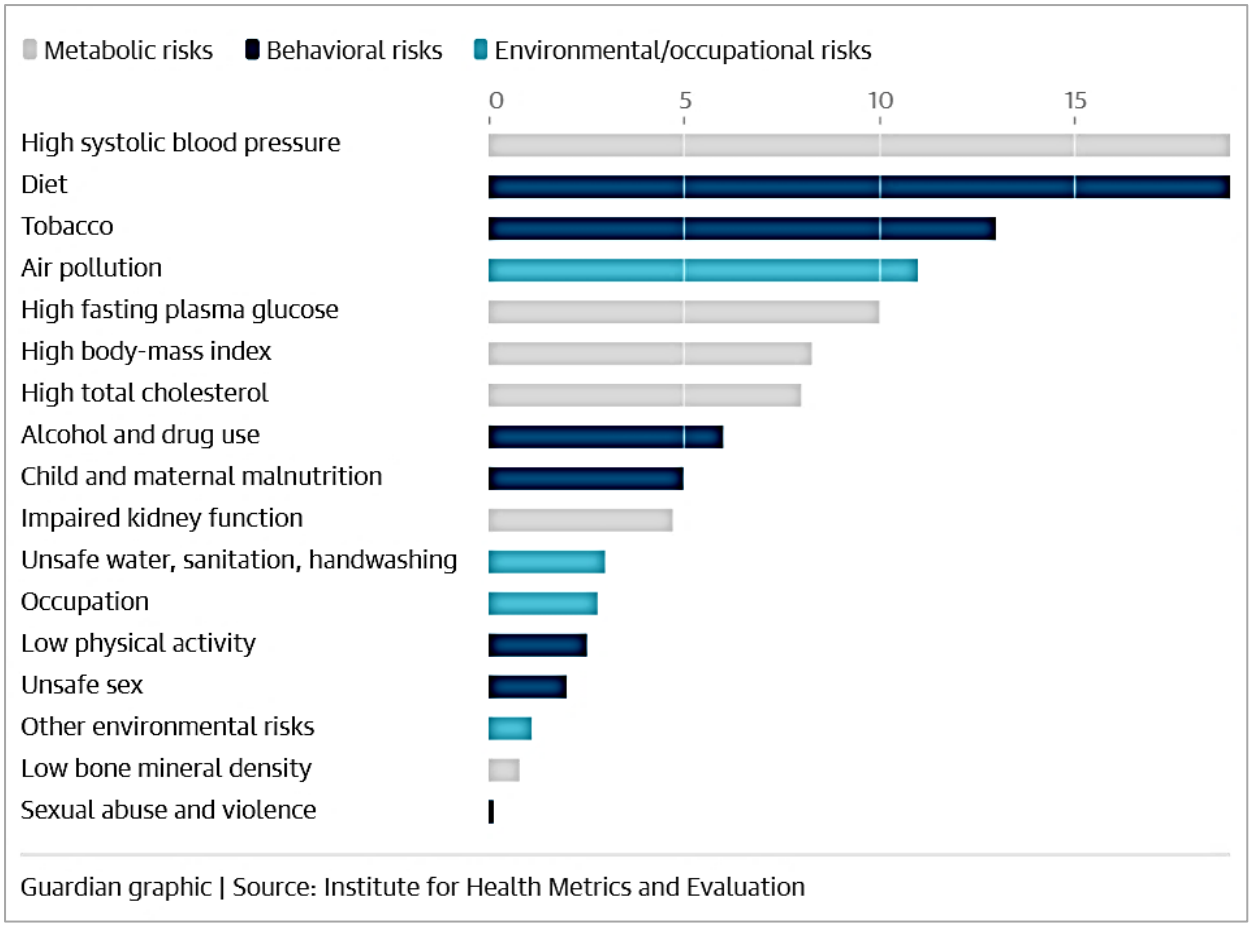

Figure 1. Factors driving the global burden of disease.

2.4 Exposure to Shocks

Urban populations, due to their high dependence on markets for food, are particularly vulnerable to fluctuations in the cost of food, both internationally and domestically (Godfray *et al.*, 2010; Maestre *et al.*, 2017). Many urban residents struggle to meet the high cost of living, with housing expenses typically being a major part of their household expenditures. As a result, they may not be able to afford sufficient food to meet their minimum nutritional requirements. Furthermore, vulnerable urban dwellers often rely on unsustainable, non-profitable, and high-risk income sources. The unpredictable nature of income combined with the volatility of prices for essential goods and services can push people in lower social segments into poverty, indebtedness, food insecurity, and an inability to meet their basic essential needs.

Whilst urban areas present a clear potential for food security, they also come with increased risks. Those who have the means to access diverse food options may find that urban diets are more varied and nutritious compared to rural diets. However, the high costs of non-food essentials mean that urban dwellers have to allocate their incomes to a wider range of goods,

including housing, energy, transportation, household items, education, health care, and personal items, in addition to food.

2.5 Urban Food Systems

There is a consensus that food-based approaches can help address undernutrition by transforming food systems and incorporating peri-urban agriculture, as these can make a significant contribution to urban food security (Maestre *et al.*, 2017). Several studies have found that diverse agricultural interventions have increased food production but did not necessarily improve nutrition. Additionally, impact pathways do not always have direct effects on diets but often indirect effects through sales and income.

The transition to urban areas is likely to result in qualitative and quantitative dietary changes. These changes involve a shift in the diet structure towards higher consumption of energy-dense foods (particularly those high in fat and added sugars), processed foods, animal source foods, sugar, and saturated fats. Conversely, there is a lower intake of complex carbohydrates, dietary fibers, fruits, and vegetables (Filippini *et al.*, 2019). Meal patterns are also change, with an increase in the number of meals eaten outside of the home. These dietary changes are driven by urbanisation, economic development, increased access to food markets selling energy-dense processed foods at low prices, and reduced prices of certain foods like vegetable oils. A study conducted in Benin and Morocco (Holdsworth *et al.*, 2019) revealed that individuals who eat out frequently consume fewer vegetables. The study also found that street food is a significant source of energy in urban areas, providing 39% of total daily energy intake for adolescents, but is typically associated with lower fruit and vegetable consumption. **Figure 2** illustrates the elements of the food system that impact diet quality.

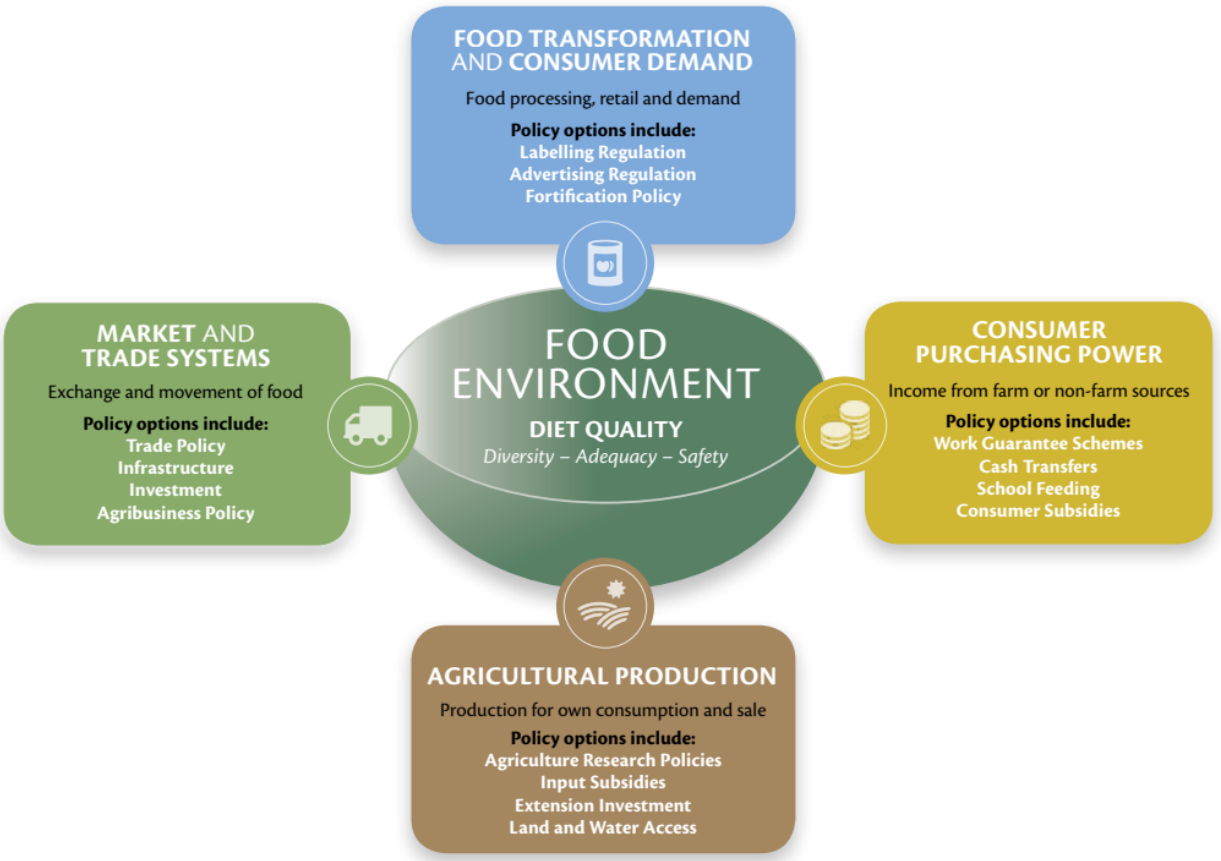

Figure 2. The elements of the food system that affect diet quality (Technical brief No1 of the Global Panel on Agriculture and Food Systems for Nutrition, 2014).

Urbanisation plays a crucial role in changing eating patterns and nutrition trends (de Lanerolle-Dias *et al.*, 2015; Ren *et al.*, 2021; Casari *et al.*, 2022).

- Rural-to-urban migrants tend to shift away from staples and towards sugary and easily accessible purchased foods. The increased consumption of food outside of the home, such as street food, has been identified as a risk factor for higher fat intake and lower levels of micronutrients.
- A positive aspect of urban food systems is the diversity of food available within most cities. However, diverse high-density diets, which differ from traditional diets, along with changing physical activity levels, will later result in a higher occurrence of Non-Communicable Diseases (NCDs) such as obesity and diabetes.
- With the increasing urbanisation and sedentary lifestyles in urban areas, obesity is now becoming a primary health issue in India, China, and other fast-shifting nations across Asia and Africa. For example, in Kenya, Senegal, and Ghana, urban obesity levels are twice the level found in rural areas.

Urbanisation also dramatically changes the structure of urban food markets:

- Supermarkets play a crucial role in urban food provision. With their increasing market share, they have gained significant power in the supply chain and have changed the relationships in the food value chain, which impacts food production.
- The informal food sector continues to be highly important, with vendors purchasing wholesale or sometimes directly from farmers. It serves as a critical source of food and income in urban areas. Food safety training for street food vendors has been shown to improve food safety and quality (e.g., Abidjan, Cote d'Ivoire).

The potential pathways to deliver good quality, nutrient-dense foods to low-income and undernourished people are numerous. Applying a pathways approach to integrating better agriculture and nutrition has proven to be a useful analytical lens. It recognises the need to examine all stages of the chain, from production to consumption, and the connections between agriculture, food systems, and nutrition. It also identifies potential key areas for policymakers to influence (Maestre et al., 2017). One pathway is by enhancing access to and consumption of foods that are naturally rich in micronutrients, thereby increasing overall dietary diversity. These foods include fresh fruits and vegetables, meat, fish, dairy products, and pulses.

2.6 Mitigating the Double Burden of Malnutrition

The quality of one's diet is a major factor in obesity and scientific evidence (Lyn et al., 2019; Peeters, 2018) suggests that the interaction between human food preferences and the environment in which those preferences are learned, expressed and reassessed plays a central role in managing obesity. People's food consumption is influenced by various individual (e.g., food preference), family (e.g., family income), and social factors (e.g., food availability and prices). Implementing appropriate food policies can help to address the obesity epidemic by creating an environment that promotes healthier diets for everyone. Hawkes et al. (2015), identified four key mechanisms through which food policies can influence the food environment and ultimately, human food preferences.

i. Providing an enabling environment for healthy preference learning: Human food preferences are primarily learned and influenced by exposure to the eating behaviours of parents, caregivers, peers and role models, as well as the foods available at home and outside the home, and cultural and social norms related to food. Preferences can also change in response to new information and marketing. Therefore, an important role for policy is to support an environment that encourages healthy preference learning from an early age.

ii. Overcoming barriers to expressing healthy preferences at the point of purchase: This mechanism recognises that even when people have a preference for healthy eating, they often face barriers to accessing and consuming a healthy diet. Many of these barriers stem from the structure of the food system, such as the availability and accessibility of nutritious foods. Low-income households, in particular, face barriers in accessing and affording healthy

foods, which are typically more expensive than less healthy alternatives. Food policies can help remove these barriers by, for example, making healthier food more affordable to all.

Encouraging people to reassess existing unhealthy preferences: This mechanism is based on evidence that people who have already developed unhealthy preferences struggle to make healthier choices. However, changes in the pricing and presentation of food in retail shops and food service environments can shift these choices (Thaler & Sunstein, 2009). Pricing and presentation affect people's food choices (Cohen and Babey, 2012) and high prices can lead consumers to choose alternatives to the food they would have chosen otherwise. Therefore, food policies can influence food prices, availability, and presentation of healthier options to encourage individuals to reassess their preferences and make healthier choices.

***Stimulating a positive food-systems response*:** Food policies designed to influence consumer choices can also have ripple effects throughout the food system. For instance, mandatory labelling of unhealthy components in food, such as trans-fats, can incentivise the food industry to reduce the presence of trans-fats in their products. Similarly, government interventions further upstream in the food system, such as mandatory food fortification to enhance nutritional quality, can impact food environments, such as the production of biofortified crops. Thus, food policies can lead to positive feedback responses within the food system.

Please refer to **Figure 3** for a framework illustrating the theory of change and the four mechanisms through which food-policy actions can contribute to healthier diets.

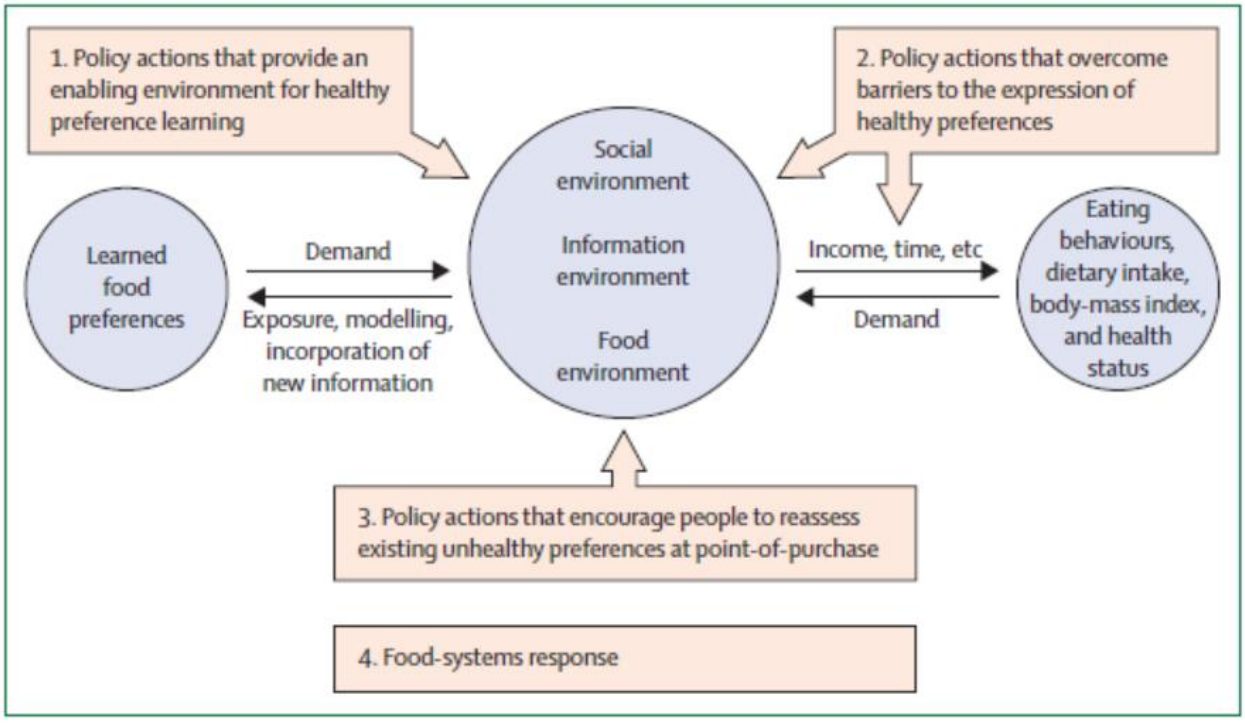

Figure 3. Theory of change and mechanisms through which food-policy actions could contribute to healthier diets. Adopted from Hawkes et al. (2015).

To improve healthy food consumption and prevent obesity, food policies should aim to achieve two main objectives. Firstly, they should work towards increasing the availability, affordability, and acceptability of healthy food choices. Secondly, they should simultaneously aim to decrease the availability, affordability, and acceptability of unhealthy food choices in various settings, including homes, schools, workplaces, and communities (Zhang et al., 2014). **Figure 4** provides a visual representation of the complex food policy environment and the interactive policy approaches to obesity prevention (Zhang et al., 2014). It is important to note that there is often an overlap among the different domains of food policy options. High-level policies are designed to change existing structures and create a context in which people are less likely to engage in undesired behaviors. For instance, implementing restrictions on fast food in school environments, such as tuckshops, can make unhealthy food inaccessible to children. Additionally, school policies on nutrition education can equip students with the necessary skills and knowledge to maintain a balanced energy intake and expenditure in the face of a changing food environment.

This dual approach during childhood, increases resilience and prepares individuals to make healthier choices in adulthood, even when faced with unhealthy consumption environments. Unfortunately, many policies only target one aspect of the food environment, failing to fully harness the potential of a more comprehensive and systematic policy adoption that could bring about more significant changes in unhealthy food environments.

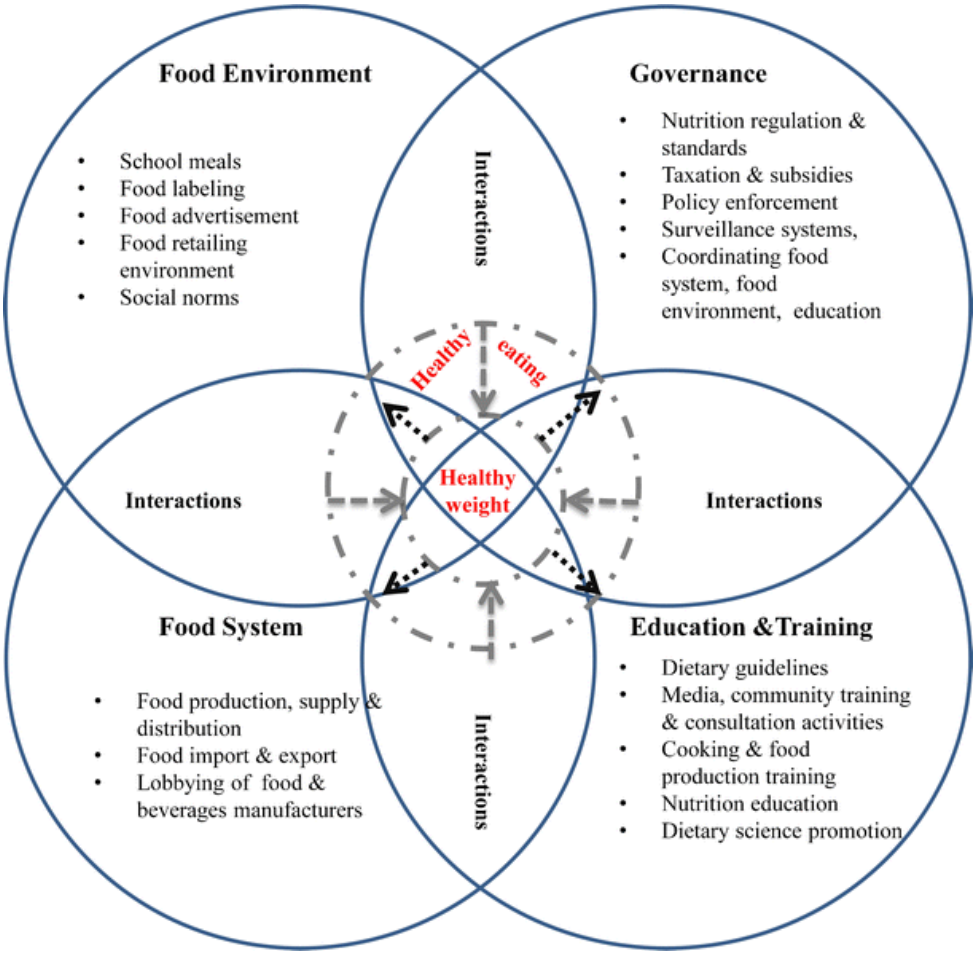

Figure 4. Synergised effects of food policies for healthy food consumption. Adopted from Zhang et al. (2014).

Figure 5 demonstrates how an integrated approach, which includes the implementation of food policies targeting the food environment, can have a positive impact on the food system and individual food choices, leading to healthier diets.

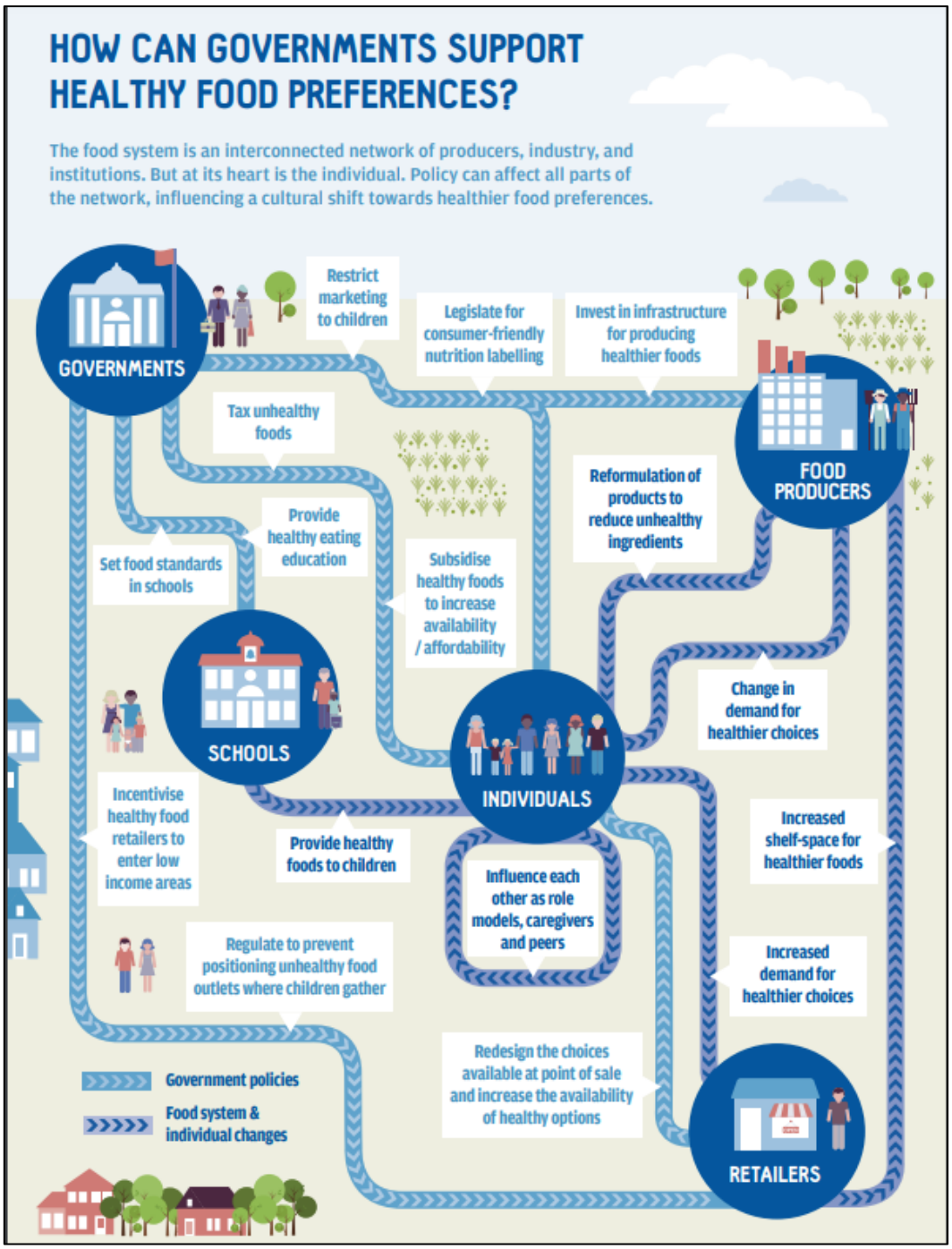

Figure 5. Mechanisms through which food-policy actions could contribute to healthier diets. Adopted from Hawkes et al. (2015).

The development and implementation of national and regional government food policies are influenced by multiple factors, including culture, tradition, and the support of various stakeholders within a society. Successful behaviour changes can only be achieved through synergistic interactions and the interoperability of policies from different constituent systems. Policy design at all levels should aim to create a seamless platform that targets individual behaviour. Policies should be designed to change the context in which undesired dietary

patterns occur, specifically the food environment that individuals face daily. Efforts to change the food environment must address the entire food system, which needs to be overhauled and reengineered to create a healthier food environment. To sustain the desired behavioural change, continuous education and training must be provided to equip individuals with the necessary knowledge and skills to adapt to the new environment. Achieving synergy among all these factors and policies requires the implementation of enforcement measures and administrative oversight from local and national governments.

2.7 Water Challenges in Urban Areas

Urbanization and climate change have worsened water shortages in cities worldwide (Wu *et al.*, 2023). Climate change is a pressing global issue with various impacts, one of which is water availability in urban areas. The influence of climate change on water resources is particularly significant in urban settings, where the intersection of population density, vulnerability of infrastructure, and water management challenges creates complex water-related problems (Heidari *et al.*, 2021). Several case studies reported by the World Bank demonstrate how social, political, and economic dynamics can greatly affect urban water demand. Addressing these water challenges in urban areas requires integrated and sustainable approaches that consider factors such as water conservation, infrastructure upgrades, pollution prevention, and community engagement.

One of the most notable effects of climate change on water availability in urban areas is the alteration of precipitation patterns. Changes in the intensity, frequency, and distribution of precipitation lead to more frequent and severe droughts, floods, and other extreme weather events in many regions. These fluctuations in precipitation patterns disrupt traditional water supply systems, strain water resources, and pose challenges for water management in urban areas.

To mitigate the impact of climate change on water availability in urban areas, it is crucial to implement integrated and adaptive water management strategies. These strategies should include measures to enhance water conservation, improve the resilience of water infrastructure, promote sustainable water use practices, and enhance water governance mechanisms. Water conservation efforts, such as promoting efficient irrigation techniques, reducing leakage in distribution systems, and encouraging water-saving behaviors among residents, can help alleviate water scarcity in urban areas. Investing in climate-resilient water infrastructure, such as green infrastructure projects, decentralized water treatment systems, and water recycling initiatives, can enhance urban water supply reliability and reduce vulnerability to extreme weather events.

The impact of climate change on the availability of water in urban areas is a complex challenge that requires holistic and innovative solutions. By implementing integrated water management strategies that prioritize water conservation, infrastructure resilience,

sustainable practices, and effective governance, urban areas can enhance their water security in the face of a changing climate. Collaboration between governments, communities, businesses, and other stakeholders is essential to address the intricate water challenges posed by climate change and ensure a resilient and sustainable water future for urban areas.

2.8 Possible Interventions to Mitigate Urban Challenges

To facilitate the adoption of the options and solutions suggested above, it is important to address existing knowledge gaps through the following recommendations (Kookana *et al.*, 2020).

1. Role of wastewater and wastewater reuse

Much more attention needs to be given to the vast areas where untreated or only partially treated, diluted, or even raw wastewater is already used informally for reuse (Silva, 2023). Treated wastewater can play a key role in meeting the water needs of people in urban cities. However, better urban planning and novel approaches are needed to realise this potential.

2. Community behavior change

Community behavioural change is as important as institutional reforms and financial incentives. Behavioural intervention should be an integral part of urban design criteria. Additionally, an understanding of health risks and approaches to managing risk through behavioural change, such as the farm-to-fork approach, is required.

3. Policies relating to the informal retail sector

A fundamental shift in attitude is needed to better recognize the value of the informal sector.

4. Tackling the challenges of urban malnutrition

It is essential to capitalize on opportunities offered by urban food systems to address the challenges of urban malnutrition. Urban contexts provide an environment for influencing the diets and nutrition of large numbers of people. National policies that regulate product formulation, labelling, advertising, and promotion should be given high priority. This is especially important in urban situations where food marketing can be particularly aggressive and encourage poor-quality diets (Chandon *et al.*, 2012). Investment in consumer education about healthier food choices is also essential.

5. Connecting with wider areas of policy

There is a need to connect with wider areas of policy that are often excluded from discussions on urban diets and nutrition. Cross-sector engagement is necessary. There are also opportunities to influence public institutions in towns and cities, such as schools, prisons, and government offices, to offer enhanced dietary choice, quality, and knowledge about nutrition (Mozaffarian *et al.*, 2018).

6. Attention to the challenges of rising overweight and obesity in urban settings

Urban policymakers in low- and middle-income countries need to pay more attention to the specific challenges associated with rising rates of overweight and obesity. The aim should be to limit further increases, as no country has yet succeeded in reversing the trend of rising obesity. If left unchecked, the associated non-communicable diseases could become a significant burden on health resources, economic development, and individuals (Amugsi *et al.*, 2017; Reyes *et al.*, 2021).

Effective action in addressing urban health and nutrition challenges needs to be thoroughly measured, rigorously analysed, and promptly disseminated. By reviewing and disseminating empirical data on successful approaches, as well as those that are unsuccessful, policymakers can be better informed and advocate for a range of customized actions. Refer to **Section 2.6** for detailed possible interventions on improving diets.

CHAPTER 3 METHODOLOGY

3.1 Sampling frame

The sample design was such that key nutrition indicators, particularly global acute malnutrition prevalence, could be reported at domain level with at least 95% confidence. The sample was drawn from 44 reporting domains made up of cities, towns, service centres and growth points. It focused on urban households residing in the medium-density, high density, and peri-urban areas of Zimbabwe. It covered Urban Council Areas, Administrative Centers, Growth Points and other Urban Areas. The 2022 ZimSTAT master sampling frame was used to draw 30 Enumeration Areas (EAs) for each domain using the Probability Proportional to Population Size (PPS) method. A total of 13 479 households were interviewed, 5 272 children under 5 years, 5 549 adolescents and 12 919 adults were measured. The enumerated households were selected using systematic random sampling within the sampled EAs.

3.1.1 Data collection process

In recognizing the importance of multi-stakeholder participation in multi-faceted assessments, ZimLAC, through multi-stakeholder consultations, developed an appropriate assessment design and data collection tools informed by the assessment objectives. The primary data collection tool used in the assessment was the android–based structured household tool. ZimLAC national supervisors and enumerators were recruited from Government, local authorities, Technical partners, Academia, United Nations, and Non-Governmental Organisations.

The Ministry of Local Government and Public Works, through the Provincial Development Coordinators' offices coordinated the recruitment of domain level enumerators and mobilisation of provincial and district enumeration vehicles. Enumerators were drawn from an already existing database of those who participated previous ZimLAC assessments. Three enumerators and one anthropometry specialist were selected from each domain for data collection.

CHAPTER 4 RESULTS

This section presents the findings of the survey.

4.1 Sample Size

Table 1 shows that a total of 13 479 households, were surveyed.

Table 1. Total number of surveyed households, household members and their age categories

Province	Sampled Households	Number of people in the sampled households			Age categories of the sampled population				
		Males	Females	Total	0 - 4	5 - 17	18 - 59	60 and above	Total
Bulawayo	2095	3 783	4 896	8 679	1 035	2 563	4 394	687	8 679
Manicaland	601	1 029	1 229	2 258	277	675	1 167	139	2 258
Mashonaland Central	600	1 066	1 283	2 349	340	682	1 209	118	2 349
Mashonaland East	1218	1 966	2 284	4 250	680	1 164	2 233	173	4 250
Mashonaland West	1194	2 195	2 583	4 778	703	1 360	2 472	243	4 778
Matabeleland North	601	960	1 129	2 089	243	546	1 216	84	2 089
Matabeleland South	899	1 308	1 838	3 146	508	746	1 728	164	3 146
Midlands	2090	3 878	4 707	8 585	1 167	2 485	4 447	486	8 585
Masvingo	1190	1 963	2 417	4 380	611	1 249	2 293	227	4 380
Harare	2991	5 746	6 705	12 451	2 042	3 266	6 431	712	12 451
Total	**13 479**	**23 894**	**29 071**	**52 965**	**7 606**	**14 736**	**27 590**	**3 033**	**52 965**

4.2 Household Dietary Diversity (HDD)

The Household Dietary Diversity (HDD) is defined as the ability to acquire sufficient quantity and quality of food to meet all household members' nutritional requirements for a productive life (Leroy *et al.*, 2015). The indicator is a measure of both the quantity and the quality of food access, and the 12 food groups included in the HHDS reflect a combination of both. Dietary diversity has long been recognized as a key element of diet quality, because eating a variety of foods helps ensure adequate intakes of essential nutrients and promotes good health.

Table 2 presents the findings on Household Dietary Diversity Score (HDDS) among the sampled households. The data reveals that 79.4% of the sampled households consumed food from five food groups and above in the seven (7) days leading up to the survey. This indicates that sampled urban households had good access to food.

Table 2. Household Dietary Diversity

Province	Household Dietary Diversity Score (mean)	Household Dietary Diversity			
		0 - 2 food groups	3 - 4 food groups	5 food groups	6-12 food groups
Bulawayo	6.5	4.6	13.1	16.3	66.0
Manicaland	7.0	0.8	9.7	14.8	74.7
Mashonaland Central	6.1	3.0	14.5	18.0	64.5
Mashonaland East	6.5	3.6	12.1	15.0	69.3
Mashonaland West	5.6	7.6	21.8	17.7	52.9
Matabeleland North	5.0	13.5	25.5	19.3	41.7
Matabeleland South	6.4	5.0	15.8	13.2	66.0
Midlands	6.1	6.5	17.3	18.3	57.9
Masvingo	6.0	3.8	16.7	18.8	60.7
Harare	6.5	6.3	11.7	13.9	68.1
National	**6.2**	**5.6**	**15.1**	**16.3**	**63.1**

4.3 Descriptives for Food Access and Diet Quality

The Food Consumption Score (FCS), is a food frequency indicator that aims to capture both diet quantity and quality of household food consumption (Marivoet *et al.*, 2019). It accounts for nutritional value of food in addition to the number of different types of food consumed (Saaka *et al.*, 2013). The results presented in **Table 3** indicate that 71.2% of the sampled households had good access to food, as evidenced by their FCS falling within the acceptable range. Only 6.5% of households have a poor FCS. In terms of the quality of the food consumed, **Table 3** highlights that a significant proportion of households (64.1%) had consumed vitamin A-rich foods daily in the seven days leading up to the survey. Similarly, 48.7% of households reported consuming protein-rich foods daily during the same period. The consumption of iron-rich foods was also high as 82% of the sampled households indicated that they had at least consumed these foods in the seven (7) days leading up to the survey. This is commendable as the consumption of iron-rich foods plays a crucial role in addressing problems of anaemia in children and women of childbearing age (Akalu *et al.*, 2021).

Table 3. Household food access and diet quality (%)

Province	Food Consumption Score (%)			Consumption of vitamin A-rich foods (%)			Consumption of protein-rich foods (%)			Consumption of iron-rich foods		
	Poor	Borderline	Acceptable	0 days	1-6 days	7 days	0 days	1-6 days	7 days	0 days	1-6 days	7 days
Bulawayo	4.9	20.5	74.6	6.0	24.0	70.0	8.2	44.3	47.5	17.6	62.8	19.5
Manicaland	2.7	20.0	77.4	2.5	17.0	80.5	8.0	42.9	49.1	14.8	56.6	28.6
Mashonaland Central	5.7	18.7	75.7	3.5	23.0	73.5	4.2	44.0	51.8	13.3	71.5	15.2
Mashonaland East	7.4	15.0	77.5	3.0	24.7	72.3	6.6	38.6	54.8	14.6	68.3	17.0
Mashonaland West	5.0	36.3	58.6	5.3	39.4	55.3	7.1	50.6	42.2	19.2	73.2	7.7
Matabeleland North	17.5	22.0	60.5	15.2	55.2	29.7	12.2	51.2	36.7	33.8	57.5	8.7
Matabeleland South	5.9	19.7	74.4	7.3	26.1	66.5	7.2	36.2	56.6	15.7	61.5	22.8
Midlands	8.8	25.1	66.1	9.4	30.4	60.2	13.5	39.6	46.9	21.8	58.7	19.5
Masvingo	7.4	27.1	65.5	8.0	37.2	54.8	12.4	47.5	40.1	21.5	60.8	17.6
Harare	4.8	18.9	76.3	3.8	28.7	67.6	5.2	41.3	53.5	14.3	66.0	19.7
National	**6.5**	**22.3**	**71.2**	**6.1**	**29.8**	**64.1**	**8.4**	**42.9**	**48.7**	**18.0**	**63.9**	**18.1**

4.4 Child Nutrition

In this section, the descriptive and inferential analyses for child nutrition status are presented. Childhood malnutrition is a pressing global issue that affects millions of children in both rural and urban areas. Studies by Woodhill et al. (2022) and Mutsiya et al. (2021) show that while progress has been made in combating malnutrition in rural settings, children in urban areas face unique challenges that impact their nutrition.

Despite the abundance of food sources in urban areas, many low-income households struggle to access nutritious and affordable food. Limited access to fresh produce and reliance on processed and fast food contribute to poor dietary habits among urban children. Implementing targeted nutrition education programmes in urban communities can empower parents and caregivers with the knowledge and skills needed to provide balanced and nutritious meals for their children. These programmes can include cooking demonstrations, workshops on healthy eating habits, and guidance on food budgeting. Community gardens and urban farming projects can promote food security and increase access to fresh produce. Furthermore, health facilities in urban areas can play a crucial role in addressing child malnutrition by integrating nutrition screening, counseling, and supplementation services into routine healthcare visits. Collaboration with community health workers and nutritionists can ensure that children receive comprehensive care and support for their nutritional needs.

Child malnutrition in urban areas is a complex issue that requires multi-faceted interventions to address the underlying factors contributing to poor nutritional status among children. By implementing targeted strategies that focus on nutrition education, food access, environmental improvements, and healthcare integration, significant progress can be made in improving the health and well-being of urban children. It is essential for policymakers, healthcare providers, community organizations, and families to work together to ensure that every child has access to adequate nutrition for healthy growth and development.

4.4.1 Descriptives of child nutrition status (6 months to 59 months)

The indicators such as stunting, wasting, overweight, and underweight are used to measure nutritional imbalance. This imbalance can result in either undernutrition (assessed from stunting, wasting, and underweight) or overweight and obesity. Child growth is recognized globally as a significant indicator of nutritional status and population health. The proportion of children with low height-for-age (stunting) reflects the combined effects of undernutrition and infections since birth, and even before birth. This measure can therefore be interpreted as an indication of poor environmental conditions or long-term restriction of a child's growth potential. The proportion of children who have low weight-for-age (underweight) can reflect wasting (i.e., low weight-for-height), indicating acute weight loss or stunting, or both. Thus, underweight is a composite indicator that may be difficult to interpret.

Table 4. Prevalence thresholds for wasting, overweight and stunting in children under 5 years (de Onis et al., 2019)

Indicators	**Prevalence cut-off values for public health significance**
Stunting	<2.5%: very low 2.5 to <10%: low 10 to <20%: medium 20 to <30%: high ≥30%: very high
Wasting	<2.5%: very low 2.5 to <5%: low 5 to <10%: medium 10 to <15%: high ≥15%: very high
Overweight	<2.5%: very low 2.5 to <5%: low 5 to <10%: medium 10 to <15%: high ≥15%: very high

Table 5 shows that the national average stunting level was 23.2%, which is categorised as high (see **Table 4**). Among the provinces, Matabeleland North had the highest stunting level at 29.7%, while Mashonaland West had the lowest at 19.2%. Matabeleland North also had the highest proportion of underweight children (16.7%) and the second highest proportion of wasted (9.4%), overweight (4.7%), and obese (6.1%) children. Harare province had the highest proportion of overweight (5%) and obese (7.7%) children.

According to literature (Cioana et al., 2022 and Zimmet, 2017), children who are overweight or obese face a higher risk of developing serious health issues such as type 2 diabetes, high blood pressure, asthma, respiratory problems, sleep disorders, and liver disease. It is crucial to develop coherent and comprehensive strategies to prevent and manage these conditions effectively and sustainably. The problem of overweight and obesity is occurring simultaneously with ongoing issues of undernutrition and micronutrient deficiencies, creating a "triple burden" of nutrition-related health challenges (Christian and Dake, 2022). Therefore, efforts to prevent and control childhood undernutrition (stunting and wasting), micronutrient deficiencies (hidden hunger), and overnutrition (overweight and obesity) must be integrated with actions to achieve other global nutrition targets.

Table 5. Prevalence of child malnutrition (stunting, underweight, wasting, overweight and obesity)

Province	Prevalence (%)				
	Stunting	Underweight	Wasting	Overweight	Obese
Bulawayo	24.6	9.6	7.0	3.5	5.3
Manicaland	21.8	8.8	8.7	3.9	5.3
Mashonaland Central	20.7	9.2	4.4	1.1	1.8
Mashonaland East	23.2	8.6	3.5	4.0	4.8
Mashonaland West	19.2	6.7	**10.2**	3.9	4.6
Matabeleland North	**29.7**	**16.7**	9.4	4.7	6.1
Matabeleland South	20.8	7.6	3.6	2.9	3.6
Midlands	21.2	7.1	3.5	2.7	3.8
Masvingo	20.5	6.8	2.2	2.4	3.7
Harare	26.2	11.1	6.0	**5.0**	**7.7**
National	**23.2**	**9.1**	**5.6**	**3.7**	**5.2**

4.4.2 Descriptives of Diet Quality for Children (6 months to 59 months)

Minimum Acceptable Diet (MAD) is a measure used to evaluate the quality and adequacy of a child's diet from 6 to 59 months of age (Sapkota *et al.*, 2022). Minimum Meal Frequency (MMF) is a proxy indicator for a child's energy requirements, and it examines the number of times a child aged 6 months to 59 months received foods other than breast milk. Insufficient dietary diversity and meal frequency can put infants and young children at risk of malnutrition, including stunting, micronutrient deficiencies, and increased morbidity and mortality (Wagris *et al.*, 2019).

The findings in **Table 6** reveal that a 34.1% of the sampled children aged 6 to 59 months had achieved the MMF, while 23.6% had attained the Minimum Dietary Diversity (MDD) and 10.4% had achieved the MAD.

Table 6. Diet quality for children (6 months to 59 months)

Province	Proportion of Children (%)		
	Minimum Meal Frequency	Minimum Dietary Diversity	Minimum Acceptable Diet
Bulawayo	37.6	20.5	11.9
Manicaland	35.9	16.7	2.6
Mashonaland Central	34.2	33.3	9.4
Mashonaland East	39.3	33.9	17.0
Mashonaland West	25.4	17.8	5.9
Matabeleland North	36.4	9.1	3.9
Matabeleland South	34.1	27.6	13.5
Midlands	29.9	17.5	8.0

Masvingo	35.3	17.4	6.5
Harare	34.6	28.6	12.6
National	**34.1**	**23.6**	**10.4**

Table 7 shows that 52.4% of the sampled children had a high intake of sweet beverages, with Matabeleland South province having the highest proportion at 61.8%. Nationally, 11.6% of children consumed unhealthy foods, with Harare having the highest proportion at 15.8%. The findings also revealed that 87.2% of the sampled children had consumed fruits or vegetables 24 hours prior to the survey and 35.6% had consumed eggs and/or flesh meat.

Consuming eggs and/or flesh meat is linked to increased energy, protein, zinc, vitamin D, essential fatty acid, vitamin B12, iron, phosphorus, and selenium intake, as well as longer recumbent length or optimal linear growth(Hailu *et al.*, 2022). Dietary patterns start during early childhood and can persist into adulthood. Hence, it is a matter of public health concern when young children consume excessive amounts of unhealthy foods, such as those high in sugar (Mahajan *et al.*, 2021).

Table 7. Consumption of Unhealthy foods and non-consumption of important foods among children

Province	Proportion of children (%)			
	Consumption of unhealthy foods	Consumption of sweet beverages	Zero/non-consumption of fruit and vegetables	Egg and Flesh consumption
Bulawayo	15.0	45.0	11.9	27.8
Manicaland	3.8	56.4	12.8	32.1
Mashonaland Central	12.0	60.7	9.4	42.7
Mashonaland East	8.5	44.6	9.8	43.3
Mashonaland West	7.0	54.1	15.1	26.5
Matabeleland North	0.0	51.9	22.1	20.8
Matabeleland South	11.8	61.8	9.4	41.2
Midlands	10.7	39.2	17.0	36.7
Masvingo	9.0	58.7	15.9	28.9
Harare	15.8	60.3	10.4	40.1
National	**11.6**	**52.4**	**12.8**	**35.6**

4.4.3 Association of Household Demographics and Child Nutrition Status (6 months to 59 months)

The results in **Table 8** indicate that child nutrition status (age 6 months to 59 months) is influenced by factors such as religion, household location, household size, and household head income. Specifically, the data show that households following the Pentecostal, Apostolic Sect, and Zion religions were more likely to have stunted children, all things being constant. Increasing household income by 1% was associated with a 4% decrease in the likelihood of having a stunted child, while increasing household size by one member was linked to a 2.3% increase in the probability of having a stunted child.

In terms of underweight children (age 6 months to 59 months), the results in **Table 8** indicate that age, sex, marital status of the household head, household income, size, and household location were the determinants. Female-headed households had a 4.4% higher probability of having underweight children as compared to their male counterparts, *ceteris paribus*. Similarly, households with informally employed heads were 2.2% more likely to have underweight children. Increasing the number of household members by one was associated with a 1.2% increase in the propensity of the household to have underweight children, *ceteris paribus*.

Table 8 displays the relationship between background characteristics and diet quality, that is, MMF, MDD, and MAD. The results reveal that increasing the income level of household head by 1% was associated with a 9.3% increased likelihood of children in the household achieving the MMF, at the 1% level of significance, all things being constant. Similarly, a 1% increase in the income level of the household head was associated with a 12% and 7.6% probability of children in the household attaining MDD and MAD, respectively, at the 1% level of significance, *ceteris paribus*. There was no significant association between the sex of the household head and the three indicators of diet quality for children. Furthermore, the results show that at the 1% level of significance and all things being constant, children from households belonging to Protestantism, Pentecostalism, the Apostolic Sect, and Zionism had a reduced probability of achieving MMF, MDD, MAD, and an increased probability of having stunted children, *ceteris paribus*.

Table 8. Associations between household demographics and child nutrition status and diet quality (6 Months to 59 Months)

Variables	Child Nutrition Status								Diet Quality					
	Stunting		Underweight		Wasting		Overweight & Obesity		MMF		MDD		MAD	
	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se	coef	se
Household head age	-0.000	(0.000)	-0.000**	(0.000)	-0.000	(0.000)	0.000	(0.000)	-0.000	(0.000)	-0.000**	(0.000)	-0.000	(0.000)
Female household head	0.033	(0.025)	0.044**	(0.018)	0.023*	(0.013)	0.006	(0.012)	-0.038	(0.040)	0.027	(0.038)	-0.031	(0.027)
Married living apart	0.024	(0.028)	-0.039**	(0.018)	-0.034***	(0.013)	0.011	(0.016)	0.085*	(0.045)	-0.029	(0.041)	0.058*	(0.032)
Divorced/separated	-0.002	(0.032)	-0.027	(0.023)	-0.013	(0.017)	-0.010	(0.016)	0.008	(0.049)	0.052	(0.048)	0.072**	(0.034)
Widow/widower	0.041	(0.034)	-0.049**	(0.023)	-0.031*	(0.017)	0.005	(0.017)	0.106*	(0.055)	-0.021	(0.048)	0.061*	(0.035)
Cohabiting	0.049	(0.065)	-0.049	(0.037)	-0.044*	(0.025)	0.021	(0.036)	-0.073	(0.084)	0.017	(0.074)	0.086	(0.067)
Never married	0.014	(0.045)	-0.033	(0.030)	0.015	(0.024)	0.001	(0.020)	-0.015	(0.060)	-0.080	(0.053)	-0.012	(0.037)
Primary level	-0.023	(0.053)	-0.024	(0.039)	-0.017	(0.030)	-0.059*	(0.030)	0.145**	(0.071)	0.021	(0.061)	-0.015	(0.045)
ZJC level	-0.036	(0.052)	-0.039	(0.039)	-0.023	(0.030)	-0.036	(0.031)	0.091	(0.072)	0.005	(0.061)	-0.019	(0.045)
O level	-0.002	(0.048)	-0.052	(0.036)	-0.028	(0.028)	-0.034	(0.030)	0.138**	(0.065)	0.055	(0.057)	0.009	(0.043)
A level	-0.015	(0.055)	-0.072*	(0.039)	-0.041	(0.030)	-0.038	(0.032)	0.123	(0.079)	0.094	(0.072)	-0.007	(0.052)
Diploma/Certificate after primary	0.040	(0.074)	-0.010	(0.054)	-0.063**	(0.032)	-0.024	(0.045)	0.162	(0.111)	-0.097	(0.086)	-0.029	(0.071)
Diploma/Certificate after secondary	-0.023	(0.055)	-0.060	(0.040)	-0.028	(0.032)	-0.027	(0.034)	0.192**	(0.082)	0.137*	(0.075)	0.064	(0.058)
Graduate/post-graduate	-0.018	(0.058)	-0.067*	(0.040)	-0.002	(0.035)	-0.022	(0.034)	0.026	(0.083)	0.107	(0.078)	0.021	(0.060)
Formally employed	0.004	(0.019)	-0.009	(0.012)	0.001	(0.010)	-0.006	(0.010)	-0.027	(0.031)	0.006	(0.027)	0.002	(0.019)
Informally employed	0.010	(0.016)	0.022**	(0.011)	0.008	(0.008)	-0.001	(0.008)	-0.000	(0.025)	0.027	(0.021)	0.001	(0.014)
Household head disability	-0.019	(0.060)	0.060	(0.052)	0.005	(0.030)	-0.011	(0.031)	0.064	(0.095)	0.073	(0.086)	0.051	(0.059)
Household has a chronically ill person	0.003	(0.013)	-0.002	(0.009)	-0.004	(0.007)	-0.000	(0.006)	-0.015	(0.021)	0.026	(0.018)	0.015	(0.013)
Protestant	0.064**	(0.026)	-0.000	(0.019)	-0.022	(0.016)	-0.038**	(0.017)	-0.098*	(0.050)	-0.125***	(0.047)	-0.122***	(0.039)
Pentecostal	0.084***	(0.023)	0.020	(0.017)	-0.020	(0.015)	-0.037**	(0.016)	-0.125***	(0.046)	-0.136***	(0.042)	-0.119***	(0.036)
Apostolic Sect	0.111***	(0.024)	0.016	(0.017)	-0.012	(0.015)	-0.022	(0.016)	-0.121***	(0.046)	-0.137***	(0.042)	-0.127***	(0.036)
Zion	0.094***	(0.034)	-0.008	(0.022)	-0.026	(0.018)	-0.029	(0.019)	-0.122**	(0.060)	-0.224***	(0.051)	-0.188***	(0.039)
Other Christian	0.042	(0.034)	-0.011	(0.023)	-0.005	(0.021)	0.011	(0.024)	-0.134**	(0.062)	-0.141**	(0.056)	-0.165***	(0.043)
Islam	0.047	(0.069)	0.008	(0.054)	0.083	(0.064)	-0.084***	(0.016)	-0.011	(0.162)	-0.295***	(0.101)	-0.220***	(0.046)
Traditional	0.005	(0.117)	-0.008	(0.070)	0.073	(0.107)	-0.079***	(0.017)	-0.203	(0.161)	-0.112	(0.167)	-0.111	(0.126)
Other religion	0.108	(0.084)	0.052	(0.058)	0.007	(0.046)	-0.038	(0.040)	-0.032	(0.170)	-0.167	(0.139)	-0.139	(0.099)
No religion	0.132***	(0.034)	0.007	(0.023)	-0.005	(0.021)	-0.025	(0.021)	-0.030	(0.060)	-0.150***	(0.054)	-0.125***	(0.043)
in(income)	-0.040***	(0.010)	-0.018***	(0.007)	-0.002	(0.006)	0.009*	(0.005)	0.093***	(0.015)	0.120***	(0.014)	0.076***	(0.011)
Household size	0.023***	(0.005)	0.012***	(0.003)	0.003	(0.003)	-0.002	(0.002)	-0.005	(0.006)	-0.014***	(0.005)	-0.011***	(0.003)

High density	-0.035	(0.022)	0.017	(0.014)	0.003	(0.010)	-0.004	(0.011)	-0.015	(0.034)	-0.036	(0.031)	0.004	(0.022)
Bulawayo	-0.024	(0.024)	-0.030*	(0.017)	0.010	(0.013)	-0.019	(0.013)	0.071*	(0.037)	-0.033	(0.031)	0.026	(0.024)
Manicaland	-0.054	(0.034)	-0.024	(0.025)	0.030	(0.022)	-0.032	(0.020)	-0.005	(0.060)	-0.153***	(0.045)	-0.112***	(0.025)
Mash Central	-0.062**	(0.030)	-0.028	(0.022)	-0.016	(0.016)	-0.064***	(0.012)	0.002	(0.053)	0.041	(0.048)	-0.037	(0.031)
Mash East	-0.028	(0.029)	-0.021	(0.020)	-0.025**	(0.012)	-0.030**	(0.014)	0.052	(0.040)	0.051	(0.039)	0.054*	(0.029)
Mash West	-0.074***	(0.024)	-0.056***	(0.016)	0.050***	(0.017)	-0.030**	(0.013)	-0.076*	(0.041)	-0.077**	(0.038)	-0.053**	(0.023)
Mat North	0.032	(0.035)	0.057**	(0.028)	0.028	(0.021)	-0.026	(0.019)	0.059	(0.064)	-0.179***	(0.040)	-0.078***	(0.028)
Mat South	-0.050*	(0.028)	-0.039**	(0.018)	-0.026**	(0.013)	-0.045***	(0.013)	0.006	(0.043)	-0.010	(0.040)	0.022	(0.030)
Midlands	-0.048**	(0.021)	-0.052***	(0.014)	-0.029***	(0.010)	-0.043***	(0.011)	-0.022	(0.032)	-0.090***	(0.028)	-0.027	(0.020)
Masvingo	-0.061**	(0.026)	-0.051***	(0.017)	-0.039***	(0.010)	-0.044***	(0.013)	0.021	(0.040)	-0.100***	(0.034)	-0.050**	(0.023)
Constant	0.346***	(0.082)	0.199***	(0.057)	0.102**	(0.045)	0.103**	(0.047)	-0.138	(0.122)	-0.200*	(0.108)	-0.140*	(0.082)
Observations	5,267		5,267		5,267		5,267		2,353		2,353		2,353	
R-squared	0.021		0.019		0.018		0.013		0.037		0.087		0.072	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.4.4 *Relationship between Food Security Indicators and Child Nutrition Status (6 months to 59 months)*

Table 9 presents the results for the relationship between food security indicators and the nutritional status of children aged 6 months to 59 months. The results indicate that households experiencing hunger had a higher chance of having stunted and wasted children, with the likelihood increasing by 1.1% and 1% respectively, at the 10% and 1% significance level. Urban agriculture was associated with a 1.6% decrease in the probability of the household having wasted children at the 10% level of significance, *ceteris paribus*. At the 5% significance level, households employing reduced coping strategies had a 0.1% increased chance of having stunted and wasted children, all things being constant.

Table 9. Association of Child nutrition status and Household Food Security (6 months to 59 months)

Variables	Stunting		Underweight		Wasting		Overweight & Obesity	
	Coef	se	coef	se	coef	se	coef	se
Food Security								
HHS	0.011*	(0.006)	0.000	(0.004)	0.010***	(0.004)	0.003	(0.003)
HDDS	0.001	(0.004)	0.001	(0.002)	0.000	(0.002)	-0.001	(0.002)
FCS	-0.001**	(0.000)	-0.001**	(0.000)	0.000	(0.000)	0.000	(0.000)
Food Insecurity	0.003	(0.015)	0.008	(0.010)	-0.004	(0.007)	-0.010	(0.007)
Water, Sanitation and Hygiene								
Unimproved sanitation	0.048	(0.034)	0.038	(0.027)	0.010	(0.019)	0.024	(0.019)
Unimproved water	-0.033	(0.041)	-0.010	(0.028)	0.012	(0.025)	-0.002	(0.022)
Limited water	0.033	(0.039)	-0.009	(0.028)	-0.029**	(0.014)	-0.003	(0.015)
Urban agriculture	-0.002	(0.020)	-0.016	(0.013)	-0.016*	(0.009)	-0.009	(0.009)
Climate Change								
Climate change adaption	0.000	(0.003)	-0.003	(0.002)	0.001	(0.001)	-0.002	(0.002)
Climate change anxiety	-0.004	(0.003)	0.002	(0.002)	0.000	(0.002)	0.001	(0.002)
Climate change knowledge	0.001	(0.002)	0.000	(0.001)	-0.000	(0.001)	0.001	(0.001)
Reduced livelihood coping strategies								
Reduced coping strategy index	0.001**	(0.001)	0.000	(0.000)	0.001**	(0.000)	-0.000	(0.000)
Livelihood coping strategy index	-0.001	(0.015)	0.005	(0.010)	-0.010	(0.008)	0.005	(0.008)
Social Support								
Government	0.035	(0.027)	-0.011	(0.017)	-0.013	(0.013)	0.007	(0.014)
UN & NGOs	0.088**	(0.039)	0.008	(0.025)	-0.027**	(0.013)	0.006	(0.018)

Churches	-0.145***	(0.039)	0.027	(0.042)	0.032	(0.032)	0.003	(0.031)
Relatives urban	-0.007	(0.032)	-0.027	(0.019)	-0.004	(0.015)	0.007	(0.017)
Relatives rural	-0.020	(0.032)	-0.024	(0.021)	-0.021	(0.013)	0.017	(0.018)
Diaspora	-0.013	(0.034)	-0.013	(0.020)	-0.003	(0.017)	-0.003	(0.018)
Observations	5,272		5,272		5,272		5,272	
R-squared	0.005		0.003		0.003		0.001	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.4.5 Relationship between Diet Quality for Children (6-23 months) and Household Food Security Indicators

The findings in **Table 10** indicate that for every point increase in Food Consumption Score (FCS) at the 1% level of significance, the chances of the household have children achieving MDD increased by 0.195%, all other things being equal. In addition, at the 1% level of significance and all things being constant, a point increase in HDDS was associated with a 2.55% increase in the likelihood of household having its children achieve MMF, a 3.72% increase in the likelihood of the children achieve MDD, and a 2.52% increase in the likelihood of the children attaining MAD. The pattern was similar for food secure household. **Table 10** also reveals that children in households experiencing hunger had a 2.39% reduced chance of achieving MMF at a 1% level of significance and a 1.02% reduced chance of achieving MAD at the 5% level of significance, *ceteris paribus*.

These results support the findings of previous studies conducted in Ghana (Agbadi, 2016; Agbadi *et al.*, 2017) and Zambia (Bwalya *et al.*, 2023), which demonstrated that children in food-secure households are significantly more likely to receive the recommended minimum acceptable diet compared to children in food-insecure households.

Table 10. Association of household Food security and diet quality for children (6-23 months)

Variables	Minimum Meal Frequency	Minimum Dietary Diversity	Minimum Acceptable Diet
FSC	0.000362	0.00195***	0.000825
	(0.000714)	(0.000683)	(0.000515)
HDDS	0.0255***	0.0372***	0.0252***
	(0.00580)	(0.00552)	(0.00415)
HHS	-0.0239***	-0.0107	-0.0102**
	(0.00757)	(0.00678)	(0.00410)
Food Security	0.0250*	0.0375***	0.0238**
	(0.0139)	(0.0131)	(0.00943)
Observations	2,355	2,355	2,355
R-squared	0.029	0.083	0.065

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.5 Exclusive Breast Feeding for Children Under Six Months

Exclusive breastfeeding, refers to the practice of providing infants under six months of age with breast milk alone and no other liquids or solid foods (Jama *et al.*, 2020), and is widely acknowledged as a crucial aspect of infant health and development. Breast milk is considered nature's ideal nourishment for babies, containing all the necessary nutrients, vitamins, and antibodies for healthy growth and development. It is easily digested and specifically designed to meet the unique nutritional needs of a growing baby, offering a balanced mix of proteins, fats, carbohydrates, and other essential nutrients (Adda *et al.*, 2020). The bioactive components of breast milk, such as antibodies, enzymes, and white blood cells, are important for bolstering the infant's immune system and protecting against infections and diseases (Alimoradi *et al.*, 2014). Moreover, exclusive breastfeeding has been shown to reduce the risk of various health problems in infants, including ear infections, respiratory infections, gastrointestinal issues, obesity, diabetes, and allergies. Breast milk's immunological properties not only safeguard infants from illnesses but also provide long-term health benefits by decreasing the risk of chronic conditions later in life (Andreas *et al.*, 2015).

In addition to benefiting infants, exclusive breastfeeding also offers advantages for mothers. It promotes quicker postpartum recovery and facilitates bonding between mothers and infants. It can reduce the risk of postpartum depression and aid in weight loss by burning extra calories. Furthermore, it lowers the risk of certain cancers, such as breast and ovarian cancer. In conclusion, exclusive breastfeeding for the first six months of life, followed by continued breastfeeding alongside appropriate complementary foods for up to two years and beyond, is crucial for the health and well-being of both infants and mothers. The benefits of exclusive breastfeeding are extensive, spanning nutritional, immunological, emotional, economic, and environmental advantages (Mandula, 2024).

4.5.1 Descriptives for Breast feeding practices

The results presented in **Table 11** show that a high proportion (89.8%) of children (0 to 23 months) were breastfed at some point and 74.4% were breastfed within the first hour after birth. However, the results show that 38.2% of infants under six months of age were exclusively breastfed, falling short of the World Health Assembly's target of 50% by 2025. The findings reveal that infants under six months of age were being fed on solid, semi-solid, or soft foods within the first three days of birth (31.2%), which is an unhealthy and not recommended practice.

Table 11. Breast feeding practices

Province	Proportion of children (%)			
	Ever breast feed	Early initiation of breast feeding	Exclusive breastfeeding	Child given liquid/ semi-solids in 1st 3 days
Bulawayo	89.5	57.1	50.0	34.3
Manicaland	91.9	83.5	29.2	30.3
Mash Central	94.6	72.4	45.5	33.6
Mash East	88.6	79.1	37.3	34.6
Mash West	88.0	69.1	70.0	30.1
Mat North	89.3	60.0	37.5	32.9
Mat South	91.0	85.4	36.7	21.6
Midlands	88.5	78.7	37.8	27.8
Masvingo	94.4	86.4	36.1	40.0
Harare	89.0	73.9	29.1	30.0
National	**89.8**	**74.4**	**38.2**	**31.2**

4.5.2 Association of Background Characteristics and Exclusive Breast Feeding (0 to 23 months)

The findings presented in **Table 12** how that households headed by elderly persons and those that practiced traditional religion were more likely to practice exclusive breastfeeding, *ceteris paribus*. At the 1% level of significance, households practicing traditional religion had a 57.3% chance of practicing exclusive breast feeding, *ceteris paribus*.

While there is conflicting evidence in literature concerning the influence of traditional and cultural beliefs on exclusive breastfeeding, the above finding is supported by studies conducted by Mututho *et al.* (2017), Reinsma et al. (2012), and Rahman et al. (2017). These studies found that in certain traditional and cultural groups, there is a strong belief that breastfeeding is associated with the intellectual development and good health of the infant, resulting in a higher rate of exclusive breastfeeding. Therefore, it is important to incorporate cultural beliefs in efforts to promote exclusive breastfeeding.

The results in **Table 12** also reveal a significant relationship between spousal cohabitation and exclusive breastfeeding, with cohabiting couples having a 26.75% lower probability of practicing exclusive breastfeeding. Although there is evidence in literature showing either a positive correlation or no correlation between cohabitation and exclusive breast feeding (Andhika, 2022; Yan *et al.*, 2023), this finding can be supported by the study of Corsack *et al.* (2022). The authors found that the relationship between cohabitation and breastfeeding practices varied based on

race/ethnicity. They concluded that current trends in breastfeeding practice may directly influence partners' support and encouragement for breastfeeding, which is often aligned with social norms and their family's previous breast feeding behaviours.

Table 12. Correlates of household background characteristics and practicing exclusive breast feeding

Variables	Exclusive breast feeding	
	coef	Se
Household head age	0.001***	(0.000)
Female household head	-0.013	(0.079)
Married living apart	0.014	(0.091)
Divorced/separated	0.087	(0.102)
Widow/widower	-0.091	(0.095)
Cohabiting	-0.267***	(0.060)
Never married	0.001	(0.145)
Primary level	-0.178	(0.118)
ZJC level	-0.028	(0.130)
O level	-0.102	(0.111)
A level	-0.076	(0.135)
Diploma/Certificate after primary	0.175	(0.181)
Diploma/Certificate after secondary	0.016	(0.148)
Graduate/post-graduate	0.087	(0.171)
Formally employed	0.046	(0.060)
Informally employed	-0.008	(0.051)
Household head disability	0.007	(0.160)
Household has a chronically ill person	-0.008	(0.040)
Protestant	-0.027	(0.100)
Pentecostal	0.028	(0.093)
Apostolic Sect	-0.106	(0.092)
Zion	-0.025	(0.125)
Other Christian	0.075	(0.119)
Islam	0.070	(0.271)
Traditional	0.573***	(0.126)
Other religion	-0.157	(0.231)
No religion	-0.106	(0.109)
in(income)	0.012	(0.028)
Household size	-0.013	(0.010)
High density	0.016	(0.064)
Bulawayo	0.200***	(0.070)
Manicaland	-0.025	(0.099)
Mash Central	0.126	(0.095)
Mash East	0.095	(0.079)
Mash West	0.152*	(0.080)
Mat North	0.107	(0.115)

Mat South	0.118	(0.103)
Midlands	0.064	(0.058)
Masvingo	0.050	(0.074)
Constant	0.316	(0.206)
Observations	611	
R-squared	0.086	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.5.3 Association of Household Food Security Indicators and Exclusive Breast Feeding

Table 13 presents the factors related to food security and practicing exclusive breastfeeding in children aged 0 to 23 months) The results indicate that households experiencing hunger had a 4.3% higher likelihood of not practicing exclusive breastfeeding compared to households not facing hunger. The findings also show that when all other factors are held constant, households employing reduced coping strategies had a 9.1% lower chance of practicing exclusive breastfeeding at the significance level of 5%.

Table 13. Correlates of household food security indicators and exclusive breast feeding

Variables	**Exclusive breast feeding**	
	coef	se
Food Security	.	(.)
HHS	-0.043***	(0.014)
HDDS	0.007	(0.011)
FCS	-0.001	(0.001)
Food Security	0.025	(0.046)
Reduced coping strategies		
Reduced coping strategy index	-0.003**	(0.001)
Livelihood coping strategy	-0.091**	(0.042)

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.***1***

4.5.4 Factors Associated with Child Diet Quality (6-23 months)

Table 14 shows significant associations between food security indicators and diet quality for children (6-23 months). At the 1% level of significance, children from households in hunger were 2.3% less likely to attain the recommended MMF, *ceteris paribus*. Similarly, all things constant, food insecure households had a 4.4%, 5.8%, and 4.6% reduced chance of attaining the recommend MMF, MDD, and MAD respectively. As expected, children in households where women consumed a good diet were also associated with good diet quality.

There was no association between urban agriculture and children's diet quality. Children from households with knowledge about climate change had a 0.8% increased chance of achieving the recommended MMF at a significant level of 1% and were 0.4% more likely to achieve the recommended MAD, all else being equal. The results also indicate that households with

unimproved sanitation had a 13.4% reduced probability of achieving the recommended MMF at a significance level of 1%, all else being equal. The results also show that households employing coping strategies were less likely to achieve the minimum required diet quality for children aged 6-23 months.

In terms of social support, **Table 14** reveals no association between support from the government, UN/NGOs, churches, or remittances from the diaspora, and children's diet quality. However, support from relatives in rural areas was found to have a positive and significant association with a higher MDD for children aged 6-23 months at a significance level of 5%, all things being equal.

Table 14. Factors associated with children's diet quality (6-23 months)

Variables	MMF		MDD		MAD	
	coef	se	coef	se	coef	Se
Food Security						
HHS	-0.023***	(0.008)	-0.009	(0.007)	-0.009**	(0.004)
HDDS	0.025***	(0.006)	0.037***	(0.005)	0.025***	(0.004)
FCS	0.000	(0.001)	0.002**	(0.001)	0.001	(0.001)
Food insecurity	-0.044*	(0.023)	-0.058***	(0.020)	-0.046***	(0.015)
Women Dietary Diversity						
Minimum dietary diversity	0.021***	(0.008)	0.027***	(0.007)	0.016***	(0.005)
Minimum dietary diversity women	0.008	(0.039)	0.084**	(0.036)	0.030	(0.026)
Urban agriculture	0.006	(0.031)	0.014	(0.029)	0.000	(0.021)
Water and Sanitation and Hygiene						
Unimproved sanitation	-0.134***	(0.043)	0.035	(0.050)	-0.049*	(0.026)
Unimproved water	-0.034	(0.063)	0.074	(0.065)	0.029	(0.047)
Reduced livelihood coping strategies						
Reduced coping strategy index	-0.004***	(0.001)	-0.002***	(0.001)	-0.001***	(0.000)
Livelihood coping strategy index	0.012	(0.023)	-0.022	(0.021)	-0.034**	(0.015)
Climate Change						
Climate change adaptation	-0.007*	(0.004)	0.007*	(0.004)	-0.003	(0.003)
Climate change anxiety	-0.006	(0.006)	0.001	(0.005)	-0.001	(0.004)
Climate change knowledge	0.008***	(0.003)	-0.001	(0.002)	0.004**	(0.002)
Shocks						
Household has a member affected by cholera	-0.019	(0.085)	0.042	(0.073)	0.007	(0.052)
Price increase of basic commodities	0.003	(0.032)	-0.036	(0.030)	-0.011	(0.021)
High transport costs	0.062***	(0.023)	0.021	(0.020)	0.036**	(0.014)
Increase in rentals	-0.010	(0.021)	-0.022	(0.019)	-0.036***	(0.013)

Loss of employment	0.009	(0.033)	-0.019	(0.029)	-0.010	(0.021)
Death of main income earner in the household	0.025	(0.056)	-0.043	(0.048)	0.036	(0.038)
Livestock diseases	-0.058	(0.083)	0.184**	(0.084)	0.021	(0.059)
Crop pests and disease	-0.028	(0.075)	-0.087	(0.061)	-0.104***	(0.029)
Diarrheal diseases incidents among households	-0.034	(0.058)	-0.024	(0.057)	0.010	(0.036)
Malaria diseases incidents among households	-0.038	(0.101)	0.285**	(0.134)	-0.016	(0.050)
Weather related (eg floods, frost)	-0.065	(0.078)	-0.120**	(0.060)	-0.059*	(0.035)
Drought/Prolonged mid-season dry spell	-0.077***	(0.027)	-0.033	(0.024)	-0.038**	(0.016)
Human wildlife conflict	-0.112**	(0.047)	0.007	(0.052)	-0.049*	(0.026)
Conflict/social unrest	-0.055	(0.111)	-0.044	(0.092)	-0.026	(0.063)
By laws (demolitions of houses)	-0.058	(0.098)	-0.084	(0.075)	-0.001	(0.064)
By laws (affected urban agriculture)	-0.038	(0.043)	-0.024	(0.036)	0.016	(0.028)
Social support						
Government	-0.037	(0.046)	0.067	(0.043)	-0.008	(0.029)
UN&NGOs	0.061	(0.064)	-0.027	(0.052)	-0.000	(0.040)
Churches	-0.023	(0.083)	-0.026	(0.072)	-0.056	(0.041)
Relatives urban	-0.008	(0.056)	-0.128***	(0.043)	-0.084***	(0.023)
Relatives rural	-0.014	(0.050)	0.144**	(0.056)	0.054	(0.034)
Diaspora	0.052	(0.056)	0.049	(0.048)	0.012	(0.034)
Observations	2,355		2,355		2,355	
R-squared	0.030		0.087		0.069	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.6 Adolescents Nutrition

Adequate nutrition during adolescence is crucial for optimal growth and development. Adolescence, which encompasses the ages of 10 to 19 (Salam *et al.*, 2020), represents over one-fifth of the global population. This period of life is transformative and has long-term implications for an individual's health as well as the health of potential future children (Norris *et al.*, 2022). Insufficient nutrition can lead to delayed growth, stunted development, and other complications. Given the rapid growth and development that occurs during adolescence, it is imperative that adolescents receive adequate intake of both macro and micronutrients (Salam *et al.*, 2016). The nutrition status of adolescents in urban areas can vary depending on factors such as socio-economic status, dietary habits, access to healthy food options, and lifestyle choices. However, many health programmes tend to overlook the nutritional needs of adolescents, assuming they are generally healthy. This assumption is not always accurate. Addressing the nutrition status of

urban adolescents requires a comprehensive approach that includes education, access to healthy food options, promotion of physical activity, and support from healthcare providers and community resources.

4.6.1 Background characteristics and adolescent nutrition status

Table 15 displays the relationship between background characteristics and nutrition status among adolescents. Households led by individuals who were never married or were divorced/separated had a 8.2% and 5.89% higher likelihood of having a stunted adolescent, respectively, *ceteris paribus*. Moreover, an increase in household size by one member was linked to poor nutrition status among adolescents. Larger households had a higher propensity for having stunted, underweight, wasted, and overweight/obese adolescents, with increases of 1.53%, 0.68%, 1.2%, and 2.7% respectively, at the 1% level of significance, assuming all other factors are constant.

Households that followed traditional religion/beliefs had a 12.7% and 6.65% reduced likelihood of having stunted and wasted adolescents, respectively. This finding emphasises the potential benefits of incorporating traditional or cultural nutrition practices or foods based on the survey's evidence of a positive relationship between traditional religion/beliefs and certain nutrition outcomes. A 1% increase in household income level was associated with a 1.19% reduced chance of having underweight adolescents at the 1% level of significance, *ceteris paribus*. The results also show a 2.71% increased chance of having overweight/obese adolescents with higher income levels.

These results show the importance of nutrition education for adolescents. According to Ziso *et al.* (2022), the prevalence of convenience stores and fast-food outlets in urban areas is contributing to higher rates of malnutrition, obesity, and diet-related diseases among urban adolescents.

Table 15. Association of household characteristics and nutrition status of adolescents

Variables	Stunting	Underweight	Wasting	Overweight & Obesity
Household head age	-0.000127*	0.000103	9.90e-06	0.000612*
	(7.60e-05)	(0.000203)	(6.71e-05)	(0.000365)
Female household head	-0.00315	0.0255**	0.00941	0.0271
	(0.0193)	(0.0108)	(0.0136)	(0.0243)
Married living apart	0.0372*	0.000151	0.0398**	-0.00770
	(0.0214)	(0.0122)	(0.0172)	(0.0285)
Divorced/separated	0.0589**	-0.0149	-0.00423	0.0108
	(0.0252)	(0.0137)	(0.0163)	(0.0306)
Widow/widower	0.0361	-0.0103	0.00381	-0.0162
	(0.0242)	(0.0142)	(0.0170)	(0.0312)
Cohabiting	-0.0665	0.0152	-0.0537**	-0.0549
	(0.0420)	(0.0379)	(0.0235)	(0.0664)
Never married	0.0820***	-0.0154	0.00625	0.0544

	(0.0296)	(0.0117)	(0.0177)	(0.0371)
Primary level	-0.0355	-0.00387	-0.0347	0.00704
	(0.0425)	(0.0218)	(0.0328)	(0.0492)
ZJC level	-0.0397	-0.0129	-0.0327	0.0386
	(0.0418)	(0.0225)	(0.0334)	(0.0505)
O' level	-0.0408	-0.0129	-0.0488	0.0447
	(0.0387)	(0.0209)	(0.0306)	(0.0471)
A' level	-0.0970**	-0.0143	-0.0415	0.0302
	(0.0427)	(0.0237)	(0.0348)	(0.0565)
Diploma/Certificate after primary	-0.0144	-0.0145	-0.0988***	0.0767
	(0.0584)	(0.0291)	(0.0343)	(0.0853)
Diploma/Certificate after secondary	-0.0889**	-0.00195	-0.0534	0.0460
	(0.0436)	(0.0247)	(0.0351)	(0.0620)
Graduate/Postgraduate	-0.00299	0.00111	-0.0684**	0.0637
	(0.0486)	(0.0254)	(0.0345)	(0.0652)
Formally employed	-0.00366	0.00466	0.00281	0.0481**
	(0.0146)	(0.00797)	(0.0106)	(0.0216)
Informally employed	0.0326**	0.0190***	0.00209	0.00833
	(0.0131)	(0.00668)	(0.00879)	(0.0163)
Protestant	-0.0362	0.00252	0.00711	-0.0239
	(0.0223)	(0.0118)	(0.0148)	(0.0310)
Pentecostal	-0.0125	0.00501	0.0245*	-0.0167
	(0.0207)	(0.0105)	(0.0133)	(0.0276)
Apostolic Sect	-0.0371*	0.0111	0.0123	-0.0129
	(0.0209)	(0.0110)	(0.0131)	(0.0282)
Zion	-0.0141	0.00426	-0.00861	-0.00676
	(0.0319)	(0.0143)	(0.0174)	(0.0383)
Other Christian	-0.0415	-0.00501	0.0104	-0.0287
	(0.0268)	(0.0128)	(0.0177)	(0.0387)
Islam	-0.0849	0.0215	0.0362	-0.0209
	(0.0530)	(0.0417)	(0.0518)	(0.0908)
Traditional	-0.127***	-0.0205*	-0.0665***	0.0503
	(0.0475)	(0.0116)	(0.0163)	(0.121)
Other religion	-0.0887*	-0.00602	-0.0120	-0.0426
	(0.0457)	(0.0215)	(0.0292)	(0.0657)
No religion	-0.0275	0.0151	0.0124	-0.0573
	(0.0281)	(0.0162)	(0.0191)	(0.0365)
ln (income)	-0.0138	-0.0119***	-0.000260	0.0271**
	(0.00875)	(0.00427)	(0.00619)	(0.0112)
Household size	0.0153***	0.00688***	0.0120***	0.0270***
	(0.00394)	(0.00203)	(0.00307)	(0.00476)
High Density	0.00152	0.00196	0.00711	0.0451*
	(0.0178)	(0.00948)	(0.0114)	(0.0236)
Bulawayo	-0.0379**	-0.0405***	0.0293**	0.00448
	(0.0178)	(0.00924)	(0.0129)	(0.0242)
Manicaland	0.0386	-0.0115	-0.00146	0.104***
	(0.0290)	(0.0145)	(0.0171)	(0.0399)
Mash central	-0.0451*	-0.0264*	-0.0214	-0.0738**
	(0.0259)	(0.0138)	(0.0159)	(0.0298)
Mash East	-0.0447*	-0.0190	0.0117	-0.0419
	(0.0234)	(0.0132)	(0.0162)	(0.0299)
Mash West	0.0470*	-0.00456	-0.00954	-0.0239
	(0.0248)	(0.0141)	(0.0134)	(0.0288)

Mat North	-0.0124	-0.0306**	0.0642**	0.0319
	(0.0277)	(0.0131)	(0.0254)	(0.0364)
Mat South	-0.0921***	-0.0310**	-0.00358	-0.0254
	(0.0207)	(0.0123)	(0.0149)	(0.0320)
Midlands	-0.0868***	-0.0173	-0.00465	-0.0470*
	(0.0178)	(0.0112)	(0.0120)	(0.0243)
Masvingo	-0.0764***	-0.0263**	-0.0162	-0.0582**
	(0.0198)	(0.0114)	(0.0124)	(0.0276)
Constant	0.232**	0.0732	-0.0310	-0.00637
	(0.102)	(0.0486)	(0.0583)	(0.142)
Observations	5,544	5,544	5,544	5,544
R-squared	0.026	0.014	0.017	0.024

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.6.2 Association of Household Food Insecurity and Adolescent Nutrition Outcomes

The results in **Table 16** show that at the 1% level of significance, an increase in FCS was associated with a 0.151% probability of having overweight and obese adolescents. This result corroborates previous finding in **Table 15** on increased chances of overweight and obesity in adolescents when household income increased. The results also show significant relationship between food insecurity and adolescent nutrition outcomes as food insecurity was associated with increased chances of having stunted, underweight, wasted, and overweight/obese adolescents, at the 1% level of significance, *ceteris paribus*. **Table 16** also reveal a significant association between an increase in FCS and the prevalence of overweight and obesity at a 1% level of significance. Additionally, the results highlight a significant relationship between food insecurity and nutritional outcomes in adolescents. Food insecure households had an increased probability of having stunted, underweight, wasted, and overweight/obese adolescent at the 1% level of significance. These findings emphasize the importance of addressing food insecurity as a key factor influencing adolescent nutrition outcomes.

Table 16. Correlates of household food insecurity and nutrition outcomes for adolescents

Variables	Stunting	underweight	Wasting	Overweight & Obesity
FCS	4.56e-05	0.000105	2.55e-05	0.00151***
	(0.000331)	(0.000188)	(0.000259)	(0.000497)
HDDS	-0.00138	-0.00240*	0.000397	0.00523
	(0.00291)	(0.00142)	(0.00201)	(0.00422)
HHS	0.00667	0.00121	-0.000191	-0.00726
	(0.00522)	(0.00287)	(0.00347)	(0.00594)
Food Insecurity	-0.0178***	-0.00764**	-0.00983**	-0.0270***
	(0.00627)	(0.00315)	(0.00425)	(0.00892)
Observations	5,549	5,549	5,549	5,549
R-squared	0.002	0.002	0.001	0.006

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.7 Nutrition Status for Women of Childbearing Age (15–49 years)

Nutrition is vital for the overall health and well-being of women of childbearing age (Hutchesson *et al.*, 2020). It is important for women in this age group to consume enough essential nutrients like folic acid, iron, calcium, and vitamins to maintain optimal health and prevent nutrient deficiencies. Proper nutrition also plays a key role in supporting reproductive functions and ensuring a healthy pregnancy. Maintaining a healthy diet is especially crucial for women of childbearing age as it can impact fertility, pregnancy outcomes, and the health of the developing fetus (Gómez *et al.*, 2020). Adequate nutrition reduces the risk of certain birth defects and complications during pregnancy and childbirth. Additionally, good nutrition can help manage conditions like gestational diabetes and preeclampsia, which can affect both mother and baby. The nutritional status of women in this age group is influenced by various factors, including socioeconomic status, access to food, education level, cultural beliefs, and personal lifestyle choices (Brace *et al.*, 2020).

Individual lifestyle choices, such as smoking, alcohol consumption, and sedentary behavior, can also impact the nutritional status of women (Shlisky *et al.*, 2017). Unhealthy habits can contribute to nutrient deficiencies and increase the risk of chronic diseases (Egger *et al.*, 2014; Schmidt *et al.*, 2016). Similarly, women with lower levels of education may have limited knowledge about nutrition and healthy eating habits (Sansom *et al.*, 2021). Lack of awareness about the importance of a balanced diet can contribute to poor nutrition among women of childbearing age. Cultural beliefs and practices can also influence women's dietary habits. Some cultural beliefs may promote traditional foods that may not provide adequate nutrients for women in this age group (de Diego-Cordero *et al.*, 2021; Ramulondi *et al.*, 2021). Individual lifestyle choices, such as smoking, alcohol consumption, and sedentary behavior, can also impact women's nutritional status (Shlisky *et al.*, 2017). Unhealthy habits can lead to nutrient deficiencies and increase the risk of chronic diseases (Darboux *et al.*, 2022; Di Renzo *et al.*, 2022).

Addressing the factors that influence nutritional status, such as socioeconomic disparities, access to food, education level, cultural beliefs, and lifestyle choices, is crucial for improving the dietary habits of women in this age group. Providing access to affordable and nutritious foods, nutrition education, and healthcare services can support women in making healthy choices and improving their nutritional status for a healthier future.

4.7.1 Relationship between background characteristics and Minimum Dietary Diversity for Women (MDD-W)

Table 17 shows that women of childbearing age from households headed by elderly persons had a 0.58% reduced chance of achieving the MDD-W. This result was statistically significant at the 1% level of significance, *ceteris paribus*. At the 1% level of significance, women of childbearing age from female-headed households had a 94.1% chance of attaining the MDD-W, all things being constant. Except for spousal cohabitation, all other marital statuses were negatively associated with the women ability to achieve the MDD-W. Women of childbearing age from households headed a graduate/postgraduate had a 63.4% increased likelihood of achieving the MDD-W at a 1% significance level, while those headed by heads with primary education had a 29.6% lower chance of attaining the MDD-W. Increasing household income by 1% and increasing household size were associated with women of childbearing age in these households having higher chances of achieving the MDD-W.

Table 17. Relationship between background characteristics and Minimum Dietary Diversity for Women (MDD-W)

VARIABLES	Minimum Dietary Diversity for Women
Household head age	-0.00582***
	(0.00126)
Female household head	0.941***
	(0.0597)
Married living apart	-0.662***
	(0.0731)
Divorced/separated	-0.754***
	(0.0730)
Widow/widower	-1.193***
	(0.0778)
Cohabiting	0.233
	(0.216)
Never married	-0.980***
	(0.0805)
Primary level	-0.296**
	(0.123)
ZJC level	-0.126
	(0.127)
O' level	0.0772
	(0.121)
A' level	0.308**
	(0.150)
Diploma/Certificate after primary	-0.243
	(0.180)
Diploma/Certificate after secondary	0.175
	(0.153)
Graduate/Postgraduate	0.634***
	(0.167)

Formally employed	0.538***
	(0.0526)
Informally employed	0.487***
	(0.0401)
	(0.148)
Protestant	0.306***
	(0.0752)
Pentecostal	0.344***
	(0.0667)
Apostolic Sect	0.263***
	(0.0672)
Zion	0.277***
	(0.0925)
Other Christian	0.139
	(0.0962)
Islam	0.106
	(0.202)
Traditional	-0.376*
	(0.199)
Other religion	-0.0366
	(0.207)
No religion	0.111
	(0.0859)
ln (income)	0.365***
	(0.0269)
Household size	0.114***
	(0.0104)
High Density	-0.0836
	(0.0580)
Bulawayo	0.173***
	(0.0602)
Manicaland	0.589***
	(0.0927)
Mash central	0.769***
	(0.0919)
Mash East	0.517***
	(0.0773)
Mash West	0.0908
	(0.0646)
Mat North	-0.265***
	(0.0831)
Mat South	0.121*
	(0.0727)
Midlands	-0.383***
	(0.0553)
Masvingo	0.00193
	(0.0597)
Constant	-0.776***
	(0.287)
Observations	13,439
R-squared	0.152

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.8 Adult Nutrition

Adult nutrition status plays a crucial role in determining overall health and well-being. A well-balanced diet that includes essential nutrients is vital for maintaining optimal health and preventing nutritional deficiencies (Nieuwenhuizen *et al.*, 2010). More so, adequate nutrition plays a key role in preventing chronic diseases and can help reduce the risk of developing conditions like hypertension, osteoporosis, and certain types of cancer (Han *et al.*, 2009). A healthy diet rich in vitamins, minerals, and antioxidants supports the immune system and helps ward off illnesses and proper nutrition contributes to increased energy levels, improved cognitive function, and enhanced physical performance.

Several factors can influence the nutrition status of adults. Access to nutritious foods can be influenced by socioeconomic factors such as income, education, and location. Individuals with lower socioeconomic status may have limited access to fresh produce and healthy food options, leading to poor nutrition status (Costa *et al.*, 2019). Personal dietary choices and habits play a significant role in determining adult nutrition status. Factors such as food preferences, cultural influences, and eating patterns can impact the quality of one's diet and overall nutritional intake. Lifestyle factors including physical activity, smoking, alcohol consumption, and stress levels can affect adult nutrition status (Boden-Albala *et al.*, 2000; Santos, 2022). Unhealthy lifestyle choices can lead to poor dietary habits and nutrient deficiencies, compromising overall health (Li *et al.*, 2022). Furthermore, the availability of unhealthy food options, fast food establishments, and processed foods in the food environment can influence adult nutrition status. Easy access to high-calorie, low-nutrient foods may contribute to poor dietary choices and unhealthy eating habits.

4.8.1 Prevalence of Adult Nutrition Status Indicators

Table 18 presents findings on nutrition status of adults. The table reveals a relatively high proportion of overweight and obese individuals within the age groups of 18-59 and 60 years and above. Specifically, 27.9% of adults aged 18-59 were overweight, while 22.1% were obese. Likewise, 30.9% of adults aged 60 and above were overweight, and 30.6% were obese. In both age groups, the proportion of adults in the normal category was below 50%.

Increasing obesity is a function of increased caloric intake and decreased energy expenditure. Adults' obesity is a serious health concern and is associated with many chronic diseases, including cardiovascular disease, diabetes, arthritis, gall bladder diseases, certain cancers and respiratory diseases (Ayatollahi *et al.*, 2010). Hence, changing dietary habits, consumption of unhealthy foods and limited physical activity pattern could be the be the reasons for the increase in overweight and obesity in adults in urban areas. There is a need to establish programmes for promoting awareness among the population of the health hazards and means of control for obesity.

Table 18. Prevalence of Nutrition status indicators of adults (18-59 years and 60 years and above)

Province	Adults (18-59 years)				Adults (60 years and above)			
	Normal	Thinness	Overweight	Obese	Normal	Thinness	Overweight	Obese
Bulawayo	47.2	7.1	25.2	20.5	33.0	5.2	33.0	28.9
Manicaland	41.0	3.5	33.1	22.4	25.2	3.4	40.3	31.1
Mashonaland Central	46.6	5.3	28.8	19.2	32.6	12.8	26.7	27.9
Mashonaland East	43.4	4.6	30.9	21.1	36.4	5.2	24.7	33.8
Mashonaland West	45.5	5.6	29.1	19.9	44.9	3.4	28.4	23.3
Matabeleland North	43.1	6.9	27.5	22.5	27.7	4.3	27.7	40.4
Matabeleland South	41.5	5.1	27.9	25.5	26.2	4.9	26.2	42.6
Midlands	44.4	5.2	25.2	25.3	32.4	2.3	31.3	34.0
Masvingo	41.3	3.9	27.3	27.6	25.2	0.9	37.8	36.0
Harare	46.7	4.3	29.4	19.5	37.3	5.9	27.9	29.0
National	**44.8**	**5.2**	**27.9**	**22.1**	**33.7**	**4.7**	**30.9**	**30.6**

4.8.2 Association of Household Characteristics and Adult Nutrition Status

The results presented in **Table 19** reveal that female-headed households had a 9.6% higher chance of having overweight or obese adults, at the 1% level of significance. On the other hand, households headed by spouses who were living apart, divorced, or widowed had an increased probability of having thin adults and a decreased probability of having overweight or obese adults, at the 1% level of significance, *ceteris paribus*.

Households headed by formally or informally employed heads had a reduced probability of having thin or overweight/obese adults, indicating a higher likelihood of having healthy adults. At the 1% level of significance, increasing household income by 1% was associated with an 8.3% higher probability of having overweight and obese adults. This finding aligns with the results for adolescents (**Section 4.6.2**), therefore suggesting the same recommendation of nutrition education.

Furthermore, the results show that households that had chronically ill individuals had a 1% and 12.5% higher probability of having thin and overweight/obese members, respectively, at significance levels of 5% and 1%, all things being equal.

Table 19. Background characteristics and adult nutrition status

Variables	Thinness		Overweight & obese	
	coef	se	coef	se
Household head age	0.000	(0.000)	0.001***	(0.000)
Female household head	-0.035***	(0.009)	0.096***	(0.019)
Married living apart	0.026***	(0.010)	-0.148***	(0.022)
Divorced/separated	0.020**	(0.010)	-0.064***	(0.023)
Widow/widower	0.033***	(0.012)	-0.067***	(0.025)
Cohabiting	-0.019	(0.019)	-0.063	(0.065)
Never married	0.070***	(0.013)	-0.167***	(0.025)
Primary level	0.018	(0.020)	-0.058	(0.042)
ZJC level	0.004	(0.019)	-0.043	(0.043)
O level	-0.011	(0.018)	-0.045	(0.040)
A level	-0.010	(0.020)	-0.076	(0.047)
Diploma/Certificate after primary	0.008	(0.025)	-0.024	(0.063)
Diploma/Certificate after secondary	-0.002	(0.021)	-0.017	(0.049)
Graduate/post-graduate	-0.021	(0.020)	0.065	(0.051)
Formally employed	-0.020***	(0.006)	-0.072***	(0.018)
Informally employed	-0.012**	(0.006)	-0.055***	(0.014)
Household head disability	-0.001	(0.011)	-0.018	(0.029)
Household has a chronically ill person	0.010**	(0.005)	0.125***	(0.012)
Protestant	-0.011	(0.010)	0.043*	(0.025)
Pentecostal	-0.020**	(0.009)	-0.041*	(0.022)
Apostolic Sect	-0.021**	(0.010)	-0.058**	(0.023)
Zion	-0.017	(0.013)	-0.053*	(0.031)
Other Christian	-0.001	(0.014)	-0.034	(0.031)
Islam	-0.028	(0.024)	0.044	(0.073)
Traditional	-0.039	(0.025)	-0.044	(0.081)
Other religion	0.038	(0.032)	0.042	(0.071)
No religion	-0.001	(0.013)	-0.091***	(0.028)
in(income)	-0.007*	(0.004)	0.083***	(0.009)
Household size	0.014***	(0.002)	0.059***	(0.004)
High density	-0.008	(0.008)	0.017	(0.019)
Bulawayo	0.037***	(0.009)	0.130***	(0.020)
Manicaland	0.005	(0.011)	0.365***	(0.033)
Mash Central	0.030**	(0.013)	0.075***	(0.028)
Mash East	0.008	(0.009)	0.076***	(0.024)
Mash West	0.016*	(0.009)	0.083***	(0.023)
Mat North	0.045***	(0.013)	0.161***	(0.031)
Mat South	0.012	(0.009)	0.090***	(0.025)
Midlands	0.010	(0.007)	0.080***	(0.018)
Masvingo	-0.006	(0.008)	0.102***	(0.021)
Constant	0.060**	(0.029)	-0.094	(0.071)
Observations	12,919		12,919	
R-squared	0.022		0.085	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.8.3 Association of Adult Nutrition Status and Selected Livelihood Variables

Table 20 presents results on the relationship between adults' nutritional status and several livelihood variables. The results show that, all things being equal, households experiencing hunger had a 0.7% higher chance of having thin members. At the 1% level of significance, food insecure households were 10.1% less likely to have overweight or obese members. All things being constant, all WASH indicators, specifically, unimproved sanitation, unimproved water, and limited water, were significantly associated with a decreased likelihood of having obese members at the 1% level of significance.

Households engaged in urban agriculture were found to have a 6.6% increased risk of having overweight and obese members. Although this finding may seem surprising, given the expectation that urban agriculture contributes to physical activity and healthier diets (Audate *et al.*, 2019; Harada *et al.*, 2021), a study by Dempsey *et al.* (2018) reported a similar finding. Dempsey et al. (2018) attributed this relationship to other characteristics of urban areas, such as energy-dense diets.

The results in **Table 20** also show that at the 1% level of significance, households receiving government social support had an 8.8% increased risk of having an overweight/obese member, while households receiving social support from UN/NGOs had a 14.7% increased risk, both at a 1% level of significance. These results are in line with the findings of Chaparro *et al.* (2014) and Fernald *et al.* (2008), who observed that food aid and cash transfers were associated with increased overweight and obesity among adults. According to Chaparro et al. (2014), social support programmes that provide food aid may play a significant role in increasing obesity, as delivering extra calories to individuals who do not need them could increase their risk of being overweight and obese.

Table 20. Correlates of adult nutrition status and selected livelihood variables

Variables	Thinness		Overweight & Obesity	
	coef	se	coef	se
Food Security				
HHS	0.007***	(0.002)	-0.009*	(0.005)
HDDS	-0.001	(0.001)	0.004	(0.003)
FCS	0.000	(0.000)	0.001***	(0.000)
Food Insecurity	0.008*	(0.005)	-0.101***	(0.013)
Water, Sanitation and Hygiene				
Unimproved sanitation	0.005	(0.013)	-0.099***	(0.028)
Unimproved water	-0.006	(0.015)	-0.115***	(0.039)
Limited water	-0.014	(0.011)	-0.089***	(0.027)
Urban agriculture	0.005	(0.007)	0.066***	(0.017)
Livelihood and reduced coping strategies				
Reduced coping strategy index	0.000**	(0.000)	-0.000	(0.000)
Livelihood coping strategy index	0.005	(0.003)	-0.009	(0.007)

Climate change				
Climate change adaptation	0.000	(0.001)	-0.002	(0.002)
Climate change knowledge	0.004	(0.005)	0.011	(0.013)
Climate change anxiety	0.000	(0.001)	0.005*	(0.003)
Social Support				
Government	0.026**	(0.011)	0.088***	(0.024)
UN/NGO	0.034**	(0.014)	0.147***	(0.033)
Churches	0.024	(0.022)	0.054	(0.046)
Relatives urban	-0.014	(0.011)	-0.071**	(0.028)
Relatives rural	-0.005	(0.012)	0.075**	(0.031)
Diaspora	0.024*	(0.013)	-0.009	(0.030)
Observations	12,944		12,944	
R-squared	0.002		0.011	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.9 Interaction of Individual Chronic Conditions, Smoking and Nutrition status

4.9.1 Association of Chronic Conditions and Current Lifestyle in Adults 18 years and above

The findings presented in **Table 21** reveal that adults who had a history of smoking and drinking had a 0.064% and 0.036% higher risk of developing chronic conditions, respectively, at a significance level of 5%, *ceteris paribus*.

Table 21. Correlation between chronic conditions and current lifestyle in adults 18 years and above

Variables	**Chronic conditions**	
	coef	se
Current lifestyle		
Adult currently drinks and smokes	-0.0247***	(0.00705)
Adult smokes	0.0231	(0.0184)
Smoking frequency	-0.00157	(0.00811)
Alcohol drinking frequency	-0.0215**	(0.00840)
Prior lifestyle		
Smoking years	0.000644**	(0.000327)
Alcohol drinking years	0.000366**	(0.000175)
Physical activity/Exercise		
Physical activity	-0.0384***	(0.00352)
Number of sports days per week	-0.00561***	(0.000907)
Constant	0.146***	(0.00291)
Observations	25,358	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.10 Water, Sanitation and Hygiene

Table 22 shows that 81.9% of the sampled households were connected to Council/ZINWA water. This commendable as access to water is important for human health, well-being, and development. **Table 22** also reveals that 25.4% of the households were satisfied with the water supply (availability), while 28.2% were satisfied with the quality of the water. There is need for the city councils, local authorities and ZINWA to improve on availability and quality of the water being supplied to households.

Table 22. Access to piped water and satisfaction with water supply and water quality (%)

Province	Dwelling unit connected to council/ZINWA water	Water Supply			Water Quality		
		Dissatisfied	Neutral	Satisfied	Dissatisfied	Neutral	Satisfied
Bulawayo	88.1	92.2	3.4	4.4	88.4	4.7	6.9
Manicaland	85.7	47.1	4.9	48.0	19.7	5.3	74.9
Mashonaland Central	87.0	43.8	13.8	42.4	38.9	15.6	45.5
Mashonaland East	84.1	40.9	36.5	22.6	45.6	33.3	21.1
Mashonaland West	79.6	69.6	18.1	12.3	75.9	17.1	7.0
Matabeleland North	65.2	21.8	26.5	51.7	15.7	21.5	62.8
Matabeleland South	93.2	35.8	23.7	40.5	46.6	27.1	26.3
Midlands	70.7	59.4	12.9	27.8	43.3	14.6	42.1
Masvingo	83.9	46.2	5.5	48.3	42.2	7.9	49.9
Harare	81.8	67.4	20.5	12.1	87.9	8.1	3.9
National	**81.8**	**60.9**	**13.7**	**25.4**	**58.4**	**13.4**	**28.2**

4.10.1 Association of WASH variables and Disease Outbreaks

The results presented in **Table 23** show that at the 1% level of significance and holding all things constant, households with basic sanitation conditions had a reduced likelihood of experiencing incidences of diarrhoea (2.98%), cough (5.5%), and fever (3.2%) outbreaks in children under the age of 5 years. An increase in distance to the water source and a lack of hand washing facilities was associated with an increased risk of disease outbreaks.

Table 23. Association between WASH variables and disease outbreaks

Variables	Disease outbreak		
	Diarrhoea	Cough	Fever
Increase of distance to a water source	0.0859***	0.0597***	0.0747***
	(0.0184)	(0.0213)	(0.0197)
Basic sanitation	-0.0298***	-0.0547***	-0.0322**
	(0.0110)	(0.0147)	(0.0127)
Absence of a handwashing facility	0.0658***	0.0208	0.0292**
	(0.0114)	(0.0161)	(0.0139)
Unimproved water	0.0208	0.0626	0.129**
	(0.0371)	(0.0522)	(0.0516)
Constant	0.112***	0.341***	0.203***
	(0.0204)	(0.0245)	(0.0223)
Observations	6,422	6,422	6,422
R-squared	0.005	0.001	0.003

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5. RECOMMENDATIONS

Based on the findings represented above, the following recommendations are put forward.

Recommendations

Based on the findings represented above, the following recommendations are put forward.

1. Improve diet quality

The results revealed high levels of overweight and obesity in the sampled urban population. The findings point to diets that are energy dense but lacking essential micronutrients. The following interventions are proposed.

i. *Nutrition education and awareness* - the ministry responsible for health needs to take aggressive action in nutrition education and awareness to prevent the increased rates of Non-Communicable Diseases (NCDs). More nutrition education campaigns, and awareness efforts are needed to educate the urban population about healthy nutrition behaviours.

ii. *Incorporating nutrition literacy into all levels of education* - the ministries responsible for primary and secondary education, as well as higher and tertiary education, should incorporate nutrition literacy into all levels of education. School-based approaches are uniquely positioned to drive positive change, as they have the power to shape lifelong eating habits, core food skills, and preferences for locally available nutritious foods. Nutrition literacy can lead to individuals adopting healthier eating habits and making conscious dietary choices, which can have significant positive impacts on overall health and well-being.

iii. *Incorporating traditional and cultural nutrition practices in nutrition education* **-** the results showed that households that followed traditional religion had a lower likelihood of having stunted and wasted children, with decreases of 12.7% and 6.65% respectively, compared to those who followed other forms of religion, all things being equal. These findings suggest potential benefits of incorporating traditional and cultural nutrition practices in nutrition education.

iv. *Increasing availability of healthy foods in school and work environments* **-** school and work environments can play an important role in promoting healthy eating by increasing the availability of nutritious foods and restricting less healthy options within these environments. There is need for a multisectoral approach where every stakeholder advocates for the provision of nutritious and healthy foods within one's environment, especially in schools and work places.

v. *Expanding the diet-related health tax to other unhealthy* - Zimbabwe introduced a sugar tax in December 2023, which is aimed at discouraging the consumption of sugar-sweetened beverages. There might be need to expand this tax to include other unhealthy

foods as a way to discourage the consumption of such foods. The global trend towards diets high in sugar-sweetened beverages and energy-dense ultra-processed foods is linked to a higher incidence of obesity, diabetes, and other non-communicable diseases, and there is need to take action now. Globally, many countries are implementing diet-related health tax to encourage healthier eating habits (Pineda *et al.*, 2024).

Refer to **Section 2.6** for more interventions on improving diets.

2. Improve Infant and young child feeding practices (IYCF)

The results revealed that the national average prevalence of stunting was high at 23.2% and obesity levels were also high (5.2%). Efforts to address childhood undernutrition, micronutrient deficiencies, and overnutrition need to be integrated to achieve global nutrition targets. The following interventions are proposed.

Extended nutrition education to all caregivers and not mothers only **–** there is need to extend nutrition education to all caregivers, including baby minders and house helpers as in urban areas, these categories of caregivers tend to spend more time with children under the age of 5 years. Scientific evidence (Imdad et al., 2011 & Hossain et al., 2024) showed that caregivers' level of nutritional knowledge is a predictor of feeding practices and lack of nutritional knowledge on child feeding among caregivers contributes significantly to poor dietary practices of children under five years of age.

3. Improve Water, Sanitation and Hygiene

There is need for the ministry responsible for water, city councils/municipalities/local authorities and all the developmental organisations working in the WASH sector to call for action aimed at improving WASH conditions for maternal and newborn health and emphasis should be on i) integrating WASH into budget priorities for water supply and quality, ii) emphasizing WASH in campaigns for maternal and child health, and iii) embedding WASH into national and global targets and monitoring frameworks.

4. Improve targeting in social support programmes

There is need for the ministry responsible for social welfare and the various organisations that provide social support to vulnerable groups to improve the identification and targeting of such households. The identification and targeting should be based on available data, e.g. census and ZimLAC data.

6. REFERENCES

Adda, L., Opoku-Mensah, K., & Dako-Gyeke, P. (2020). "Once the child is delivered, he is no more your baby," Exclusive Breastfeeding experiences of first-time mothers in Kassena-Nankana Municipality, Ghana - a qualitative study. *BMC Pregnancy and Childbirth*, *20*(1), 575. https://doi.org/10.1186/s12884-020-03272-5

Agbadi, P. (2016). *Household Food Security and Child Diet in Northern Regions of Ghana: Evidence from the 2012 Ghana Feed the Future Population Baseline Survey* The University of Bergen].

Agbadi, P., Urke, H. B., & Mittelmark, M. B. (2017). Household food security and adequacy of child diet in the food insecure region north in Ghana. *PLoS One*, *12*(5), e0177377.

Akalu, Y., Yeshaw, Y., Tesema, G. A., Demissie, G. D., Molla, M. D., Muche, A., Diress, M., & Tiruneh, S. A. (2021). Iron-rich food consumption and associated factors among children aged 6-23 months in sub-Saharan Africa: A multilevel analysis of Demographic and Health Surveys. *PLoS One*, *16*(6), e0253221. https://doi.org/10.1371/journal.pone.0253221

Alimoradi, F., Javadi, M., Barikani, A., Kalantari, N., & Ahmadi, M. (2014). An Overview of Importance of Breastfeeding [Review Article]. *J Compr Ped*, *5*(2), e14028. https://doi.org/10.17795/compreped-14028

Amanzadeh, B., Sokal-Gutierrez, K., & Barker, J. C. (2015). An interpretive study of food, snack and beverage advertisements in rural and urban El Salvador. *BMC Public Health*, *15*, 521. https://doi.org/10.1186/s12889-015-1836-9

Amugsi, D. A., Dimbuene, Z. T., Mberu, B., Muthuri, S., & Ezeh, A. C. (2017). Prevalence and time trends in overweight and obesity among urban women: an analysis of demographic and health surveys data from 24 African countries, 1991-2014. *BMJ open*, *7*(10), e017344. https://doi.org/10.1136/bmjopen-2017-017344

Andhika, E. R. (2022). Neither the Cohabitation of the Father nor the Grandmother Can Help Exclusive Breastfeeding in Indonesia: Empirical Research Using SUSENAS 2019 and 2020. *Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning*, *6*(1), 116-134.

Andreas, N. J., Kampmann, B., & Mehring Le-Doare, K. (2015). Human breast milk: A review on its composition and bioactivity. *Early Human Development*, *91*(11), 629-635. https://doi.org/https://doi.org/10.1016/j.earlhumdev.2015.08.013

Audate, P. P., Fernandez, M. A., Cloutier, G., & Lebel, A. (2019). Scoping review of the impacts of urban agriculture on the determinants of health. *BMC Public Health*, *19*(1), 672. https://doi.org/10.1186/s12889-019-6885-z

Ayatollahi, S. M. T., & Ghoreshizadeh, Z. (2010). Prevalence of obesity and overweight among adults in Iran. *Obesity Reviews*, *11*(5), 335-337. https://doi.org/https://doi.org/10.1111/j.1467-789X.2010.00725.x

Boden-Albala, B., & Sacco, R. L. (2000). Lifestyle factors and stroke risk: exercise, alcohol, diet, obesity, smoking, drug use, and stress. *Current atherosclerosis reports*, *2*(2), 160-166.

Brace, A. M., Moore, T. W., & Matthews, T. L. (2020). The Relationship Between Food Deserts, Farmers' Markets, and Food Assistance Programs in Hawai'i Census Tracts. *Hawaii J Health Soc Welf*, *79*(2), 36-41.

Bwalya, R., Chama-Chiliba, C. M., Malinga, S., & Chirwa, T. (2023). Association between household food security and infant feeding practices among women with children aged 6–23 months in rural Zambia. *PLoS One*, *18*(10), e0292052.

Casari, S., Di Paola, M., Banci, E., Diallo, S., Scarallo, L., Renzo, S., Gori, A., Renzi, S., Paci, M., de Mast, Q., Pecht, T., Derra, K., Kaboré, B., Tinto, H., Cavalieri, D., & Lionetti, P. (2022). Changing Dietary Habits: The Impact of Urbanization and Rising Socio-Economic Status in Families from Burkina Faso in Sub-Saharan Africa. *Nutrients*, *14*(9). https://doi.org/10.3390/nu14091782

Chandon, P., & Wansink, B. (2012). Does food marketing need to make us fat? A review and solutions. *Nutr Rev*, *70*(10), 571-593. https://doi.org/10.1111/j.1753-4887.2012.00518.x

Chaparro, M. P., Bernabe-Ortiz, A., & Harrison, G. G. (2014). Association between food assistance program participation and overweight. *Revista de Saúde Pública*, *48*, 889-898.

Chong, B., Jayabaskaran, J., Kong, G., Chan, Y. H., Chin, Y. H., Goh, R., Kannan, S., Ng, C. H., Loong, S., & Kueh, M. T. W. (2023). Trends and predictions of malnutrition and obesity in 204 countries and territories: an analysis of the Global Burden of Disease Study 2019. *EClinicalMedicine*, *57*.

Corsack, C., Wallenborn, J. T., Harley, K. G., & Eskenazi, B. (2022). Parental cohabitation and breastfeeding outcomes among United States adolescent mothers. *Breastfeeding Medicine*, *17*(1), 72-78.

Costa, B. V. L., Menezes, M. C., Oliveira, C. D. L., Mingoti, S. A., Jaime, P. C., Caiaffa, W. T., & Lopes, A. C. S. (2019). Does access to healthy food vary according to socioeconomic status and to food store type? an ecologic study. *BMC Public Health*, *19*(1), 775. https://doi.org/10.1186/s12889-019-6975-y

Darboux, A. J., Agueh, V., & Santos, R. Y. (2022). Assessment of the nutritional status and dietary intake of women of childbearing age in the city of Comè, Benin. *Pan Afr Med J*, *41*, 350. https://doi.org/10.11604/pamj.2022.41.350.33393

de Bruin, S., Dengerink, J., & van Vliet, J. (2021). Urbanisation as driver of food system transformation and opportunities for rural livelihoods. *Food Security*, *13*(4), 781-798. https://doi.org/10.1007/s12571-021-01182-8

de Diego-Cordero, R., Rivilla-Garcia, E., Diaz-Jimenez, D., Lucchetti, G., & Badanta, B. (2021). The role of cultural beliefs on eating patterns and food practices among pregnant women: a systematic review. *Nutr Rev*, *79*(9), 945-963. https://doi.org/10.1093/nutrit/nuaa119

de Lanerolle-Dias, M., Lanerolle, P., Atukorala, S., & de Silva, A. (2015). Urbanisation, dietary patterns and body composition changes in adolescent girls: a descriptive cross sectional study. *BMC nutrition*, *1*(1), 30. https://doi.org/10.1186/s40795-015-0027-5

de Onis, M., Borghi, E., Arimond, M., Webb, P., Croft, T., Saha, K., De-Regil, L. M., Thuita, F., Heidkamp, R., Krasevec, J., Hayashi, C., & Flores-Ayala, R. (2019). Prevalence thresholds for wasting, overweight and stunting in children under 5 years. *Public Health Nutr*, *22*(1), 175-179. https://doi.org/10.1017/s1368980018002434

Dempsey, S., Lyons, S., & Nolan, A. (2018). Urban green space and obesity in older adults: Evidence from Ireland. *SSM - Population Health*, *4*, 206-215. https://doi.org/https://doi.org/10.1016/j.ssmph.2018.01.002

Di Renzo, G. C., & Tosto, V. (2022). Food insecurity, food deserts, reproduction and pregnancy: we should alert from now. *The Journal of Maternal-Fetal & Neonatal Medicine*, *35*(25), 9119-9121. https://doi.org/10.1080/14767058.2021.2016052

Egger, G., & Dixon, J. (2014). Beyond Obesity and Lifestyle: A Review of 21st Century Chronic Disease Determinants. *BioMed Research International*, *2014*, 731685. https://doi.org/10.1155/2014/731685

Fernald, L. C., Gertler, P. J., & Hou, X. (2008). Cash component of conditional cash transfer program is associated with higher body mass index and blood pressure in adults. *J Nutr*, *138*(11), 2250-2257. https://doi.org/10.3945/jn.108.090506

Filippini, R., Mazzocchi, C., & Corsi, S. (2019). The contribution of Urban Food Policies toward food security in developing and developed countries: A network analysis approach. *Sustainable Cities and Society*, *47*, 101506. https://doi.org/https://doi.org/10.1016/j.scs.2019.101506

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Gómez, G., Nogueira Previdelli, Á., Fisberg, R. M., Kovalskys, I., Fisberg, M., Herrera-Cuenca, M., Cortés Sanabria, L. Y., Yépez García, M. C., Rigotti, A., Liria-Domínguez, M. R., Guajardo, V., Quesada, D.,

Murillo, A. G., & Brenes, J. C. (2020). Dietary Diversity and Micronutrients Adequacy in Women of Childbearing Age: Results from ELANS Study. *Nutrients*, *12*(7). https://doi.org/10.3390/nu12071994

Hailu, B. A., Geremew, B. M., Liverani, S., Abera, K. S., Beyene, J., & Miheretu, B. A. (2022). Mapping and determinants of consumption of egg and/or flesh foods and zero vegetables or fruits among young children in SSA. *Scientific Reports*, *12*(1), 11924. https://doi.org/10.1038/s41598-022-15102-z

Han, Y., Li, S., & Zheng, Y. (2009). Predictors of nutritional status among community-dwelling older adults in Wuhan, China. *Public Health Nutrition*, *12*(8), 1189-1196.

Harada, K., Hino, K., Iida, A., Yamazaki, T., Usui, H., Asami, Y., & Yokohari, M. (2021). How Does Urban Farming Benefit Participants' Health? A Case Study of Allotments and Experience Farms in Tokyo. *International journal of environmental research and public health*, *18*(2). https://doi.org/10.3390/ijerph18020542

Hawkes, C., Smith, T. G., Jewell, J., Wardle, J., Hammond, R. A., Friel, S., Thow, A. M., & Kain, J. (2015). Smart food policies for obesity prevention. *The lancet*, *385*(9985), 2410-2421.

Heidari, H., Arabi, M., Warziniack, T., & Sharvelle, S. (2021). Effects of Urban Development Patterns on Municipal Water Shortage [Original Research]. *Frontiers in Water*, *3*. https://doi.org/10.3389/frwa.2021.694817

Holdsworth, M., & Landais, E. (2019). Urban food environments in Africa: implications for policy and research. *Proceedings of the Nutrition Society*, *78*(4), 513-525. https://doi.org/10.1017/S0029665118002938

Hutchesson, M. J., de Jonge Mulock Houwer, M., Brown, H. M., Lim, S., Moran, L. J., Vincze, L., Rollo, M. E., & Hollis, J. L. (2020). Supporting women of childbearing age in the prevention and treatment of overweight and obesity: a scoping review of randomized control trials of behavioral interventions. *BMC Women's Health*, *20*(1), 14. https://doi.org/10.1186/s12905-020-0882-3

Huttinger, A., Dreibelbis, R., Kayigamba, F., Ngabo, F., Mfura, L., Merryweather, B., Cardon, A., & Moe, C. (2017). Water, sanitation and hygiene infrastructure and quality in rural healthcare facilities in Rwanda. *BMC Health Services Research*, *17*(1), 517. https://doi.org/10.1186/s12913-017-2460-4

Jama, A., Gebreyesus, H., Wubayehu, T., Gebregyorgis, T., Teweldemedhin, M., Berhe, T., & Berhe, N. (2020). Exclusive breastfeeding for the first six months of life and its associated factors among children age 6-24 months in Burao district, Somaliland. *International Breastfeeding Journal*, *15*(1), 5. https://doi.org/10.1186/s13006-020-0252-7

Kookana, R. S., Drechsel, P., Jamwal, P., & Vanderzalm, J. (2020). Urbanisation and emerging economies: Issues and potential solutions for water and food security. *Science of The Total Environment*, *732*, 139057. https://doi.org/https://doi.org/10.1016/j.scitotenv.2020.139057

Leroy, J. L., Ruel, M., Frongillo, E. A., Harris, J., & Ballard, T. J. (2015). Measuring the Food Access Dimension of Food Security:A Critical Review and Mapping of Indicators. *Food Nutr Bull*, *36*(2), 167-195. https://doi.org/10.1177/0379572115587274

Li, Y., Zhang, C., Ding, S., Li, J., Li, L., Kang, Y., Dong, X., Wan, Z., Luo, Y., & Cheng, A. S. (2022). Physical activity, smoking, alcohol consumption and depressive symptoms among young, early mature and late mature people: a cross-sectional study of 76,223 in China. *Journal of Affective Disorders*, *299*, 60-66.

Lyn, R., Heath, E., & Dubhashi, J. (2019). Global implementation of obesity prevention policies: a review of progress, politics, and the path forward. *Current Obesity Reports*, *8*, 504-516.

Maestre, M., Poole, N., & Henson, S. (2017). Assessing food value chain pathways, linkages and impacts for better nutrition of vulnerable groups. *Food Policy*, *68*, 31-39.

Mahajan, A., Yu, J., Hogan, J. L., Jewell, K., Carriero, A., Annis, A., Sadowski, A., Darlington, G., Buchholz, A. C., Duncan, A. M., Haines, J., & Ma, D. W. L. (2021). Dietary sugar intake among preschool-

aged children: a cross-sectional study. *CMAJ Open*, *9*(3), E855-e863. https://doi.org/10.9778/cmajo.20200178

Mandula, P. P. (2024). Breast-feeding: A Dual Perspective from a Primi Mother and Paediatrician. *Journal of Neonatology*, *0*(0), 09732179231220205. https://doi.org/10.1177/09732179231220205

Marivoet, W., Becquey, E., & Van Campenhout, B. (2019). How well does the Food Consumption Score capture diet quantity, quality and adequacy across regions in the Democratic Republic of the Congo (DRC)? *Food Security*, *11*(5), 1029-1049. https://doi.org/10.1007/s12571-019-00958-3

Mozaffarian, D., Angell, S. Y., Lang, T., & Rivera, J. A. (2018). Role of government policy in nutrition-barriers to and opportunities for healthier eating. *Bmj*, *361*, k2426. https://doi.org/10.1136/bmj.k2426

Mututho, L. N., Kiboi, W. K., & Mucheru, P. K. (2017). Factors associated with exclusive breastfeeding in Kenya: a systematic review. *International Journal of Community Medicine and Public Health*, *4*(12), 4358-4362.

Nieuwenhuizen, W. F., Weenen, H., Rigby, P., & Hetherington, M. M. (2010). Older adults and patients in need of nutritional support: review of current treatment options and factors influencing nutritional intake. *Clinical nutrition*, *29*(2), 160-169.

Norris, S. A., Frongillo, E. A., Black, M. M., Dong, Y., Fall, C., Lampl, M., Liese, A. D., Naguib, M., Prentice, A., & Rochat, T. (2022). Nutrition in adolescent growth and development. *The lancet*, *399*(10320), 172-184.

Peeters, A. (2018). Obesity and the future of food policies that promote healthy diets. *Nature Reviews Endocrinology*, *14*(7), 430-437.

Popkin, B. M., Adair, L. S., & Ng, S. W. (2012). Global nutrition transition and the pandemic of obesity in developing countries. *Nutrition reviews*, *70*(1), 3-21.

Rahman, N., Dewi, N. U., Fitrasyah, S. I., Bohari, B., Oktaviani, V., & Rifai, M. (2017). Factors related to exclusive breastfeeding among mothers in the city of Palu, Central Sulawesi, Indonesia.

Ramulondi, M., de Wet, H., & Ntuli, N. R. (2021). Traditional food taboos and practices during pregnancy, postpartum recovery, and infant care of Zulu women in northern KwaZulu-Natal. *Journal of Ethnobiology and Ethnomedicine*, *17*(1), 15. https://doi.org/10.1186/s13002-021-00451-2

Reinsma, K., Bolima, N., Fonteh, F., Okwen, P., Yota, D., & Montgomery, S. (2012). Incorporating cultural beliefs in promoting exclusive breastfeeding. *African Journal of Midwifery and Women's Health*, *6*(2), 65-70. https://doi.org/10.12968/ajmw.2012.6.2.65

Ren, Y., Castro Campos, B., Peng, Y., & Glauben, T. (2021). Nutrition Transition with Accelerating Urbanization? Empirical Evidence from Rural China. *Nutrients*, *13*(3). https://doi.org/10.3390/nu13030921

Reyes, L. I., Constantinides, S. V., Bhandari, S., Frongillo, E. A., Schreinemachers, P., Wertheim-Heck, S., Walls, H., Holdsworth, M., Laar, A., Nguyen, T., Turner, C., Wellard, K., & Blake, C. E. (2021). Actions in global nutrition initiatives to promote sustainable healthy diets. *Global Food Security*, *31*, 100585. https://doi.org/https://doi.org/10.1016/j.gfs.2021.100585

Saaka, M., & Osman, S. M. (2013). Does household food insecurity affect the nutritional status of preschool children aged 6-36 months? *International Journal of Population Research*, *2013*.

Salam, R. A., Das, J. K., Irfan, O., Ahmed, W., Sheikh, S. S., & Bhutta, Z. A. (2020). Effects of preventive nutrition interventions among adolescents on health and nutritional status in low- and middle-income countries: A systematic review. *Campbell Systematic Reviews*, *16*(2), e1085. https://doi.org/https://doi.org/10.1002/cl2.1085

Salam, R. A., Hooda, M., Das, J. K., Arshad, A., Lassi, Z. S., Middleton, P., & Bhutta, Z. A. (2016). Interventions to Improve Adolescent Nutrition: A Systematic Review and Meta-Analysis. *Journal of Adolescent Health*, *59*(4, Supplement), S29-S39. https://doi.org/https://doi.org/10.1016/j.jadohealth.2016.06.022

Sansom, G., & Hannibal, B. (2021). Disparate access to nutritional food; place, race and equity in the United States. *BMC nutrition*, *7*(1), 29. https://doi.org/10.1186/s40795-021-00434-2

Santos, L. (2022). The impact of nutrition and lifestyle modification on health. *European journal of internal medicine*, *97*, 18-25.

Sapkota, S., Thapa, B., Gyawali, A., & Hu, Y. (2022). Predictors of Minimum Acceptable Diet among Children Aged 6-23 Months in Nepal: A Multilevel Analysis of Nepal Multiple Indicator Cluster Survey 2019. *Nutrients*, *14*(17). https://doi.org/10.3390/nu14173669

Satterthwaite, D., McGranahan, G., & Tacoli, C. (2010). Urbanization and its implications for food and farming. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 2809-2820. https://doi.org/doi:10.1098/rstb.2010.0136

Schmidt, H., Mah, C. L., Cook, B., Hoang, S., Taylor, E., Blacksher, E., Goldberg, D. S., Novick, L., Aspradaki, A. A., & Tzoutzas, I. (2016). Chronic disease prevention and health promotion. *Public health ethics: Cases spanning the globe*, 137-176.

Shalit, N., Tierney, A., Holland, A., Miller, B., Norris, N., & King, S. (2016). Factors that influence dietary intake in adults with stable chronic obstructive pulmonary disease. *Nutrition & Dietetics*, *73*(5), 455-462.

Shlisky, J., Bloom, D. E., Beaudreault, A. R., Tucker, K. L., Keller, H. H., Freund-Levi, Y., Fielding, R. A., Cheng, F. W., Jensen, G. L., Wu, D., & Meydani, S. N. (2017). Nutritional Considerations for Healthy Aging and Reduction in Age-Related Chronic Disease. *Advances in Nutrition*, *8*(1), 17-26. https://doi.org/https://doi.org/10.3945/an.116.013474

Siddiqui, F., Salam, R. A., Lassi, Z. S., & Das, J. K. (2020). The Intertwined Relationship Between Malnutrition and Poverty. *Frontiers in public health*, *8*, 453. https://doi.org/10.3389/fpubh.2020.00453

Silva, J. A. (2023). Wastewater Treatment and Reuse for Sustainable Water Resources Management: A Systematic Literature Review. *Sustainability*, *15*(14), 10940. https://www.mdpi.com/2071-1050/15/14/10940

Thaler, R. H., & Sunstein, C. R. (2009). *Nudge: Improving decisions about health, wealth, and happiness*. Penguin.

Vilar-Compte, M., Burrola-Méndez, S., Lozano-Marrufo, A., Ferré-Eguiluz, I., Flores, D., Gaitán-Rossi, P., Teruel, G., & Pérez-Escamilla, R. (2021). Urban poverty and nutrition challenges associated with accessibility to a healthy diet: a global systematic literature review. *International Journal for Equity in Health*, *20*(1), 40. https://doi.org/10.1186/s12939-020-01330-0

Wagris, M., Seid, A., Kahssay, M., & Ahmed, O. (2019). Minimum Meal Frequency Practice and Its Associated Factors among Children Aged 6-23 Months in Amibara District, North East Ethiopia. *J Environ Public Health*, *2019*, 8240864. https://doi.org/10.1155/2019/8240864

Wu, C., Liu, W., & Deng, H. (2023). Urbanization and the Emerging Water Crisis: Identifying Water Scarcity and Environmental Risk with Multiple Applications in Urban Agglomerations in Western China. *Sustainability*, *15*(17), 12977. https://www.mdpi.com/2071-1050/15/17/12977

Yan, J., Berrigan, M. N., Wang, J., Kamp Dush, C. M., & Schoppe-Sullivan, S. J. (2023). Coparenting relationship quality and breastfeeding duration for dual earner new parents. *Journal of Social and Personal Relationships*, *40*(9), 2878-2891.

Ziso, D., Chun, O. K., & Puglisi, M. J. (2022). Increasing Access to Healthy Foods through Improving Food Environment: A Review of Mixed Methods Intervention Studies with Residents of Low-Income Communities. *Nutrients*, *14*(11). https://doi.org/10.3390/nu14112278

Zhang, Q., Liu, S., Liu, R., Xue, H., & Wang, Y. (2014). Food Policy Approaches to Obesity Prevention: An International Perspective. *Current Obesity Reports*, *3*(2), 171-182. https://doi.org/10.1007/s13679-014-0099-6

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