Communities in Transition: Perceptions of the Drivers of the Nutrition Transition in Rural and Urban Kilimanjaro, Tanzania

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Abstract

Suboptimal diets are a major risk factor for avoidable death and disease worldwide. In many LMICs, populations are discarding nutritious, locally-sourced, minimally-processed traditional diets in favour of diets high in salt, sugar, saturated fats, and highly-processed foods. This so-called 'nutrition transition' is rapidly taking hold in Sub-Saharan Africa too.

Recently, compelling evidence was published on the superior health effects of the 'East African heritage diet' that has long supported the wellbeing of communities in Kilimanjaro, Tanzania—contrasted with the detrimental effects of the 'Western-style' diet to which many are turning.

This study investigates what communities across urban and rural Kilimanjaro perceive to be the key drivers of this dietary change. Using a qualitative design, thirteen focus group discussions were conducted—stratified by location, age, and gender—to gain insight into community perceptions.

Thematic analysis revealed that while traditional foods are widely valued for their cultural identity and perceived health benefits, they are increasingly deprioritized in daily diets in favour of 'modern' fare seen as more available, convenient, and socially prestigious. This shift occurs in tension with widespread anxiety about modern, globalized food practices—especially the use of agricultural chemicals, the influence of digital media on youth, and suspicion toward commercial actors.

The findings highlight how urban and rural communities experience the transition differently, requiring tailored policy responses, especially in light of rapid urbanization. Culturally grounded interventions are needed to promote traditional food knowledge, restore agency in food choice, and address structural barriers to healthy traditional eating in Tanzania's evolving food environments.

Key Words: nutrition transition; traditional diets; Tanzania; urban-rural divide; community perceptions.

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List of Abbreviations

AU	African Union
DALY	Disability-Adjusted Life Year
DBM	Double Burden of Malnutrition
DR-NCD	Diet-Related Non-Communicable Disease
EAC	East African Community
FAFH	Food Away From Home
FAO	Food and Agriculture Organization of the United Nations
FBDG	Food-Based Dietary Guideline
FE	Food Environment
FGD	Focus Group Discussion
FYDP	Five-Year Development Plan
GDP	Gross Domestic Product
HIC	High-Income Country
HPF	Highly-Processed Food
KCMCU	Kilimanjaro Christian Medical College University
LMIC	Low- and Middle-Income Country
MFBC	Multinational Food and Beverage Company
NCD	Non-Communicable Disease
NGO	Non-Governmental Organisation
NMNAP	National Multisectoral Nutrition Action Plan
OOP	Out-Of-Pocket

SADC	South African Development Community
SES	Socioeconomic Status
SSA	Sub-Saharan Africa
SSB	Sugar-Sweetened Beverage
TA	Thematic Analysis
T2DM	Type-II Diabetes Mellitus
TBS	Tanzania Bureau of Standards
TDV	Tanzania Development Vision
TFNC	Tanzania Food and Nutrition Centre
TV	Television
UPF	Ultra-Processed Food
WHO	World Health Organization
WFP	World Food Programme
YLD	Years Lost to Disability

Glossary

Terms included below are italicized upon their first appearance in the main text.

Community: A group of individuals who share common geographical location, cultural heritage, or socialites(1).

Convenience foods: Pre-packaged or ready-to-eat foods designed for quick preparation or consumption, often high in preservatives, salt, and unhealthy fats(2).

Cultural identity: The connection between food practices and one's sense of belonging to a particular cultural, ethnic, or social group, often shaped by tradition, symbolism, and community norms(2).

Disability-Adjusted Life Year (DALY): A metric used to quantify the burden of disease by combining years of life lost due to premature mortality and years lived with disability(3).

Diet-Related Non-Communicable Disease (DR-NCD): A subset of NCDs that are strongly linked to unhealthy dietary patterns and malnutrition(4). These include overweight and obesity, hypertension, high cholesterol, type 2 diabetes, cardiovascular disease, stroke, and cancers of the oesophagus, trachea, bronchi, lungs, lips, oral cavity, nasopharynx, colon, and rectum(5).

Double Burden of Disease (DBD): When a population experiences high prevalence of both communicable (infectious) and non-communicable diseases(6).

Double Burden of Malnutrition (DBM): The coexistence of both overnutrition (overweight, obesity) and undernutrition (stunting, wasting) in a country, region, household, or individual(7).

Focus Group Discussion (FGD): A qualitative research method involving guided group discussions used to explore participants' attitudes, beliefs, and experiences regarding a particular topic(8).

Food-Away-From-Home (FAFH): Foods and meals prepared and consumed outside the home, including those from restaurants, street vendors, fast-food outlets, cafés, and institutional settings(9).

Food Environment (FE): The consumer interface with the food system that encompasses the availability, affordability, convenience, and desirability of foods(10).

Food Sovereignty: The right of peoples and sovereign states to define their own food systems and agricultural and food policies, placing the needs of local communities and ecosystems above those of global markets and corporations(11).

Globalization: The growing interconnectedness of nations through economic integration, cultural exchange, communication, and travel(12).

Highly-Processed Foods (HPF): Foods that have undergone significant industrial processing, contain few whole ingredients, and often include artificial additives such as preservatives, sweeteners, emulsifiers, and colourings(6). See Appendix C for Africa-specific examples per level of processing. For this research, the term "highly-processed" will be used instead of “ultra-processed” when processing classification criteria are not explicit, due to the lack of consensus on the definition of ultra-processed food and high variability in use of the term in the literature.

Minimally-Processed Foods: Foods that have undergone basic processing to make them safe or edible—such as cleaning, peeling, or freezing—without substantially altering their nutritional content or structure(6). See Appendix C for Africa-specific examples per level of processing.

Modern food: The term used by participants in this research to describe non-traditional foods which are more highly-processed, contain added ingredients such as sugar, salt, or preservatives, are ready to eat or require less time for preparation, and are sometimes imported. The term encapsulates unhealthy food-away-from-home. Examples cited in the research can be found in Figure 12 (Section 6.2) and from the literature in Appendix C. This locally-used term is adopted from the Results section onwards, as more academic terms like "Western" or "processed" were rarely used.

Modern diet: The term used by participants in this research to describe non-traditional, often Western-style dietary patterns including diets featuring highly-processed foods tending to be unhealthy (high in salt, fat, oils). This locally-used term is adopted from the Results section onwards, as more academic terms like "Western" or "processed" were rarely used.

Nutrition Transition: Broad patterns of dietary change that accompany economic, demographic, and epidemiological shifts, typically resulting in increased consumption of fats, sweeteners, and animal-source foods(13).

Non-Communicable Disease (NCD): Diseases of long duration (chronic) and are not spread from person to person. They result from a combination of genetic, physiological, environmental and behavioural factors(14).

Obesity: A condition characterized by excessive body fat that poses a risk to health: a major risk factor for chronic diseases including diabetes, cardiovascular diseases, and cancer. Defined as having a Body Mass Index (BMI: calculated by dividing weight in kilogrammes by height in metres squared) of ≥30.0 kg/m^2(15).

Overweight: A condition where a person has more body weight than is considered healthy for their height. Classified by Body Mass Index (BMI: calculated by dividing weight in kilogrammes by height in metres squared) of $25.0 \leq x \leq 29.9$ kg/m^2(15).

Rural: A geographical area characterized by low population density, where traditional lifestyles and dietary patterns tend to be preserved(16).

Thematic analysis: A flexible approach to analysing qualitative data by identifying, analysing, and reporting patterns (themes) to provide a rich and detailed account of the data(17).

Traditional diet: A diet deeply rooted in local culture, agriculture, and customs. It is characterized by minimally-processed foods, seasonal and locally available ingredients, home preparation, and intergenerational knowledge transfer. These diets are generally free from corporate influence(11,18).

Traditional foods: Foods that originate from a specific geographic area, sourced from local environments, and prepared using traditional processing methods(19).

Ultra-Processed Foods (UPF): Industrial formulations of substances derived from foods and additives, typically containing little or no whole food. Defined by the 'NOVA classification' system, these multi-ingredient products are designed for palatability, convenience, and profit, and are linked to adverse health outcomes(6). See Appendix C for Africa-specific UPF examples.

Urban: A geographical area characterized by high population density, built infrastructure, and access to modern amenities(20).

Urbanization: The demographic and structural shift toward increasing population concentration in densely populated settlements where non-agricultural economic activities dominate(21).

Western(-style) diet: A diet characterized by high consumption of industrially processed foods designed for shelf-stability and convenience which tend to be high in sugar, salt, saturated fat, preservatives, and/or taste enhancers. This dietary pattern is associated with development of non-communicable diseases(22).

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Personal Introduction

This thesis was born out of a five-minute conversation in a classroom at KIT in May 2024, when a visiting lecturer mentioned in passing some ongoing research examining changing diets and its association to changing disease epidemiology in East Africa. The intersection of food, health, and culture immediately resonated – knitting together many strands of my past experiences: an early career in oncology clinical trials, a long-standing interest in nutrition science, and a deep personal passion for cooking and communal dining. That moment sparked the beginnings of what would become this thesis.

Before joining the master's in international health at KIT, I spent six years working in pharmaceutical research, focused on cancer therapies. But over time, I felt disenfranchised by the inequitable access to these cutting-edge therapies, and a growing pull toward prevention and equity-focused initiatives. I became more involved in patient advocacy and policy work, opening my eyes to what can be achieved with evidence-based policymaking.

During a six-month internship with the Access to Nutrition Initiative – a research and policy-focused NGO that benchmarks food industry contributions to advancing global nutrition goals – I worked on a project examining the increasing influence of large commercial actors in East Africa's food system. It exposed me to the stark realities of the nutrition transition—not just the health consequences, but also the impact on food sovereignty, as powerful multinational food companies infiltrate local markets and undermine traditional food values in the name of profit. That experience ignited in me a strong sense of food justice and deepened my motivation to critically explore how communities themselves perceive and respond to these transformations.

This thesis explores the drivers of dietary change—often referred to as the nutrition transition—in rural and urban communities of Kilimanjaro, Tanzania. It seeks to understand how communities perceive and navigate rapidly changing food environments, and how structural, social, cultural, and individual factors shape food choices. I was drawn to this subject not only because of its scientific and policy relevance, but also for the opportunity to engage in community-grounded research in a novel cultural context.

My hope is that this research contributes to a growing body of work that centres community voices in public health nutrition, and that it supports the development of more contextually grounded, culturally respectful food and nutrition policies in East Africa which help to improve the health and livelihoods of many.

Structure of the Thesis

This thesis is structured into 7 main chapters. Chapter 1 introduces the background of the nutrition transition, globally and in Tanzania, then provides contextual information to set the stage for the study's relevance in Kilimanjaro. Chapter 2 presents a brief overview of the existing literature relevant to the drivers of Tanzania's nutrition transition and highlights the gaps this study seeks to address. Chapter 3 outlines the problem statement and provides justification for the research. Chapter 4 states the study's objectives and research question. Chapter 5 outlines the methodology for data collection and analysis, and details ethical considerations, the researcher's positionality, and the philosophical foundations underpinning the research. Chapter 6 presents the study's results, organised into seven themes reflecting community perspectives on the drivers of dietary change. Chapter 7 discusses these findings in relation to existing evidence and theory, and finally Chapter 8 offers conclusions, practical recommendations, and reflections on future research and policy implications.

1 Introduction

1.1 Background

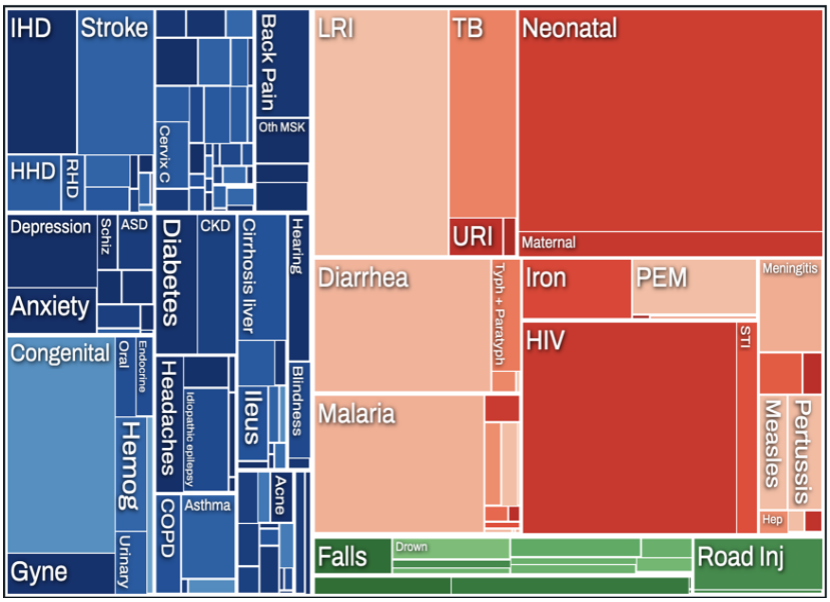
1.1.1 Diet-related disease on the rise

Worldwide, poor diets are a leading modifiable risk factor for non-communicable diseases (NCDs)(23). Diets high in saturated fat, total fat, sugar, salt, refined grains, and animal-sourced foods increase the risk of *diet-related NCDs (DR-NCDs*) with a spectrum of severity(23,24) via myriad mechanisms (Appendix A)(25–27). Globally, DR-NCDs account for 22% of adult deaths, 15% of *disability-adjusted life years (DALYs)*(23), and cost US$11 trillion annually(28). Beyond human suffering, this hinders progress on poverty reduction, health equity, and economic stability(29).

Conversely, diets featuring diverse, nutrient-dense, high-fibre foods such as legumes, pulses, vegetables, and fruits are well-evidenced to protect against DR-NCDs(25,30). Traditional dietary patterns including Mediterranean(31–33) and Japanese(33) have particularly well-documented health-promoting effects. Evidence is building too for the 'East African heritage' diet which demonstrated favourable immuno-metabolic effects in a recent study in Kilimanjaro, Tanzania, but is increasingly being abandoned by the local population(34,35).

In Tanzania, NCDs now account for one-third of all deaths(36,37). Disease and mortality trends (Figures 1-2) suggest NCDs are becoming significant public health problems on top of persisting infectious and deficiency diseases(3)—a phenomenon known as the *double burden of disease*(38,39).

(a)



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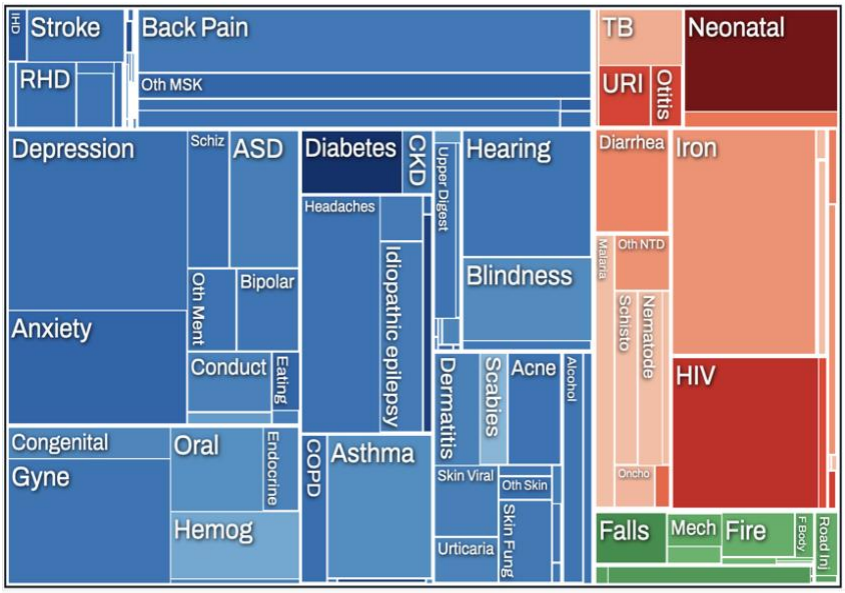

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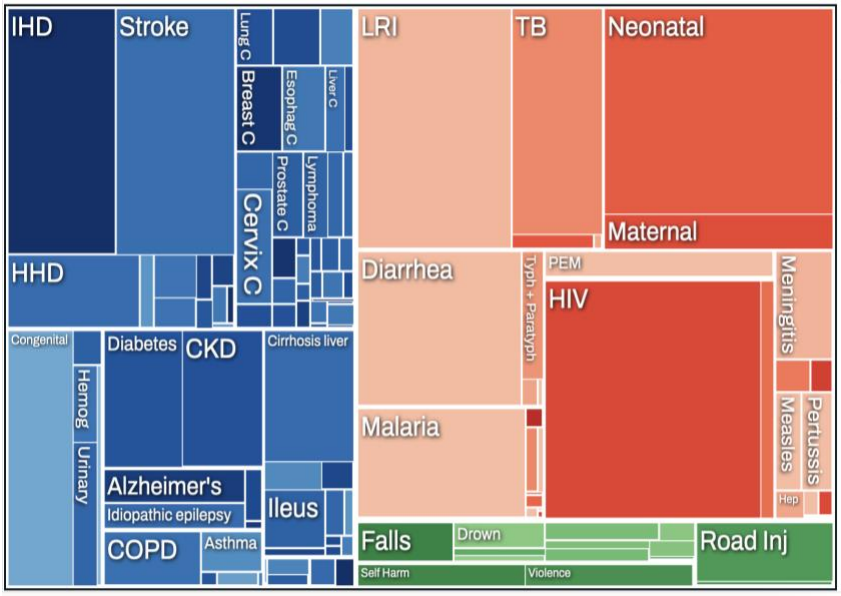


Figure 1: The burden (expressed in DALYs (a), YLDs (b), and deaths (c) attributable to major diseases in Tanzania in 2019 across both sexes and all ages.

Type of disease indicated by colour–NCDs (blue); communicable, maternal, neonatal, and nutritional diseases (red); injuries and accidents (green). The size of the box is proportionate to the burden displayed.

Source: Institute for Health Metrics and Evaluation (2025)(3)

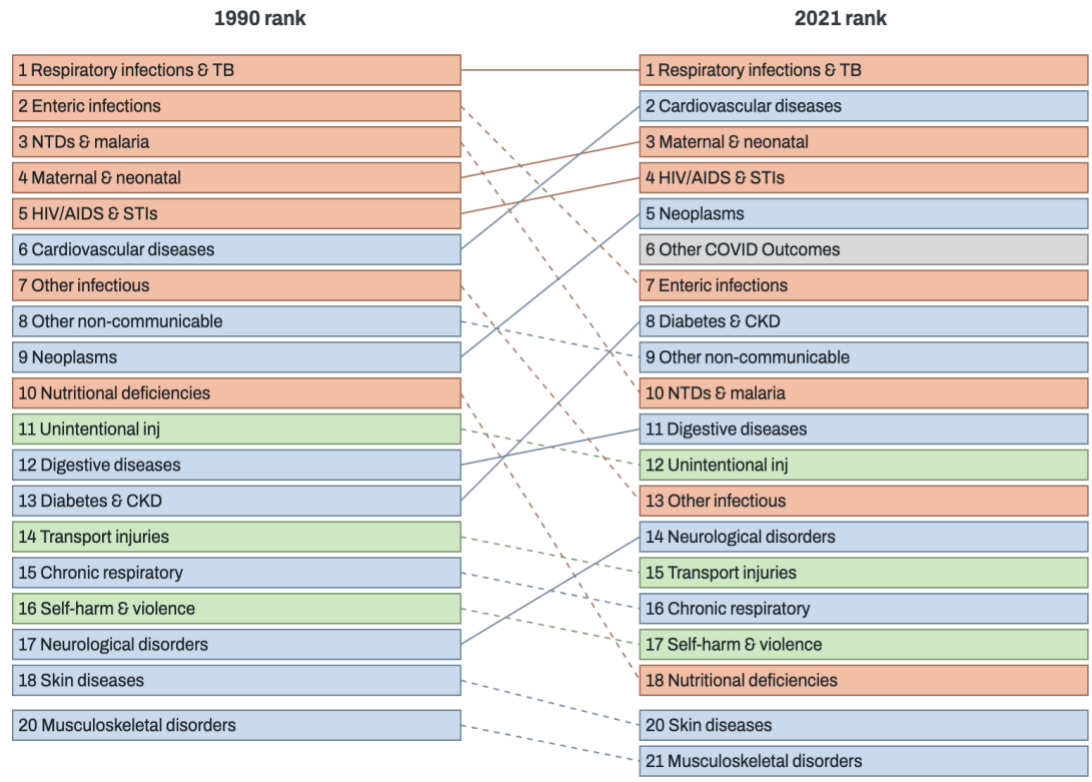


Figure 2: Ranking of cause of deaths per 100,000 in Tanzania across both sexes all ages in 1990 and 2021. Lines visualize the change in rankings between 1990 and 2021. Type of disease indicated by colour – NCDs (blue); communicable, maternal, neonatal, and nutritional diseases (orange); injuries and accidents (green). It shows the change in disease epidemiology over time in the Tanzanian population, where many of the infectious diseases leading causes of death in 1990 have now been overtaken by NCDs.
Source: Institute for Health Metrics and Evaluation, 2025(3)

When a country, region, household, or individual has the combination of both *overweight/obesity* and undernutrition/stunting, it is termed the *double burden of malnutrition (DBM*)(7,19). Sub-Saharan Africa (SSA) experienced a dramatic rise in the DBM over the past three decades (Figure 3)(40), with obesity prevalence forecast to increase 250% more by 2050—underscoring the urgent need for preventative action by improving diets(41).

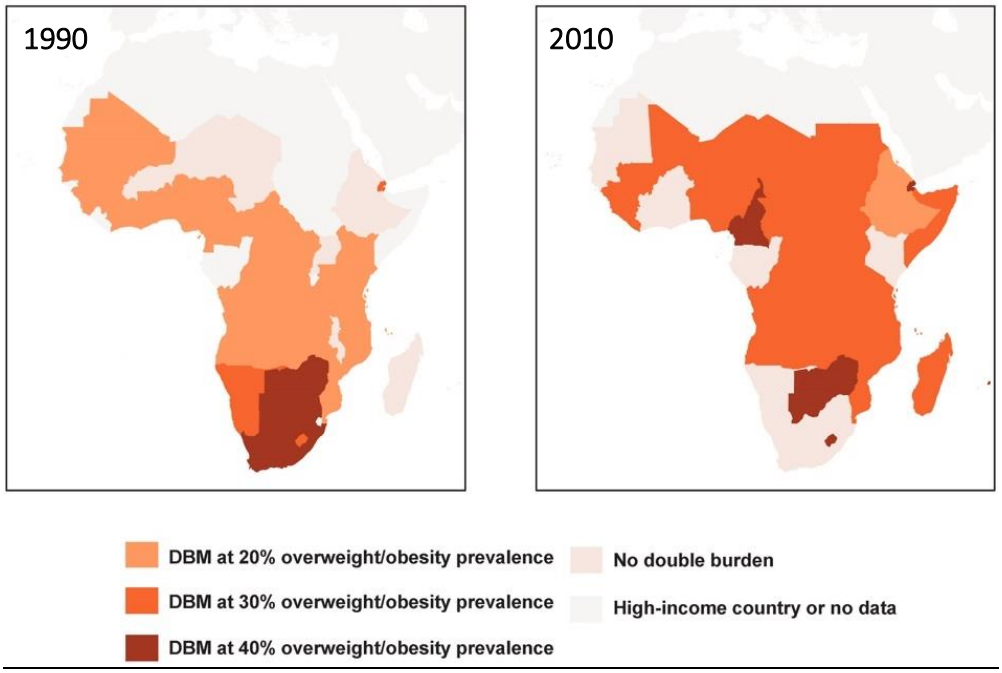


Figure 3: The prevalence of the double burden of malnutrition in Sub-Saharan African countries from 1990 to 2010.
Source: Reardon et al. 2021(40)

1.1.2 Nutrition transitions

1.1.2.1 The concept of the nutrition transition

Low- and middle-income countries (LMICs) are undergoing rapid transformations in lifestyle, physical activity, diet, and consequently body composition and disease patterns(42). The *nutrition transition* describes the displacement of *traditional diets* by those high in salt, sugar, and saturated fats yet low in wholefoods, fibre, vitamins, and minerals(13)—so-termed the '*Western-style diet'* reflective of those seen in industrialised high-income countries (HICs)(42–44).

Populations undergoing nutrition transitions experience multiple, overlapping forms of malnutrition including obesity, stunting, and micronutrient deficiencies(23,45,46). Increased intake of energy-dense, nutrient-poor, often *ultra-processed foods (UPFs)*(9,47–56) is linked to adverse physiological effects and greater DR-NCD risk(54,57–70). This is especially concerning in populations still afflicted by undernutrition as early-life undernutrition may predispose individuals to obesity and DR-NCDs in adulthood(71).

Nutrition transitions follow a predictable sequence parallelling demographic and epidemiological transitions (Appendix B)(44,72). Most LMICs are entering a phase characterised by growing DR-NCD burden (Figure 4)(42–44). Yet there is opportunity to 'leapfrog' into healthier dietary futures by learning from HIC experience(45).

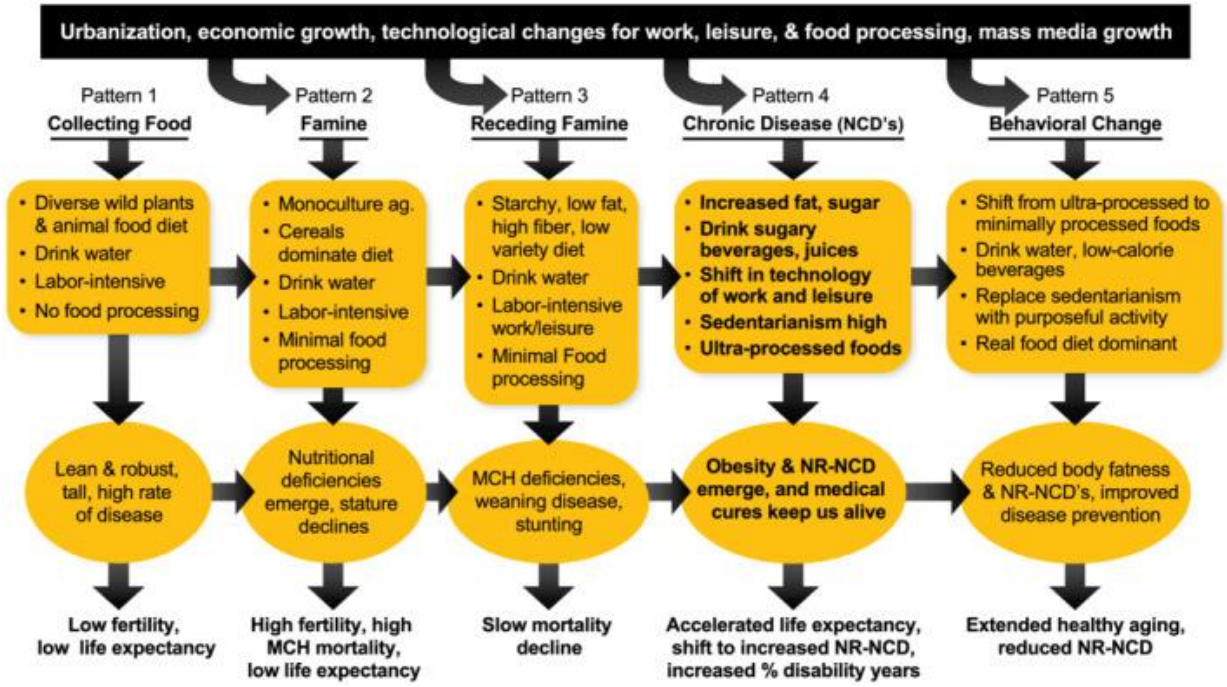


Figure 4: Stages of the nutrition transition.
Food sourcing strategies, major dietary contents, and associated population disease profiles. Many LMICs are now transitioning into Pattern 4. Pattern 5 represents a more ideal future – a hypothesized shift towards healthier diets and lifestyles which protect against DR-NCDs and extend healthy life expectancy. *Source: Popkin, 2002(44)*

Nutrition transitions are not new phenomena—colonialism, *globalization*, trade, and migration have influenced diets and diet-related-disease patterns in SSA for centuries(73). While signs of Western-style diets are tracible to the 1980s (Figure 5)(40), the current transition is unprecedented in pace, scale, and one-directional nature—as diets worldwide converge on this pattern(42). It also involves shifts in food preparation, cooking methods, eating behaviour and cultural attitudes towards food(74,75).

	Traditional	Early transitional	Mid- to late transitional	Late transitional to early modern
Cereals consumed (not reflecting the form)	Home-produced millet, sorghum, and maize	Buy millet, sorghum, and maize; start buying rice and wheat	Buy more rice and wheat and less millet, sorghum, and maize	Continue shift to rice and wheat
Acquire minimally processed cereals	Pound grain at home	Custom mill flour or buy by scoop or large bag	Buy packaged branded maize flour and polished rice	Purchase highly and ultraprocessed rather than minimally processed
Acquire minimally processed roots and tubers	Pound roots and tubers at home	Buy cassava flour by scoop or bag	Buy packaged cassava and yam flours	Continue shift to packaged cassava and yam flours
Products' processing stages	No flour purchases	Buy flour (first-stage processed); start buying bread (second-stage processed)	Buy pasta and more bread (second-stage processed)	Buy highly and ultraprocessed foods
Acquire animal products	Hunt, fish, and raise animals to consume	Buy live or custom-killed animals at retailer and clean at home	Buy minimally processed, cleaned meat and fish	Continue buying minimally processed and start buying ultraprocessed
Acquire snacks and drinks	Cook and eat traditional snacks and treats at home	Buy traditional snacks and treats	Buy ultraprocessed packaged snacks and beverages	Increase purchases of ultraprocessed snacks and SSBs
When snacks are consumed	Traditional festivals	Diverse special occasions	Weekly or daily	Increase frequency
Meal preparation and acquisition	Cook and eat meals at home	Buy traditional meals at local street vendors	Buy nontraditional meals at restaurants and street vendors	Buy at fast-food chains
Who buys meals away from home	No purchased meals	Bachelors and students	Women and men working outside the home	Whole family
Purchases of highly processed foods	A few traditional snacks (fritters, *mandazi*)	A few types (bread, *mandazi*)	Many types	Increase diversity
Sources of processed foods	Home	Small local retailers and neighbors	SMEs, stalls, and retailers in towns	Small shops and supermarkets

Figure 5: Overview of key shifts in the 50-year evolution of who, what, when, where, and how food is consumed in Sub-Saharan Africa.
Source: Reardon et al. 2021(40)

1.1.2.2 Tanzania's nutrition transition

Consumption of traditional Tanzanian foods is declining, despite benefits including maintaining healthy weight(34,76), improved child survival(77), growth and reproductive health(78), improved vision(78–80), and higher subjective quality of life(19). Protein-rich traditional staples like sorghum and millet are waning(72,81) and where they persist, how they are processed, sold, and consumed is evolving(82)—e.g., transformed into fried snacks like chapati, samosas, and *mandazi*[1](18). Fermented foods like *mbege*[2] provide valuable micronutrients but are scarce in *modern diets* due to incompatibility with industrial food processing(83). Nutrient-rich traditional vegetables provide essential vitamins and minerals to prevent malnutrition(78), yet intake remains below recommendations(84).

Displacing these are increasingly Western-style dietary patterns(78,85,86) comprising more industrially-processed foods like sugar-sweetened beverages (SSBs), packaged cookies, and noodles (see Appendix C for Africa-specific processed-food examples)(40). Extensive evidence links growing UPF consumption with rising obesity and DR-NCD rates across SSA and Tanzania(54,57–67).

The nutrition transition is evident in all districts(65), but progressing unevenly across settings and demographic groups. Urban-rural disparity in dietary patterns is evident (Figure 6)(87). Urban-dwellers consume significantly more UPF and SSBs(81,88), though rising in *rural* areas and across ages and socioeconomic groups(82). A 2022 nationally-representative survey found 28% adults, and a similarly high proportion of young children, consumed SSBs the previous day(88), while

[1] *Mandazi* is a small cake/doughnut made of sweetened dough fried in oil, a popular street-food snack along the Swahili coast.
[2] *Mbege* is a traditional home-brewed beverage made from fermented bananas and finger millet flour, native to the Chagga ethnic group of Northern Tanzania.

14% reported eating fried or salty foods like chips and *bagia*[3](88), demonstrating integration of energy-dense, nutrient-poor foods into daily diets.

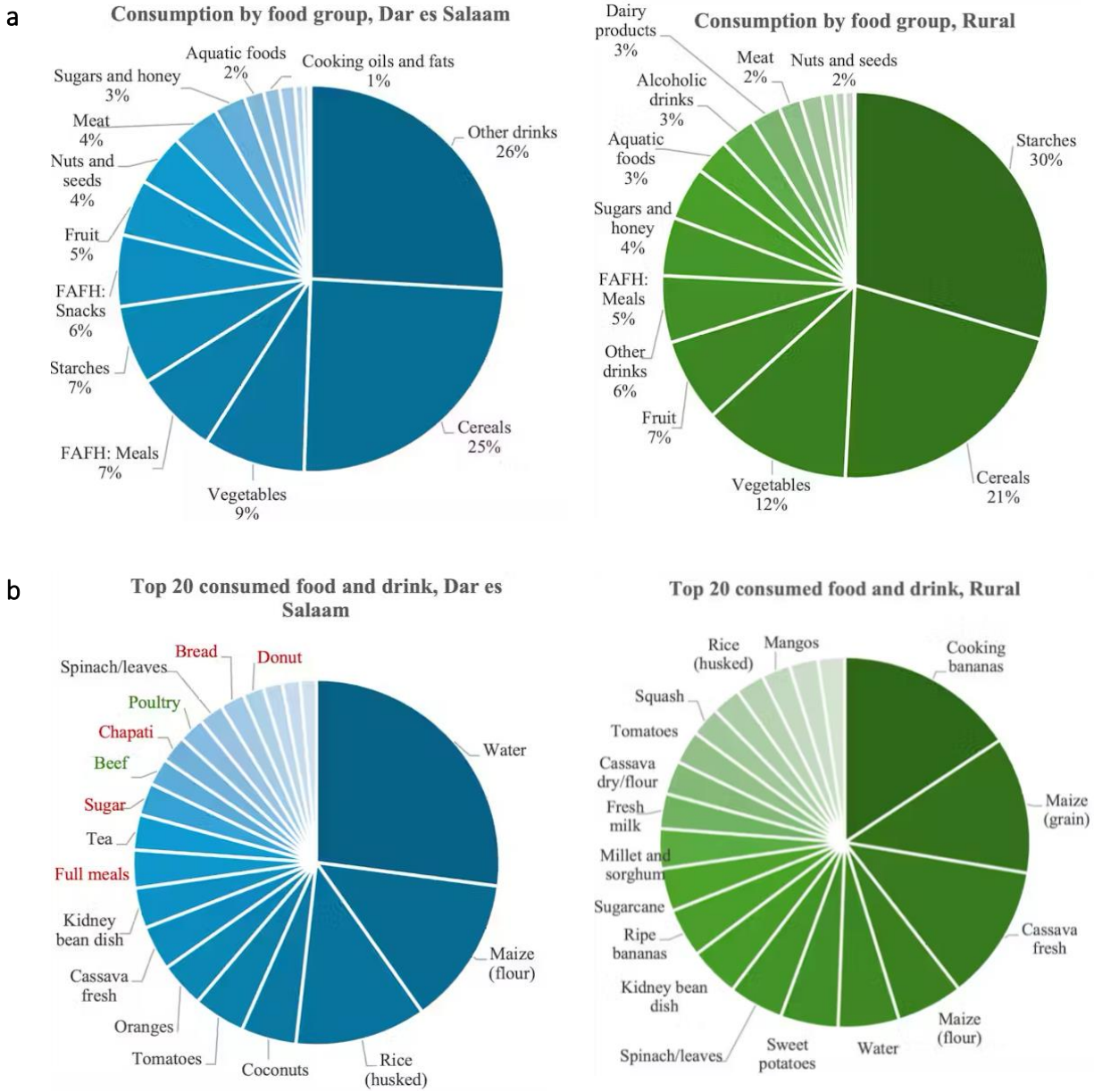


Figure 6: Comparison of food group consumption and top 20 most consumed food and drink items in urban and rural settings in Tanzania.

(a) Top panels show the proportion of total consumption by food group, in urban (blue) and rural (green) areas. **(b)** Bottom panels show the 20 most commonly consumed food and drink items in urban (blue) and rural (green) areas. Urban diets include more 'other drinks', ready-to-eat foods, and processed items such as bread, sugar, and donuts. Rural diets are more dominated by starches, vegetables, and traditional staples like maize, cassava, and leafy greens.

Source: Ameye, 2024(87)

[3] *Bagia* is a deep-fried fritter often made with black-eyed peas or other pulses, onions, and spices.

Meanwhile, food preparation methods are changing from boiling to frying(18), and sourcing is shifting from home-production to purchasing, 70% of which now consists of processed items(89). Tanzania's traditional food culture faces growing pressure from globalized practices like *food-away-from-home (FAFH)*(82).

Tanzania's nutrition transition has multiple, complex drivers. While its features are well-documented (Section 2: Literature Review), less is known about the on-the-ground drivers as perceived by communities.

1.2 Research context

1.2.3 Tanzania country and population characteristics

Tanzania, formed in 1964 through the union of Tanganyika and Zanzibar, spans diverse agroecological zones and is administratively divided into 32 regions(Figure 7)(90).

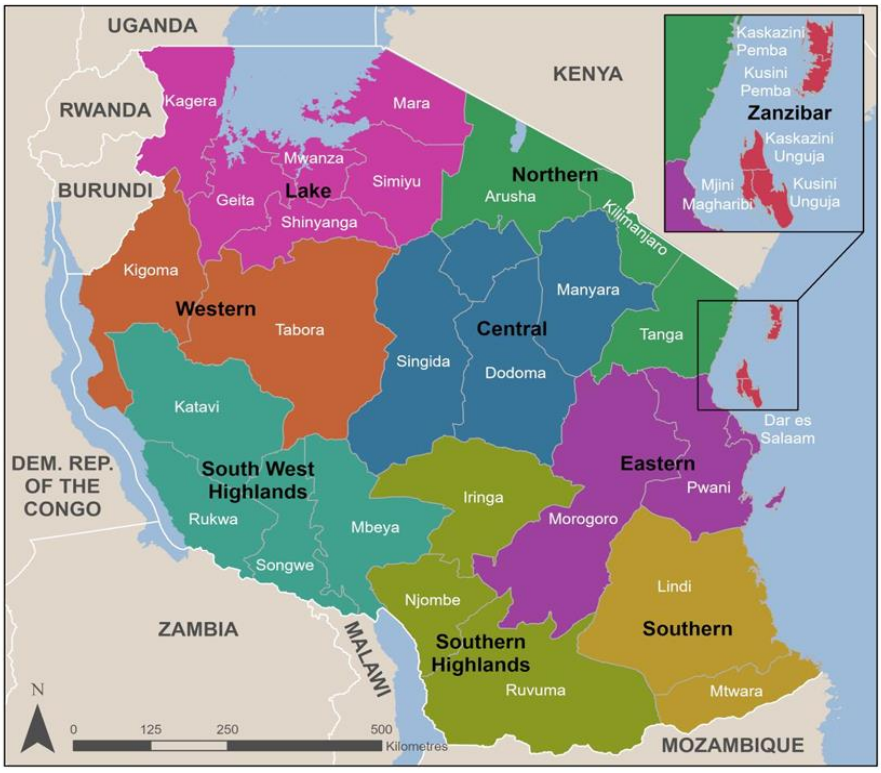


Figure 7: Map of Tanzania's agroecological zones and 32 districts.
Source: Ministry of Health, 2022(15)

Population

Tanzania is home to 69 million people, with 46% under 15-years (Figure 8). Average household size is 4.5, with one-third headed by women(88). The *urban* population doubled from 14.5% in 1992 to 28.9% in 2015(91–93), alongside fourfold increase in small urban centres between 2002–2012(94). Internal migration is widespread, with 35% living beyond their place of birth(95).

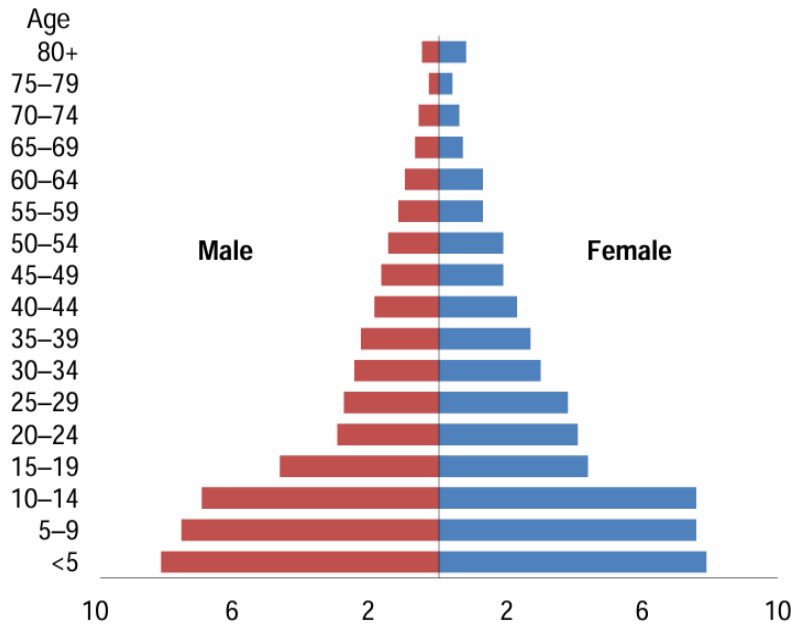


Figure 8: Population pyramid: a graphical presentation of Tanzania's population's age and sex composition.
Shown as percent distribution of the household population, by 5-year age groups, separately for males and females. Horizontal bars present the numbers or proportions of males and females in each age group. The pyramid exhibits a broad base typical of nations with improving infant mortality, high fertility, and low life expectancy.
Source: Ministry of Health, 2022(88)

Economy and wealth distribution

Tanzania achieved lower-middle-income status in 2020 and is one of SSA's fastest-growing economies(36,96). Yet only 10% are economically secure, and 43% live in poverty[4](36). Wealth is unevenly distributed, with 55% of urban residents in the highest wealth quintile versus 6% in rural areas(88).

Employment and Education

Agriculture contributes quarter of GDP[5] and employs two-thirds of the population(36,97,98). Adult literacy is 80%—below global but above regional averages(88). Educational attainment remains low: 30% complete only primary school, 10% secondary, and 1–2% post-secondary(88), with consistently higher rates in urban areas(97). Tanzania's next generation is projected to achieve only 39% of its productivity potential[6](36)—highlighting the need to invest in population health for future prosperity.

[4] *Poverty* based on the International Poverty Line of USD$2.15 per day(36).
[5] *Gross Domestic Product* is the total value of goods and services produced within a country's borders in each period, without deductions for depreciation or natural resource depletion(240).
[6] As measured by the *Human Capital Index* – a World Bank developed estimation of the expected productivity of a child born today in a given country, based on current levels of health, education, and survival(36).

Gender dynamics and marital status

Tanzania has a moderately strong patriarchal structure(91). In 2022, 98% men and 68% women were employed(88). Among earning women, one-third control their income, and 55% married women report involvement in decisions on healthcare and major purchases(88).

Race, ethnicity, tribe and religion

Tanzania has over 120 distinct ethnic and tribal groups with unique languages, customs, and food traditions(72,99). Nationally, 61% are Christian and 35% is Muslim, varying extensively by region(100).

Health system

Tanzania's decentralized, tiered healthcare system is funded through government, donors, and out-of-pocket payments – which make up one-fifth of health spending as only one-third of the population has insurance(101). Despite progress toward UHC[7], challenges persist: underfunding, workforce shortages, urban–rural inequities, and limited primary-care capacity for rising NCDs (101–104).

Nutrition landscape

Tanzania's agroecological diversity shapes regional traditional diets: cassava and coconut dominate the coast, cereals and vegetables inland, and bananas in Northern Highlands(19,65,105–108). National staples include *ugali*[8], cooked-bananas, rice, and beans(72,109,110). Around half the population consumes green leafy vegetables(88) and pulses are the primary protein source, with limited access to meat and fish(19,105). Most Tanzanian diets are unbalanced—dominated by starchy staples, low in fruits and vegetables, and high in added sugars (see Appendix D for comparison with EAT-Lancet reference diet)(85,111,111).

Urban diets are more diverse but also more calorific and processed—featuring rice, bread, mandazi, and sugary drinks—while rural diets rely more on seasonal, homegrown produce(72). Dietary diversity tracks with wealth and education(88). Tribal food traditions and wild foods continue to play key nutritional and cultural roles(72,99,112,113).

1.2.4 Kilimanjaro region and population characteristics

Kilimanjaro in Northern Tanzania is geographically diverse with a temperate climate. Fertile volcanic soils and rainfall support agriculture, employing half of residents(97,98) and contributing to the region's relative affluence and high life expectancy of 71-years(88). Traditional Kilimanjaro diets comprise green bananas, leafy greens (amaranth leaves), legumes, root vegetables (cassava, taro), and wholegrains (millet, sorghum)(34).

[7] UHC: Universal Health Coverage

[8] *Ugali* is a stiff porridge prepared using ground cassava, maize, sorghum, or millet with boiled water.

Kilimanjaro surpasses national averages in education and literacy, with one-third literate in both Swahili and English(97). Almost all (99.7%) residents are Tanzanian citizens(97). The population is ethnically diverse, though dominated by Chagga and Pare tribes(114), and religiously mixed between Christianity and Islam(97).

Unlike the predominantly rural national context, Kilimanjaro presents a more dynamic urban-rural interface, offering a unique setting to study dietary differences. While 76% remain rural(97), youth migration to urban centres is reshaping demographics, reflected in contrasting population pyramids (Figure 9)(97). Kilimanjaro hosts 1.9 million people, with a youthful average age of 22.2(88).

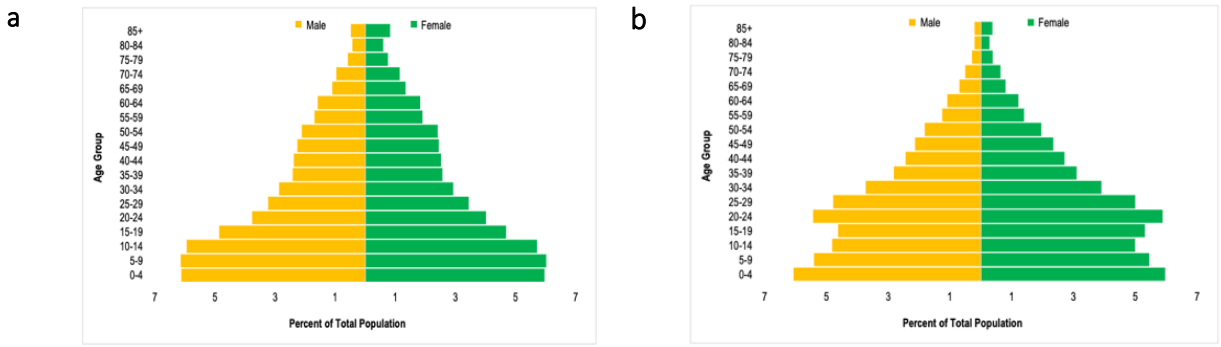


Figure 9: Population pyramid: a graphical presentation of Kilimanjaro's rural and urban population. By age and sex composition. Shown as percent distribution of the household population, by 5-year age groups, separately for males (yellow) and females (green). Horizontal bars present the numbers or proportions of males and females in each age group. (a) rural population; (b) urban population. *Source: The United Republic of Tanzania, 2024(97)*

This study was conducted in two contrasting Kilimanjaro districts: Moshi Municipal—the fully urbanized regional capital with higher literacy, infrastructure and service access, and insurance coverage(88) than Moshi Rural, which is 93% rural(97). A single unpaved road connects Moshi Rural villages to Moshi town, approximately 15km away.

1.2.5 Tanzania's nutritional indicators

Tanzania faces coexisting stunting, wasting, and overweight/obesity (Figure 10)(88) alongside widespread micronutrient deficiencies(115). This DBM affects 5.6% of households(116), both wealthy—through excess intake of energy-dense, nutrient-poor foods—and poor—from limited access to nutritious foods(113). One-third of children under-5 are stunted(37).

Overweight/obesity increases with age, education, and household wealth(88). Consistent with regional trends, rates are rising faster in urban than rural areas(117). In urban Tanzania, 50% women and 26% men are overweight/obese, compared with 28% and 12% in rural areas(88). In Kilimanjaro, 48.5% adults and 15% children are overweight/obese(88,118).

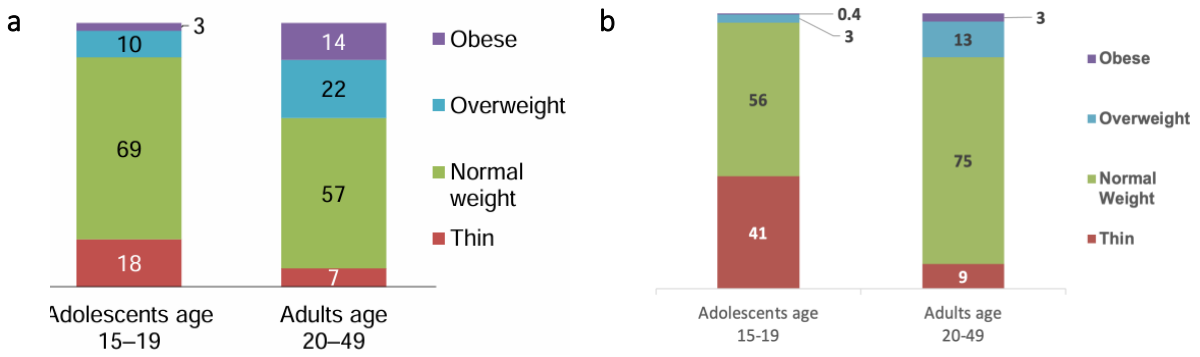


Figure 10: Nutritional status by age and sex in Tanzania in 2022.
(a) Percent distribution of nutritional status among adolescent girls (15–19 years) and women (20–49 years). **(b)** Percent distribution among adolescent boys (15–19 years) and men (20–49 years). Categories shown: Thin, Normal weight, Overweight, and Obese.
Source: Ministry of Health, 2022(88)

1.2.6 Policy context – Tanzania's food and nutrition policies

Historically, Tanzania's nutrition policy has focused on undernutrition, but rising public health concerns around overweight/obesity and DR-NCDs pose new complex challenges for policymakers. Coordinated, cross-sectoral, double-duty actions[9] are required to address malnutrition in all its forms(119).

Recent strategies—NMNAP 2016–2021[10](120), the SPNCDP 2021–2026[11](121), and TFNC[12] Strategic Plan 2020–2025(122)—promote integrated, nutrition-sensitive development[13] aligned with national goals such as TDV-2025[14] and FYDP-III[15](123). TDV-2025 emphasizes local nutritious food production to improve livelihoods and reduce NCD risk(123), while FYDP-III targets stunting and encourages school-based nutrition education, diverse agricultural production, and obesity reduction(124).

Tanzania's 2023 Food-Based Dietary Guidelines (FBDGs)(summary in Appendix D) promote diverse, culturally familiar diets, discourage UPFs, encourages home-cooking, food-label literacy and critical thinking around food marketing(125). However, widespread nutrition-education is needed to support implementation(126).

[9] Douby-duty actions aim to simultaneously tackle both undernutrition and problems of overweight/obesity and DR-NCDs. They have been proposed as a more hollistic way to effectively address malnutrition in all its forms.(119)
[10] NMNAP: National Multisectoral Nutrition Action Plan 2016–2021
[11] SPNCDP: Strategic Plan for Non-Communicable Disease Prevention 2021–2026
[12] TNFC: Tanzania Food Nutrition Centre
[13] 'Nutrition-sensitive development' emphasizes alignment between food systems and nutrition goals(241).
[14] TDV: Tanzania Development Vision
[15] FYDP-III: the Third Five-Year Development Plan

Regionally, Tanzania aligns with SADC[16], EAC[17], and AU[18] Agenda 2063, which advocate for preserving traditional diets and limiting UPF spread(127,128). While some fiscal measures, like the SSB tax, have been introduced(129), gaps remain: there are no mandatory regulations on trans-fats, front-of-pack labelling, or child-targeted food marketing(129). As in many LMICs, policy is undermined by weak political will, industry interference, and overreliance on individual-focused approaches that exacerbate health inequalities(46,130–132).

Tanzania's food-policy landscape remains under-regulated compared to other SSA countries, with reliance on non-governmental organisations (NGOs) and private actors to support nutrition initiatives(133). Strengthening state-led regulation and enforcement will be vital to protect public health and preserve traditional diets amid the nutrition transition.

[16] SADC: Southern African Development Community
[17] EAC: East African Community
[18] AU: African Union

2 Literature Review

This brief literature review synthesizes evidence on regional and national drivers of dietary change, focusing on global, social, economic, and individual factors relevant to understanding the transition in Kilimanjaro.

2.1 Hypothesized drivers of Tanzania's nutrition transition

2.1.1 Globalization

Globalization propagates industrialized, homogenized diets, displacing traditional food systems in East Africa(12,132). Global trade affects the type, cost, and demand for food products(134). Trade liberalization policies have opened Tanzania's markets to an influx of *highly-processed foods (HPF)*(48,135–138). Between 1995–2010, imports of SSBs to SADC increased by 1200% and snack-foods by 750%(138). *Foreign direct investment (FDI)* has expanded Tanzania's processed-food sector, increasing access to non-staple processed foods(85,135,139–141). Export demand has shifted focus toward cash crops, reducing subsistence farming, local crop availability, and weakening local food systems(85,142).

2.1.2 Urbanization

Urbanization accelerates the shift from traditional to modern food systems. Improved infrastructure facilitates distribution of processed-foods to supermarkets and fast-food outlets which cluster in densely-populated urban areas(19,143). Urban populations face heightened exposure to global food cultures, media, and advertising, reinforcing preference for modern diets(81,144–147). Urban *food environments (FE*) offer easier access to *modern foods*, while fresh produce is less affordable and available(81,148). Rural-to-urban migrants in Tanzania replace staples like cassava and sweet potatoes with bread, rice, cereals, pasta, and SSBs(21,76,147). Urban diets are linked with rising obesity and DR-NCD rates(21,149–151), increased FAFH intake which contributes an additional 346kcal/day(21,76,147), and reliance on *convenience foods* due to urban living conditions—limited space, storage, and cooking facilities(152).

2.1.3 Restructuring of the food system and food environment

Tanzania's food system structure is shifting from fragmented, small-scale local actors to large domestic and multinational food and beverage companies (MFBCs) that propagate modern diets(85,135). Tanzania's packaged-food market grew by 21% between 2018–2023(153) while SSB production rose sixfold from 1997–2017(81). Traditional millers like Bakhresa and Metl have diversified into branded goods(40,154) and developed extensive distribution networks to reach rural consumers(40,75). Although informal vendors and traditional markets still

dominate(2,92,93), modern retail is proliferating(153). UPFs such as cookies, noodles, and SSBs are now widely available in both modern and traditional outlets(154), with even small retailers selling branded, packaged-foods over loose staples(154,155). These shifts have drastically altered FEs, increasing access to processed products(10,40,137,139,156–158). FAFH—often non-traditional, energy-dense, and nutrient-poor—has become a major food source(9,82).

2.1.4 Corporate influence

Today, a handful of MFBCs dominate Tanzania's food supply chains: replacing local producers, shaping demand, and disrupting food cultures(132,140,141). Marketing strategies target youth through branding, events, partnerships, and pricing tactics(73,140,159,160). LMICs are framed as "emerging markets" offering vast consumer bases where sales of UPFs are now rising much faster than in HICs(159,161,162). Corporate interference hampers public health regulation, as seen in South Africa's sugar-tax debate(160). Similar dynamics may affect Tanzania(162).

2.1.5 Individual and social influences

Individual food choices during nutrition transitions are shaped by age, gender, education, occupation, beliefs, and food knowledge(163–168). Youth, especially men, appear more open to HPFs, valuing novelty, pleasure, and social status over healthfulness(169,170). Traditional Tanzanian foods are increasingly viewed as old-fashioned or inferior to modern alternatives, which are perceived as convenient and prestigious(142). Intergenerational differences exist: Tanzanian youth often reject traditional vegetables as bitter or associated with poverty, unlike elders who value their taste and health benefits(78). Food knowledge varies widely and doesn't always correlate with healthier choices(171), while fading traditional knowledge reduces the appeal and use of traditional foods(78,80). Rising women's employment fuels demand for convenience foods(10,82,146,168,171,172). Body image also plays a role: in Tanzania, overweight status aligns with beauty ideals and provides distancing from HIV stigma(173).

2.2 Research gaps

Existing research on Tanzania's nutrition transition often covers national or regional trends, focuses on urban areas, isolates single factors, and fails to capture how dietary change is experienced at the *community* level. No qualitative evidence could be found exploring perceptions on dietary change across rural and urban settings—despite evidence that the nutrition transition is taking hold in both disparately. This study addresses these gaps by exploring local perceptions of what is driving dietary change in urban and rural areas of Kilimanjaro, aiming to generate context-specific insights to inform more culturally grounded, responsive, and inclusive food and nutrition policies.

3 Problem Statement and Justification

3.1 Problem statement

Tanzania, like many SSA countries, is undergoing a nutrition transition marked by rising consumption of energy-dense, industrially-processed foods high in salt, sugar, and fat—driving a surge in DR-NCDs and the DBM(174–176). Traditional diets in Kilimanjaro—linked to positive metabolic outcomes—are increasingly displaced by Western-style diets, with health and socio-cultural consequences(34,177).

Whilst nutrition transitions across SSA are well-documented, key drivers relevant to sub-national Tanzanian contexts are less defined. Existing literature generalizes across countries or focuses on urban areas, overlooking context-specific drivers. Sociocultural aspects—such as shifting norms, community perceptions, and lived experiences—also remain underexplored. This study addresses these gaps by examining how and why diets are changing across rural and urban Kilimanjaro, offering timely, place-based insights for policy and intervention.

3.2 Justification for the research

Communities undergoing nutrition transitions encounter new foods and eating practices that can help or harm health(170). In Tanzania, rising DR-NCDs coincide with the erosion of nutritionally and culturally valuable traditional diets(18,177,178). Experts and communities alike express concern about this shift, citing threats to health, social cohesion, and identity(19,77,110,135,158,177,179) Growing dependence on imported foods and MFBCs for nutrition undermines food system resilience and *food sovereignty*(135).

Yet, the community-level drivers of this nutrition transition in urban and rural Kilimanjaro remain poorly understood. Gaining qualitative insights into why traditional foods are being abandoned and how socio-cultural factors shape diets is key to informing locally-relevant policies and interventions to guide Kilimanjaro's dietary transition toward healthier, culturally grounded diets(170,170,180,180,181). This study addresses a critical knowledge gap by centring community perspectives and exploring the context-specific influences behind the region's nutrition transition.

4 Objectives and Research Question

4.1 Research question

How do urban and rural communities in Kilimanjaro perceive the key drivers of the nutrition transition?

4.2 Primary objective

To examine how communities in urban and rural Kilimanjaro differentially perceive the key drivers of the nutrition transition.

4.3 Specific Objectives

1. Explore community perceptions of the nutrition transition on changing dietary patterns and practices in urban and rural Kilimanjaro.
2. Examine attitudes towards traditional versus 'modern' diets.
3. Identify the key drivers of dietary shifts as perceived by urban and rural communities.
4. Assess how rural and urban communities diverge in their perceptions of the key drivers of the nutrition transition.

4.4 Purpose statement

By uncovering both shared and divergent perspectives on the nutrition transition across rural and urban communities, this qualitative study seeks to generate context-specific insights into shifting dietary patterns and attitudes toward traditional and modern diets. These findings aim to inform locally-relevant nutrition policies and interventions for healthier, culturally-grounded food systems. Target audiences include policymakers, program designers, public health practitioners, and civil society actors in Tanzania.

5 Methodology

5.1 Rationale for methodology approach

A qualitative approach was planned to explore dietary change in Kilimanjaro, as it captures the complex, context-specific nature of food behaviours often missed by quantitative methods(182). *Focus Group Discussions (FGDs)* were selected for their ability to elicit rich, socially-grounded insights shaped by norms and collective identity(183). FGDs are culturally appropriate in Tanzania, inclusive of low-literacy individuals, and efficient for gathering diverse perspectives(8). Groups were stratified by age, gender, and setting to capture variation and reduce power imbalances(184).

5.2 Positionality, reflexivity, and culturalism

Qualitative research is shaped by the background, viewpoints, and personal assumptions of the researcher—who acts as the primary instrument in data generation(185). As a British biomedical sciences graduate and international health student, I was aware of the cultural and epistemological distance between myself and the study communities. My experience in pharmaceutical research and NGO policy work shaped my understanding of 'optimal' diet and health, but I remained open to different knowledge systems and lived realities.

I was conscious not to impose Western ideals of nutrition, health, or modernity, or engage in cultural essentialism[19]. I prioritized contextual sensitivity—centring local perspectives by involving researchers from the communities themselves and fostering open, participant-led FGDs. Acknowledging my positionality as an outsider—being of a different ethnicity and cultural background—I approached the research with humility, respecting participants as experts of their own experiences. Throughout data collection and analysis, I and research team members remained reflexive[20], recognising how our own assumptions could shape the process and findings.

5.3 Epistemology, ontology, and axiology

This study is grounded in a constructivist worldview(186). It assumes that knowledge is not fixed or objective, but co-produced through lived experience, culture, language, and social interaction—an interpretivist epistemological stance(186,187).

[19] Culturalism or essentialism is the risk of overemphasizing cultural explanations at the expense of structural or material factors(242).

[20] Reflexivity is defined as self-critical, sympathetic introspection and the self-conscious analytical scrutiny of the self as researcher

Ontologically, this study assumes multiple realities shaped by individuals making meaning of the world around them. Rather than seeking a singular 'truth'—such as a fixed set of factors driving dietary change—it aims to understand how communities construct diverse interpretations of it.

Axiologically, the study was committed to cultural humility, inclusivity, and respect for local knowledge systems, cultivating space for participants to express what mattered most to them.

These philosophical orientations guided the use of qualitative research methods, specifically inductive FGDs, to explore how communities make collective sense of dietary changes. The aim was to generate context-specific insights to inform both local understanding of the nutrition transition and locally-relevant interventions.

5.4 Ethics

This study was conducted in collaboration with Radboud-UMC Nijmegen[21] and KCMCU[22]. Ethical approval was obtained from KIT Ethics Committee, KCMCU's IRB[23], and Tanzania's NIMR[24]. No conflicts of interest were declared. Community leaders and local authorities granted permission, and all ethical protocols were followed(188–193). Informed consent—written or fingerprinted with a witness—was obtained, and data were securely managed under a transfer agreement and institutional governance.

Ethical challenges included power dynamics, language barriers, limits to confidentiality in FGDs, and the difficulty of gaining truly informed consent when unable to anticipate prospectively what will be uncovered(194). These were addressed through demographic stratification, bilingual cross-checking of materials, and appropriately trained local researchers, who's community ties helped build trust. Participation was voluntary, with bottled-water and travel reimbursement provided.

As a first-time Principal-Investigator, I approached the role with humility, drawing on clinical research experience, academic training, and mentorship to uphold ethical and scientific rigour despite resource constraints.

5.5 Analytical framework

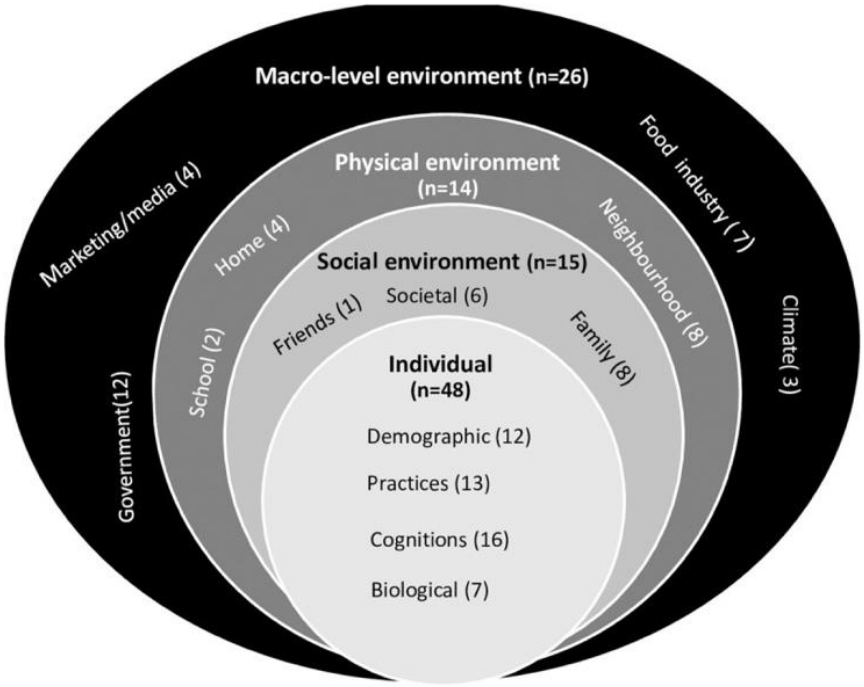
The *food environment (FE*) serves as a useful organizing framework for exploring factors and conditions that influence dietary behaviour(195). Several frameworks have been developed

[21] Radboud University Medical Centre (UMC) Nijmegen
[22] KCMCU: Kilimanjaro Christian Medical College University
[23] IRB: Institutional Review Board
[24] NIMR: National Institute for Medical Research

globally(10,180,195–197), for LMIC(150,195,197,198), and specifically for Africa(164,199). All have informed this study.

This study adopted the Osei-Kwasi African urban FE framework(199), an adaption of the widely used socio-ecological model(196) for African contexts. It identifies 103 factors influencing diet across four interrelated levels: macro, physical, social, and individual (Figure 11).

a



b

Macro Environment	FOOD INDUSTRY Food production; Ready meals; Shelf life; Market structure; Food labelling; Presentation/packaging; Quality/freshness of food	MARKETING/MEDIA Food prices; TV/radio/media; Advertising; Social media use	CLIMATE Seasonality; Weather; Home gardening	GOVERNMENT Taxes or levies; Food/agriculture policy; Access to transport; Societal norms; Social welfare policy; War; Religion; Zoning policies; Road safety; Resource of nutritionists; Dietary guidelines	
Physical Environment	NEIGHBOURHOOD Community spaces; Area deprivation; Availability/distance of food outlets; Convenience; Type of food available; Household sanitation and hygiene; Neighbourhood sanitation and hygiene; Food adulteration/contamination			SCHOOL Foods sold near schools; Healthiness of school meals	HOME Housing condition; Home food stocks; Food storage facilities; Cooking facilities
Social Environment	FRIENDS Peers/friends	FAMILY Family food practices; Family support; Food habits; Food allocation; Communal eating; House-help; Marital status; Household composition		SOCIETAL Social norms; Culture; Gender; Role modelling; Traditional taboos; Food vendor reputation	
Individual BIOLOGICAL Age; Sex; Ethnicity; Allergies; Puberty; Weight status; Pregnancy/lactation	DEMOGRAPHIC SES; Income; Education; Employment; Land use; Household food security; Women's empowerment; Female headed house; Workload in home; Migration history; Shift work; Wealth	COGNITIONS Appetite; Hunger; Texture; Mood and emotions; Stress; Wellbeing; Body satisfaction; Knowledge; Preferences; Locus of control; Risk perception; Taste; Aroma; Food appearance; Diet quality; Portion size		PRACTICES Skipping meals; Sleeping pattern; Eating out; Cooking skills; Time constraints; Eating at home; Physical/mental health; Familiarity with food; Smoking; Alcohol; Physical activity; Speed eating; Dieting	

Figure 11: Individual-level factors in the African urban food environment framework, organised across four environmental levels.

(a) A summary of themes containing individual factors, across four environmental levels in the African urban FE framework(199). The total number of factors identified for each environmental level are shown.

The subcategories are then identified with the number of factors within those, e.g. friends, societal, family. **(b)** Detailed categorisation of 103 individual-level factors across the four levels, redrawn from Osei-Kwasi et al.(199) to group factors from both the high-income country framework and specific to the African urban FE context.
Source: Osei-Kwasi et al. 2021(199)

This framework informed development of the FGD guide, a preliminary codebook for thematic analysis, systematic categorisation of qualitative data from FGDs according to established levels of influence and enhances the comparability of results with other research conducted in the African context.

Limitations of the applicability of the framework to this research

The Osei-Kwasi framework focuses on general individuals' interaction with the FE, rather than specifically in the context of dietary transitions—for which no suitable framework was found. Therefore, it excludes broader macro-level drivers that shape the FE itself, like globalization and urbanization.

Originally developed for urban contexts, many domains remain relevant across settings, but dimensions such as physical infrastructure, socioeconomic status (SES), and employment patterns reflect urban realities more closely and risk overlooking rural-specific dynamics. Given Tanzania's rapid urbanisation and growing rural–urban dietary convergence(82,154), applying the framework to rural areas is justifiable, though not without limitations. A hybrid deductive–inductive approach (see Section 5.8) allowed rural-relevant factors to emerge organically beyond the framework's urban-centric categories.

Overlap between framework levels complicates classification. While it simplifies layers of influence, it lacks the nuance of systems-based models, which better reflect complexity but are less digestible. To address these gaps, additional FE frameworks (as referenced above) and literature on the nutrition transition informed the inductive aspects of the thematic analysis.

5.6 Sampling

5.6.1 Site selection

A multi-stage purposive sampling strategy was employed to select study sites containing varying degrees of urbanization and populations with diverse age structure, ethnicity, tribe, religion, education, and occupation. Two neighbouring districts – Moshi Municipal and Moshi Rural – were selected for their representativeness of contrasting urban and rural contexts.

Within these districts, five wards were purposefully selected in consultation with local stakeholders, based on factors such as accessibility, population density, religious and cultural practices, and existing links with the research community. In Moshi Municipal, three wards—

Pasua, Miembeni, and Boma Mbuzi—were selected, and in Moshi Rural two wards—Kidia and Uru Shimbwe—giving a total of five unique study sites (Figure 12).

Within each ward, one to three communities (collections of houses or streets) were identified from which to recruit participants, based on proximity to a suitable community space to conduct FGDs.

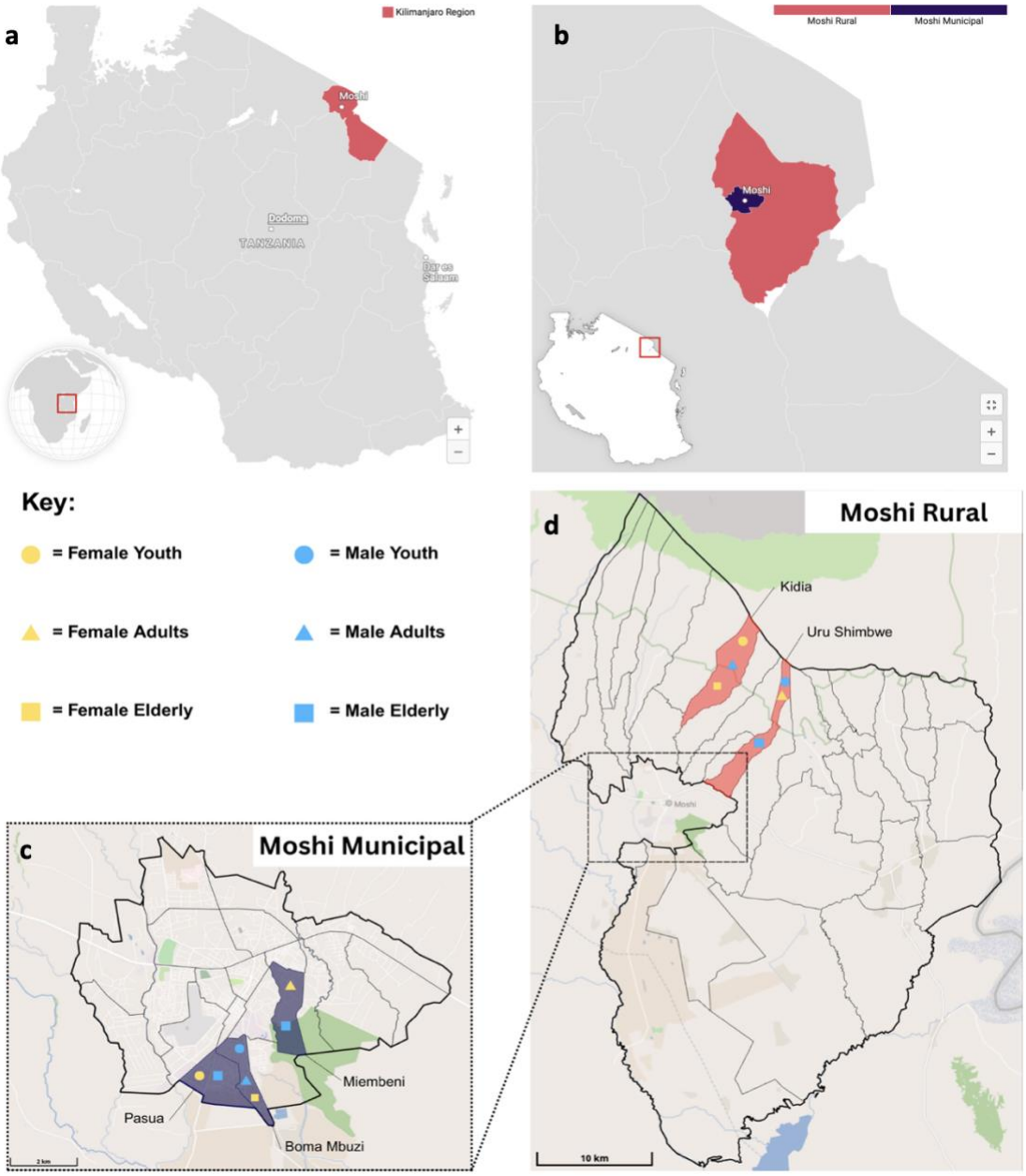


Figure 12: Map of study location and sites.
(a) Location of Tanzania and the Kilimanjaro region. **(b)** Two districts – Moshi Rural (red) and Moshi Municipal (blue) – within the Kilimanjaro region. **(c)** The three wards selected as study sites within Moshi Municipal district. **(d)** The two wards selected as study sites within Moshi Rural district.
Source: developed by author.

5.6.2 Participant selection

Within each site, participants were identified using deliberative purposive sampling. FGD participants were stratified by age (youth: 18–25 years; adults: 26–59 years; elderly: ≥60 years) and gender (male; female) to ensure representation of diverse groups and facilitate open discussion among peers with shared experiences. One FGD was planned for each demographic stratum in both rural and urban locations (Figure 12). Community health workers advised on participant selection and issued invitations to participate to those meeting the eligibility criteria.

5.7 Data collection

Between May and June 2025, 13 FGDs were conducted in urban and rural communities of Moshi Municipal and Moshi Rural Districts of Kilimanjaro. Discussions were facilitated in Swahili by three local researchers with lived experience in the context and training in FGD methodology(8). FGDs took place in familiar community locations, each with 6-12 participants and lasting 50–80 minutes.

Participants received an information sheet and consent form (Annex A) detailing voluntary participation, confidentiality, and withdrawal rights, which they signed in the presence of a witness. Participants also completed a brief sociodemographic questionnaire (Annex B) to contextualise the findings. Facilitators followed a flexible, semi-structured guide (see Annex C), developed in English then translated into Swahili for use. Discussions were audio-recorded with participant permission.

5.8 Data Analysis

5.8.1 Data preparation: transcription and translation

FGD audio-recordings were transcribed verbatim in Swahili. Transcripts were then translated into English for analysis. Cross-checking by the research team ensured linguistic accuracy and preservation of original meanings of culturally specific expressions.

5.8.2 Analysis software

A computer-assisted analysis approach was chosen to enable secure data storage and organization and enhance transparency and efficiency of the analysis process(200). Translated English-language FGD transcripts were uploaded to *Dedoose* qualitative analysis software.

5.8.3 Thematic analysis

To identify, analyse, and report patterns of meaning within the data, a *thematic analysis (TA)* approach was adopted for its theoretical flexibility and ability to produce a rich, detailed, and nuanced accounts of the data(17). TA was conducted by a sole-coder who was trained in qualitative analysis methods, following Braun and Clarke's six-phase approach (Appendix E)(17). A hybrid deductive-inductive coding strategy allowed for both alignment with existing literature and data-driven insights to emerge(201).

The unit of analysis was the focus group as a whole, to capture shared meanings and group dynamics. Full transcripts were used as the coding unit to preserve conversational context. Post-FGD debriefs facilitated real-time reflection on the data generated—supporting iterative refinement of the discussion guide. Data collection continued until thematic saturation was reached—when no substantially new themes were emerging(202).

5.8.4 Coding and theme development

A preliminary codebook, informed by the Osei-Kwasi framework (Section 5.5), guided initial deductive coding. This was accompanied by open coding[25] to identify inductive codes grounded in participants' lived experiences. Coding was conducted at both semantic and latent level—capturing explicit content and underlying meanings based on contextual understanding(17). The resulting descriptive and interpretive codes were iteratively reviewed, refined, and grouped into broader categories based on shared meaning, with overlapping codes reworded or merged for analytical coherence. Divergent and contradictory perspectives were retained as valuable expressions of subjective realities and competing truths within communities. This dual deductive–inductive approach allowed for both the adaptation of existing concepts and the emergence of new context-specific themes. An audit trail documenting key analytic decisions and code development is provided in Appendix F and the final codebook in Appendix G.

5.8.5 Reporting Scope

While TA covered the full breadth of data collected across FGDs, this thesis selectively presents only a subset of findings most relevant to the research objective: how rural and urban communities differ in their perception of the drivers of dietary change. To maintain analytical focus, only drivers that were differentially expressed between rural and urban groups are presented here. These were identified by calculating the ratio of code applications between rural and urban transcripts, with codes that appeared more than twice as frequently in one setting considered meaningfully different and selected for in-depth analysis and reporting. This

[25] 'Open coding' refers to an early phase of qualitative TA in which data is broken down into discrete parts, closely examined, and labelled to identify emerging concepts without predetermined categories(17)

approach highlights contextual contrasts aligned with the study's objectives, while acknowledging the broader data landscape in which they were situated.

5.9 Acknowledgement of methodological limitations

Resource constraints limited full representation of Kilimanjaro's religious, ethnic, and socio-economic diversity. Local input in site and participant selection aimed for variation in age, tribe, religion, and occupation—enhancing local relevance but potentially reducing wider comparability. The cross-sectional design captures current drivers but not how these change over time. Group-based methods like FGDs risk social desirability and dominance effects, potentially silencing minority views, but this was mitigated through intentional group composition and skilled facilitation. Relying on translated FGD transcripts for analysis risked losing meaning or nuance.

The analytical approach of using code frequency ratios to identify urban-rural divergent themes risks imposing a quantitative lens on qualitative data. Variations in participant numbers and transcript length may have inflated some frequencies, so frequency patterns were cross-checked against the analyst's holistic understanding of the dataset. Frequencies guided theme identification but were not used to rank importance.

6 Results

6.1 Participant characteristics

A total of 112 participants took part in 13 FGDs across five sites in two districts. Table 1 provides an overview of the composition of each FGD and participant characteristics.

Table 1: Composition of FGDs and participant characteristics.
Summary of 112 participants in 13 FGDs across five sites in two districts: total 61 urban, 51 rural; 60 males (33 urban), 52 females (28 urban); 35 youth (18–25yrs), 32 adults (26–59yrs), 45 elderly (>60yrs). Participants spanned 20 ethnicities (mostly Chagga [37], Pare [20]) and identified as Christian (33) or Muslim (23). Most (58) living in setting of birth; 27 migrated (26 rural-to-urban). A repeat FGD was held in error with urban elderly males. Inclusion of some participants outside pre-specified age ranges are indicated with an asterisk (*). 'Unknown' denotes missing or incomplete data sociodemographic data.
Source: Developed by author.

Setting	Site	Gender	Age group	Particip-ants (n)	Av. age (range)	Av. years education (range)	Employment status	Occupation	Tribe	Religion	Marital Status	Place of birth	Head of household
Urban	Boma Mbuzi	M	Youth	10	24.8 (18-40)*	11.1 (8-13)	Employed(9); Self-employed(1)	Business(6); Technician(2); Chef(1); Unknown(1)	Pare(3); Zigua(2); Meru(1); Rangi(1); Sambaa(1); Nyamwezi(1); Zaramo(1)	Muslim(3); Unknown(7)	Single(6); Married(2); Unknown(2)	Urban(9); Rural(1)	Yes(2); No(8)
	Pasua	F	Youth	9	20.1 (18-24)	10.8 (8-14)	Unemployed - unable to work(6); Unemployed - able to work(3)	Student(5); Unknown(4)	Pare(3); Rangi(2); Nyiramba(1); Sukuma(1); Sambaa(1); Iraqw(1)	Christian - Unspecified(4); Muslim(1); Unknown(4)	Single(3); Married(2); Unknown(4)	Urban(5); Rural(4)	Yes(1); No(8)
	Boma Mbuzi	M	Adult	8	35.3 (27-50)	13.3 (8-18)	Employed(8)	Driver(3); Business(3); Engineer(2)	Sambaa(2); Pare(3); Nyakyusa(1); Zigua(1); Ha(1)	Muslim(7); Christian - Unspecified(1)	Married(7); Single(1)	Unknown	Unknown
	Miembeni	F	Adult	9	31.6 (25-40)	9.4 (7-13)	Self-employed(8); Unemployed(1)	Business(7); Housekeeper(1)	Chagga(2); Zigua(2); Sukuma(1); Pare(1); Sambaa(1); Iraqw(1); Nyaturu(1)	Muslim(2); Christian - Catholic(1); Christian - Lutheran(1); Unknown(5)	Single(2); Married(2); Separated(1)	Urban(5); Rural(4)	Yes(4); No(5)
	Pasua	M	Elderly	8	65.8 (60-75)	7.8 (4-13)	Employed(6); Retired(1); Self-employed(1)	Construction(2); Agriculture(2); Security(2); Tailor(1); Carpenter(1)	Pare(5); Nyamwanga(1); Ndali(1); Sukuma(1)	Muslim(3); Christian - Unspecified(4); Unknown(1)	Divorced(1); Widow(2); Married(4)	Rural(7); Urban(1)	Yes(8)
	Miembeni	M	Elderly	7	72.6 (63-84)	7.6 (2-13)	Employed(3); Retired(4)	Agriculture(3); Business(2)	Chagga(3); Sambaa(1); Digo(1); Pare(1); Kurya(1)	Muslim(1); Christian - Lutheran(1); Christian - Catholic(1)	Married(6); Widow(1)	Rural(4); Urban(3)	Yes(7)
	Boma Mbuzi	F	Elderly	10	65 (63-70)	7 (2-13)	Self-employed(3); Employed(3); Unemployed(3); Retired(1)	Business(6); Livestock control(1)	Pare(4); Chagga(2); Nyaturu(1); Ngoni(1); Ndengereko(1); Ikoma(1)	Muslim(6); Unknown(4)	Married(3); Widow(6); Separated(1)	Rural(6); Urban(4)	Yes(7); No(3)
Rural	Uru Shimbwe	M	Youth	10	24.6 (20-35)*	8.4 (8-10)	Employed(9); Self-employed(1)	Agriculture(9); Business(1)	Chagga(9); Gogo(1)	Christian - Catholic(9); Christian – Seventh-day Adventist(1)	Single(9); Married(1)	Rural(10)	No(7); Yes(3)
	Kidia	F	Youth	6	19 (18-21)	Unknown	Unemployed – unable to work(5); Unemployed – able to work(1)	Student (5)	Unknown	Unknown	Single(6)	Unknown	Unknown
	Kidia	M	Adult	5	53.6 (35-60)	Unknown	Employed(6)	Plumber(1); Agriculture(1); Construction(1)	Unknown	Unknown	Married(5); Single(1)	Unknown	Unknown
	Uru Shimbwe	F	Adult	10	50.9 (37-67)*	8.5 (8-12)	Employed(8); Self-employed(2)	Agriculture(7); Tailoring(1); Business(1)	Chagga(9); Unknown(1)	Christian - Catholic(7); Christian - Lutheran(2); Unknown(1)	Unknown(10)	Rural(10)	No(7); Yes(3)
	Uru Shimbwe	M	Elderly	12	74.5 (65-93)	7.3 (3-9)	Employed(11); Retired(1)	Agriculture(12)	Chagga(12)	Christian - Catholic(4); Christian - Lutheran(1); Unknown(7)	Married(10); Widow(2)	Rural(11); Urban(1)	Yes(12)
	Kidia	F	Elderly	8	65.9 (60-72)	Unknown	Employed(7); Retired(1)	Agriculture(7)	Unknown	Unknown	Married(4); Widow(4)	Unknown	Unknown

6.2 Community perspectives on current and changing diets

To explore current eating patterns, the opening discussion prompt was: *"What types of foods are eaten most in this area today?"* Responses from urban and rural participants are visualized in Figure 13.

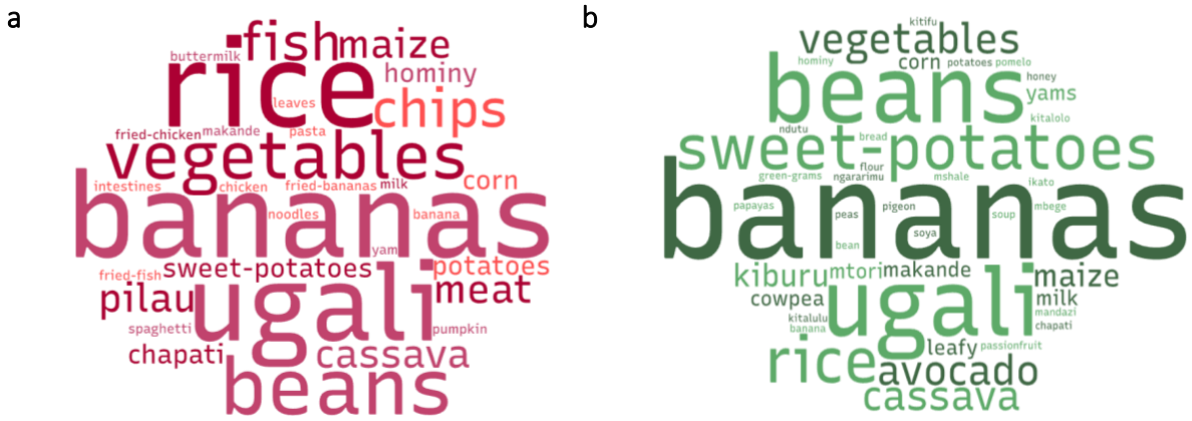


Figure 13: Commonly consumed foods in urban and rural settings, as reported by participants.
Word-cloud' diagram illustrating participants reports on foods currently consumed in urban **(a)** and rural **(b)** settings. The text-size of the word is proportional to the number of mentions.
Source: Developed by author.

To gain personal experiences with changing food habits and understand local emerging food trends, the follow-up question was asked: "*Have you seen any changes in the types of foods that people eat in this community*?"

Participants perceived diets in Kilimanjaro were changing in six key ways. First, many previously common traditional foods (examples in Figure 14a) are now rarely consumed. Second, while some traditional foods remain in name, production methods have changed— with home-pounded staples like maize and cassava now industrially-processed, and agrochemical use in crop production. Third, food quality is perceived to have declined, with less flavourful and nutritious vegetables and meat. Fourth, and most keenly emphasized, was how cooking methods have shifted from boiling to frying. Fifth, entirely new foods (examples in Figure 14b)—previously absent from local diets—are now regularly consumed. Finally, eating practices have changed, with more FAFH and fewer intergenerational, communal meals.

Figure 14: Food-specific examples demonstrating dietary change as reported by participants.
(a) Examples of traditional foods described as "forgotten," "abandoned," or rarely consumed. **(b)** Examples of novel "modern" foods reported as newly available and increasingly consumed.
Source: Developed by author.

Participants—especially elders—expressed deep concern about the health and cultural consequences of dietary change, across three key dimensions. First, they lamented that the medicinal and health-promoting properties of traditional foods are being lost alongside their declining consumption. Described as "natural", "pure" and "strong", these foods were believed to support digestion, physical strength, longevity, healthy aging, emotional wellbeing, and act "like medicine" for infections, stomach ulcers, diabetes, cardiovascular disease, kidney disease, malaria, and postpartum recovery.

Contrastingly, modern diets were seen as harmful—linked to both acute (fatigue, digestion issues, skin irritation) and chronic (obesity, diabetes, hypertension, cancer, infertility) health issues. Processed and 'chemically-treated' foods were labelled "poison" and "dangerous" and blamed for early aging, poor productivity, and disease. The vitality of elders raised on traditional diets was repeatedly compared with "sickly" and "vulnerable" younger generations raised on modern ones.

Beyond health, participants voiced anxiety about the erosion of traditional food culture that "carries a sense of *cultural identity* and pride". Traditional foods were framed as integral to personal, intergenerational, and cultural wellbeing.

6.3 Drivers of dietary changes: thematic analysis

TA identified 23 key drivers of dietary change across the dataset. Each was coded individually, then grouped into 10 overarching themes aligned to one of four levels of the Osei-Kwasi framework (Section 5.5). Figure 15 summarises this thematic structure. Full code definitions are provided in Appendix H.

Table 2: Summary of codes identified through thematic analysis, organised by theme and food environment category.

Thematic analysis identified 23 distinct drivers of dietary change, each coded individually and grouped into 10 overarching themes aligned with four levels of the Osei-Kwasi food environment framework (see Section 5.5). This table summarises the thematic structure; full code definitions in Appendix H.

Source: Developed by author.

Category	Theme		Code
Macro-environment	Structural	1	**Globalization eroding traditional food culture**
		2	**Urbanization creating modern food environments**
	Food industry	3	**Decline in production of traditional foods**
		4	**Concerns over agrochemical use reducing traditional food appeal**
		5	**Commercial incentives driving modernization of diets**
	Marketing/media	6	**Advertising and marketing driving demand for modern foods**
		7	**Digital media amplifying exposure to modern foods**
Physical environment	Home environment	8	**Lack of tools for home-preparation of traditional meals**
	Neighbourhood environment	9	**Proximity and type of food retail driving access to modern foods**
		10	**Shifting availability from traditional to modern foods**
Social environment	Family	11	**Evolving family food practices favouring modern diets**
		12	**Generational clashes: domination of youth food habits and preferences**
	Societal	13	**Social influence and norms driving modern food consumption**
		14	**Social status conferred by modern food**
		15	**Taboos and myths discouraging traditional food use**
		16	**Tribal mixing diluting distinct traditional food practices**
Individual	Sociodemographic	17	**Employment type & demands constraining traditional dietary practices**
		18	**Income determining affordability of traditional foods**
	Practices	19	**Eating away from home prompting modern food choices**
		20	**Time constraints hindering traditional food preparation**
	Cognitions	21	**Loss of traditional food knowledge and familiarity**
		22	**Preferences moulded by heightened sensory appeal of modern foods**
		23	**Overlooking or misunderstanding health risks of modern foods**

The results presented here focus on a subset of salient themes that were most differentially expressed between rural and urban FGDs, in line with the study's objective. As outlined in Section 5.8.5, codes applied more than twice as frequently in one setting than the other were selected for reporting (see Figure 16). Themes that fell outside this threshold are summarised in Table 14 but not analysed in depth. Figure 17 highlights the seven codes identified as differentially expressed, showing their frequency of application across setting, gender, and age group.

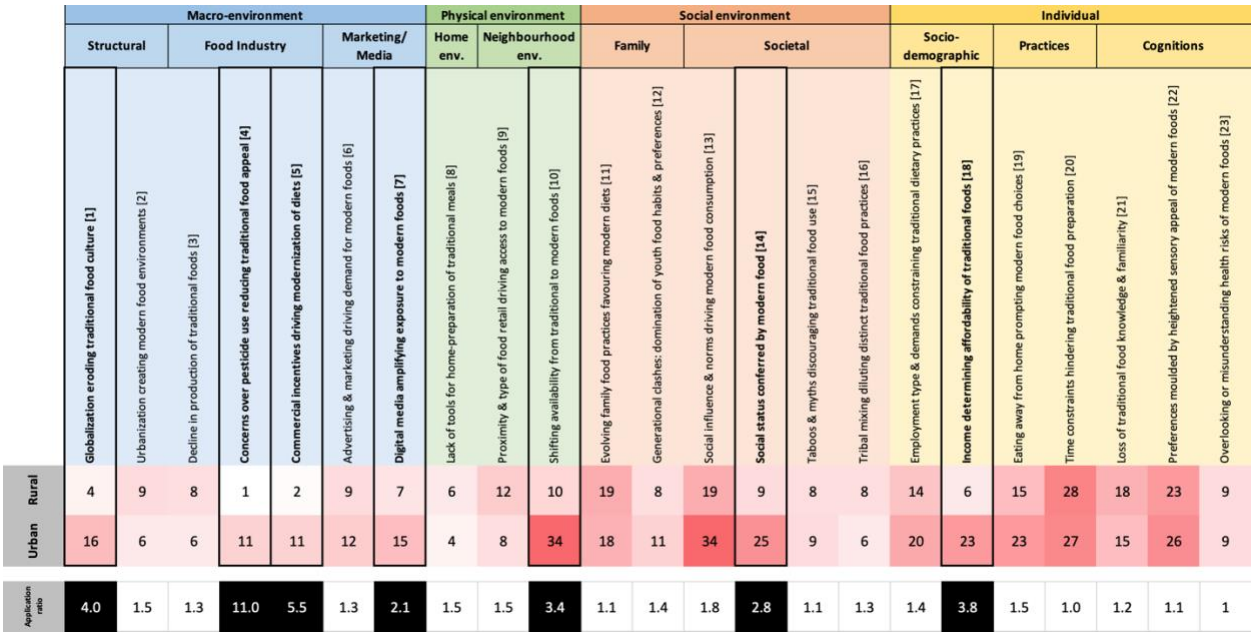


Figure 15: Code frequency by setting (urban vs rural).

Frequency heatmap of each code (n=23) applied across FGDs in urban and rural settings. Codes reflect distinct perceived drivers of dietary change, grouped by thematic category (aligned with Osei-Kwasi framework). Colour intensity represents relative frequency; darker shades of red indicate more frequent application. 'Application ratios' below each column indicate how many times more the code appeared in one setting. Codes with a ratio >2 (highlighted with black boxes) were considered notably different and are discussed in the Results chapter.

Source: Developed by author.

		Macro-level drivers				Physical environment	Social environment	Individual
		Structural	Food Industry		Marketing/ Media	Neighbourhood Environment	Societal	Socio-demographic
		Globalization eroding traditional food culture	Concerns over agrochemical use reducing traditional food appeal	Commercial incentives driving modernization of diets	Digital media amplifying exposure to modern foods	Shifting availability from traditional to modern foods	Social status conferred by modern food	Income determining affordability of traditional foods
Setting	Rural	4	1	2	7	10	9	6
	Urban	16	11	11	15	34	25	23
Gender	Male	14	7	11	10	31	24	22
	Female	6	5	2	12	13	10	7
Age	Youth	2	1	1	9	15	4	8
	Adult	6	1	1	3	9	10	9
	Elderly	12	10	11	10	20	20	12

Figure 16: Frequency of selected codes by setting, gender, and age group.
Heatmap showing the frequency of the seven codes selected for presentation, disaggregated by geographic setting (urban/rural), gender (male/female), and age group (youth/adult/elderly). Across all codes, frequencies were consistently higher in urban than rural FGDs, reflecting the urban focus of many concerns. Macro-level drivers (blue) appeared nearly twice as often in urban settings and were raised most frequently by elderly participants. Physical environment drivers (green) were cited most often by urban and male participants. Social environment drivers (orange) were more common among urban and male groups and appeared to increase with age. Individual-level drivers (yellow) were referenced primarily by male and elderly participants.
Source: Developed by author.

Below, results are presented thematically, sub-headed by code title, progressing from macro- to individual-level drivers. Illustrative quotes are used throughout to reflect participants' lived experiences.

6.3.1 Globalization eroding traditional food culture

Globalisation was cited fourfold more frequently by urban-dwellers, more by men and elderly groups. It was viewed as a powerful structural force of dietary change in Kilimanjaro, operating via several mechanisms: expanding access to modern foods and cooking appliances, shaping preferences in line with global food culture, and encouraging the mixing of habits between previously distinct groups:

> *"Globalisation has changed things. We've been influenced by Western ways."*
> — Urban Male Elderly

Participants described how globalisation reshapes availability in the physical FE—"the things that exist are different"—with an influx of imported food products and modern appliances such as rice cookers, which alter both what is feasible and desirable to prepare. The presence of such technologies was contrasted with the past, when clay pots and firewood—central to the preparation of many traditional dishes—were commonplace. Modern appliances were also tied to a decline in communal eating and freshly cooked meals, e.g., microwaves enabling children to reheat food independently:

> *"Our grandparents used utensils for their cooking, such as clay pots, but nowadays there is technology, there are rice cookers, or if someone wants to roast, they put it in the oven."* — Urban Male Youth

In tandem with these physical changes, participants emphasized the cognitive influence of globalisation. Digital exposure to international food cultures—through online recipes, social media, advertising—was seen to erode distinct local food practices. Younger generations were deemed particularly impressionable to these global food influences, a generational divide underscored by a sense of loss among elders:

> *"When they [children] taste and see there's a different flavour from these traditional foods, they want to eat those from outside."* – Rural Female Adult

Participants reported how "trust favours foreign items", stemming from assumptions about superior quality, packaging, and branding. This reinforces the desirability of globalized diets which become associated with prestige, status, and progressiveness, while traditional foods were seen as outdated or inferior:

> *"If [the label] says made in Kenya or Uganda, people in Tanzania often hesitate to accept it. But if it says America or another foreign country, they trust it more. We tend to accept products from abroad because we believe they have been*

tried and tested… Locally made items are sometimes seen as low-quality compared to foreign goods." – Urban Male Adult

Globalisation was seen to foster "mixing of dietary habits" as interaction between diverse communities and ethnic groups blurs once-distinct traditional foodways.

6.3.2 Concerns over agrochemical use reducing traditional food appeal

The perceived loss of traditional foods extended beyond quantity to quality, safety, and cultural authenticity. Participants described how even when traditional crops are still grown, they are no longer perceived as truly traditional due to widespread agrochemical use in their production. These inputs were seen to "ruin" traditional crops by fundamentally altering the taste, appearance, and safety, undermining their cultural value and reducing their appeal:

"The available ones are grown with chemicals... it has no flavour. When you eat, it becomes completely different." — Urban Male Youth

Some participants described agrochemical-treated crops as "harmful" and "poison", directly attributing them to negative health outcomes including skin irritation and diarrhoea. As a result, even traditional vegetables available in local markets are increasingly distrusted and rejected, perceived as unsafe:

"You'll find market vegetables use chemicals. While vegetables of the past didn't... and these chemicals have harm. And that's why people get strange diseases. So, you can't eat vegetables." – Urban Male Elderly

These concerns were often attributed to malpractice by agricultural workers, particularly a rush to "harvest quickly", and a lack of oversight or quality control in the supply chain. Participants believed that agrochemical-treated produce enters the market too soon after spraying, before the chemicals had dissipated:

"These green leafy vegetables we use now are not right. You find that the vegetables have been sprayed with pesticide maybe today…they will just harvest them and tomorrow they bring them to the market." – Urban Female Elderly

6.3.3 Commercial incentives driving modernization of diets

Commercialization and profit-driven changes to the food system were noted far more in urban areas, mainly by older men, and rarely by youth or adults. Participants were highly alert to how both MFBCs and local vendors prioritized profit over health, ethics, and food quality:

"Businesspeople aren't trustworthy…they are ruining our food to be poor. They're afraid of getting a loss. Businesspeople now harm us." – Urban Male Elderly

Suspected malpractice included premature harvesting of crops after agrochemical spraying and addition of harmful preservatives to prolong shelf-life. Illegal practices such as "forging of TBS[26] products" and tampering with expiry dates to avoid making a loss were reported. Deceptive marketing and misleading food labelling elicited frustration, such as labels showing images of fruits not actually included in the product.

This commercialization was viewed as permeating all levels of the food system, from industrially-processed packaged foods to meals sold by informal street-vendors. Participants linked this erosion of food ethics to a deepening distrust in the safety and integrity of everyday traditional foods—those once regarded as nourishing and trustworthy now seen as "ruined" by commercial interests.

This deep suspicion of commercial actors was matched by a pleading call for greater government oversight, regulation, and accountability to protect public health—expressing frustration that institutions responsible for consumer protection were failing to enforce rigorous controls:

"We should ask the government to take responsibility for these modern products we use daily. Institutions like TBS must be more careful because they are approving products that are harming us… without properly confirming if it truly benefits the consumer. Now, people open companies, bring products to market without proper checks, and it's the common citizen who suffers. The government must strictly regulate these companies. We are not against businesses, but they must be fully certified and transparent. So please, help us, you are working for the people, so protect the people." – Urban Male Adult

6.3.4 Digital media amplifying exposure to modern foods

The influence of digital media on dietary change was mentioned twice as often in urban than rural groups, similarly across genders and between elderly and youth. Participants described how television, radio, social media, and the internet amplify exposure to modern foods such as chicken, chips, sandwiches, pizza, and burgers—which are disproportionately represented over traditional dishes. Online platforms like Google, YouTube, and social media were cited as key platforms where individuals encounter new recipes, modern preparation styles, and appealing modern food imagery:

[26] TBS: Tanzania Bureau of Standards – the national standards body responsible for developing and enforcing standards related to product quality (food labelling, packaging, and certification) to ensure consumer safety and regulatory compliance.

"When someone opens the internet, they find food like pizza or fried chicken."
— Urban Male Youth

Participants noted this digital exposure often encourages people—especially youth—to try and subsequently adopt modern foods in place of traditional dishes:

"Nowadays, youth have smartphones. When they want to cook something, they Google, they know how this thing is cooked. It's different from the past [when] those phones weren't there, so they cooked according to what they understood." – Rural Female Youth

Television was deemed a particularly influential channel through which many youths now learn to cook, rather than via elders or inter-generational traditional knowledge. TV shows were seen to encourage modern cooking practices—often involving excessive use of oil:

"The way youth cook nowadays is different… they want to imitate what they see on television. They rely on watching cooking shows. My own son is learning how to cook by watching TV. You'll hear him say, 'I'm going to cook a cake,' but they're not cooking like we used to, with natural ingredients and traditional methods." — Urban Female Elderly

6.3.5 Shifting availability from traditional to modern foods

This theme was frequently raised in urban FGDs, especially by males, elders and youth. Participants described a noticeable shift in food availability—from predominantly traditional to increasingly modern foods. Many voiced frustrations at the scarcity of traditional options and the growing presence of modern alternatives (examples in Figure 13 Section 6.2) in markets and food vendors:

"Modern foods are more easily available in markets than these local ones. These traditional foods now, let's say they're lost. I see availability now of traditional foods is few." – Rural Female Adult

Even when participants wanted to eat traditional foods, the environment—including food stalls and restaurants—didn't support it:

"How many places are there in Kilimanjaro that make traditional food?... This whole city sells food, but I don't remember what place you go and get truly traditional food and eat." — Urban Male Elderly

Modern foods were described as ubiquitous and "unavoidable" – becoming the default due to their visibility and ease of access. As more people work away from home, especially in urban areas, participants reported eating more FAFH, where their food choices are limited to what vendors offer: overwhelmingly modern items like chips, with traditional fare rarely available. One

rural vendor insisted this shift was not only supply-driven, but also shaped by changing consumer preferences:

> *"What sells are outside things more than traditional ones. Now if you bring outside things, you'll do more business: egg chops, sambusa, cutlets, kebabs… more than a person who has decided to boil their bananas or boil sweet potatoes. I don't see any type of customer coming to buy."* — Rural Female Adult

Yet some emphasized the relative persistence of traditional diets in villages where modern FAFH options are not as readily accessible:

> *"In the village, you will eat what is prepared. Maybe in town you can leave and buy chips if you have money, but in the village, especially at night, there's no such option."* — Urban Male Adult

Participants attributed this waning availability of traditional foods to declining self-production of traditional crops, the rise of industrial farming, and policy-driven prioritization of export-oriented agriculture.

6.3.6 Social status conferred by modern food

Social pressures to adopt modern diets—shaped by awareness of how food choices signal wealth and social status—were more strongly felt among urban participants, especially men, and intensified with age. Across groups, modern foods like burgers, pizza, and packaged snacks were repeatedly linked to aspiration, upward mobility, wealth, and described as markers of "high status":

> *"They appear as a person with good income, that they're a rich person! Because truly for people of low status, it's difficult to get packaged foods from the West coming here. So, they appear as a person with great ability."* – Rural Female Adult

Contrastingly, traditional foods were described as symbols of poverty, that someone is "struggling" or lacks ambition or success:

> *"I can cook indigenous food and people will see me as a peasant… I have no money in life, I cannot cook well. That is why we stop eating old things, you can cook, and another person laughs. That fear and anxiety that someone will say I have eaten this food."* – Urban Female Youth

Furthermore, some traditional foods were perceived as inferior, or even unfit for human consumption, reflecting declining respect:

"…there's traditional mbege over here and beer over there, they'll immediately dismiss mbege, saying, 'Give that to the pigs. I'm sticking with beer.'" – Rural Male Youth

These perceptions affected the foods chosen for catering during celebrations like weddings or funerals, at which many confessed they would never serve traditional foods, but deliberately offer modern foods to signal success or avoid embarrassment.

The visibility and proximity of neighbours, particularly in rapidly urbanizing areas, was mentioned as intensifying this dynamic. For example, urban participants described feeling pressure to adopt new foods or brands that neighbours or friends were seen using.

6.3.7 Income determining the affordability of traditional foods

Income was cited as key determinant of diets, nearly fourfold more by urban participants, especially men, with little variation across age groups. However, its influence was framed in contrasting ways. For some, insufficient income limited access to nutritious, diverse, traditional foods; for others, it necessitated reliance on those same traditional foods, perceived as cheaper than modern or imported alternatives.

At a rudimentary level, income dictated what people can afford to buy. Traditional foods were perceived by some to be more expensive than modern options, and thus out of reach:

"If you find them [traditional vegetables] at the market, you'll find their cost is bigger than these foods that aren't traditional… you'll just run away, there's no reason to eat those. They're very expensive." — Urban Male Elderly

Low income was also seen as a barrier to agency and dietary diversity, reducing meals to simplified, often starchy staples and making it difficult to "meet nutrition guidelines":

"The rice and beans won't have any side dishes; there will be no vegetables. We end up eating meals that are not complete or balanced because of financial constraints." — Urban Female Elderly

Higher income was perceived to prompt dietary change especially indulgence in modern, processed, and oil-rich meals, and shifting where food is bought from informal to formal retail like supermarkets:

"When a person gets income, they see they should use it. When I was back there eating boiled bananas, it's not that I liked them, it's the life that goes with the income I had. But I want to eat like one who eats their foods with meat-oil. When I get my income, I won't remember those boiled bananas anymore, now I'm taking revenge. Now I'll eat lots of oil, and fried rice, and everything I know is tasty, I'll use it." — Urban Male Elderly

7 Discussion

7.1 Meeting the research aims

This study aimed to explore the perceived drivers of the nutrition transition in urban and rural communities of Kilimanjaro. To my knowledge, no qualitative studies in Tanzania have sought to understand community-level perceptions of the nutrition transition, especially in relation to urban–rural differences. This study thus provides valuable experiential evidence to add nuance to often quantitative or top-down data, grounding the theoretical concepts of the nutrition transition in local lived experiences.

7.2 Summary of key findings

Community members in both rural and urban Kilimanjaro clearly recognize and articulate the ongoing nutrition transition—diets are shifting in content, practice, and meaning. Elderly participants were positioned as custodians of tradition—more attuned to the cultural and health consequences of dietary change. Across demographics, a strong cultural attachment to traditional foods and belief in their health benefits persists, yet traditional diets are increasingly sidelined by structural, physical, social, and individual-level forces.

Among the seven key drivers most differentially expressed between rural and urban groups were globalization eroding traditional food culture; concerns over agrochemical use reducing traditional food appeal; commercial incentives driving diet modernization; digital media amplifying exposure to modern foods; shifting availability from traditional to modern foods; social status conferred by modern food; and income determining affordability of traditional foods.

These drivers were all more keenly felt by urban communities—reflecting their role as the frontline of the nutrition transitions—foreshadowing broader pressures that may accompany Tanzania's steep urbanisation trajectory. Four of these seven drivers were macro-level forces, underscoring the structural rather than individual forces shaping dietary change.

Several of these drivers—globalization, income, social status, and commercial activity—were deductively coded based on the Osei-Kwasi framework. Other themes inductively emerged from the data, including concerns over agrochemical use and digital media. This suggests alignment with previous research whilst also revealing context-specific concerns, demonstrating the value of this hybrid deductive-inductive approach in affirming and extending existing understandings of the nutrition transition.

Findings reveal tensions between cultural identity and modernity in shaping food choices in Kilimanjaro today. They underscore community support for policies that protect and promote traditional food systems, regulate harmful agricultural practices, and harness digital platforms—

particularly to engage the upcoming generation—in promoting healthier, culturally-rooted dietary transitions.

7.3 The characteristics of Kilimanjaro's nutrition transition

Participants' accounts of food habits and behaviours suggest that Kilimanjaro communities sit between Stage 3 and 4 of Popkin's model (Figure 4 Section 1.1.2.1)(44) and in the mid- to late-transitional phase of Reardon's framework (Figure 5 Section 1.1.2.1)(40). This phase is marked by the persistence but transformation of traditional foods, the emergence of novel food products, and growing FAFH practices, while traditional foods still predominate and UPFs have not yet gained dominance as in industrialized HICs(40,48). This marks a critical window of opportunity for intervention, where primordial prevention[27] is still feasible.

7.4 Thematic interpretation and reflections on the analytical framework

This chapter synthesizes the key findings from TA through an adapted structure that reorganises the four levels of the Osei-Kwasi framework into three interconnected domains: Structural and environmental influences (7.4.1), Sociocultural norms and identities (7.4.2), and Individual-level factors (7.4.3).

This reorganization reflects the interconnected nature of the drivers described by participants, and the difficulty of assigning them to a 'level'. While the Osei-Kwasi framework provided a helpful starting point for data collection and analysis, its four levels proved too rigid to reflect how participants experienced overlapping influences. Several context-specific drivers emerged inductively, falling outside its structure, while others spanned multiple levels. Rather than imposing predefined levels, this discussion presents findings holistically—focused not only on where drivers originate, but on how participants experience them as dynamic overlapping forces.

The discussion situates findings within national and international literature on the nutrition transition, highlighting areas of alignment, divergence, and insights novel to the Kilimanjaro context. Special attention is paid to rural-urban disparities.

7.4.1 Structural and environmental influences

Participants described how imported goods, commercial incentives, agrochemical use, and digital media are altering both the availability and perceptions of traditional foods—together fuelling the nutrition transition. These drivers are felt most acutely in urban areas which

[27] Primordial prevention is a level of disease prevention that focuses on preventing the emergence of risk factors by addressing underlying social, environmental, and behavioural determinants(29). In the context of nutrition, this includes shaping food systems and environments to promote healthy dietary patterns before unhealthy habits and diet-related risk factors develop.

experience lower access to traditional foods and greater exposure to globalized market forces and cultural influence. Rather than passive trends, these forces were experienced as tangible and disruptive, reshaping how people access, trust, and value food.

Globalisation was the most frequently cited macro-level driver, especially by older and urban residents—reflecting how urbanisation and globalisation operate in tandem(21,136). Echoing global literature(12,13,44,203), participants saw globalization as both an economic and cultural force—reshaping the physical FE through influx of imported products and modern appliances, whilst also transforming food preferences, values, and aspirations. This mirrors Appadurai's concept of cultural hybridity, where dominant global food influences displace local foodways(204).

Although participants widely perceived globalized FEs as becoming more diverse, this sense of choice is nutritionally speaking illusory. Modern diets tend to homogenize food offerings, with many modern manufactured products derived from the same core ingredients and displacing diverse traditional, nutrient-dense foods(73,132). This 'scarcity throughout abundance' masks a narrowing of culturally and nutritionally meaningful options(18).

The psychological appeal of imported goods was evident, with trust skewed in favour of foreign products—seen as safer, of higher quality, more appealingly branded, and progressive. This mirrors findings in other LMICs where dietary transitions are closely tied to shifting consumer aspirations, branding influence, and globalised value systems(195,205), although research in West Africa uncovered scepticism toward imported products(172).

References to globalisation were rare among youth but increased with age group, reflecting a generational divide. Perhaps for youth—who have grown up this globalised food system—such modernity is normalised and embraced for its novelty and convenience, as proposed by other research(72,172). In contrast, elders mourned the erosion of once ubiquitous traditions.

These symbolic shifts were accompanied by distrust in modern agricultural practices, particularly in urban areas where food is more often market-bought than homegrown thus the supply chain is opaquer(195,205). As urbanisation continues to consume agricultural land, these concerns are likely to intensify across the region(21,147).

Agrochemical use was seen to compromise traditional crops, affecting both taste and safety, triggering calls for stronger oversight. This echoes concerns in other LMICs about weak regulation and declining trust in the food system(206,207). While in some contexts, like Burkina Faso, traditional produce is still viewed as "clean" and "natural"(172), this association appears tainted in Kilimanjaro due to the overuse of agrochemicals. A similar sentiment was reported in the disparate setting of the Arctic, where fears of contamination among Indigenous communities discourage consumption of nutrient-rich local foods(208). This highlights how modern agricultural practices and chemical contamination strip traditional foods of their cultural meaning – undermining trust, contributes to alienation from traditional diets, and accelerating the nutrition transition.

Commercialisation of the food system amplified this distrust. Participants demonstrated an astute grasp of the commercial determinants of health (CDH)[28]—grounded not in theory, but in lived experience. Profit motives of a range of food system actors—from local vendors to MFBCs—were seen to undermine food quality and safety, while the consequences are shouldered by individuals, governments, and public health systems(135,140,160,160,162).

Reports of forged labels, tampered expiry dates, and harmful additives conveyed deep scepticism toward the food industry. Complaints about incoherent food labels reinforce concerns documented elsewhere that packaging features misleading claims or inaccessible languages(209). These insights augment Hawkes(159) and Kraak's(210) critiques of weak regulation, such as voluntary food labelling, particularly in low-literacy contexts where symbolic marketing trumps factual information.

Paradoxically, commercial foods remain prevalent, due to their availability, marketing, and convenience(11,159)—highlighting a tension between awareness and autonomy in food choice. Many voiced concerns about corporate motives—suggesting communities are not passively accepting change but questioning and seeking to reshape it—but others valued the practicality of modern foods.

Digital media further reinforced the pull of modern diets, especially among youth. Exposure to digital content was seen to trigger experimentation with modern foods. Youth reported turning to the internet for inspiration, suggesting an active engagement with digital platforms as sources of culinary knowledge. Platforms like YouTube and social media reportedly valorise modern foods while sidelining traditional dishes. This aligns with evidence of growing food and beverage marketing in Tanzania via radio, television, and social media by both domestic and MFBCs(40,48,153). As mobile phone use and internet penetration continue to rise in Tanzania, even rural communities are increasingly exposed to digital culinary content and advertising(88).

This digital shift introduces new culinary norms and disrupts intergenerational knowledge transfer, as cooking skills are increasingly learned online or through television cooking shows rather than from elders—a pattern also reported across other LMICs(211,212). While digital media broadens access to global food culture, it also appears to undermine local culinary heritage and promote less healthy diets—given participants' reports of media dominance of recipes high in oil, fat, and sugar. Many feared this exposure permanently reshapes habits, tastes, and aspirations, making a return to traditional diets unlikely. Yet some also saw potential in harnessing digital platforms to revive traditional food culture.

Somewhat surprisingly, participants made no mention of digital marketing by specific brands, focusing instead on the types of foods featured online. This could reflect deep embedment in digital culture, where 'invisible' yet pervasive UPF marketing often escapes critical scrutiny while exerting substantial influence(213). Alternatively, it could suggest that online advertising by

[28] CDH refers to the systems, practices, and pathways through which commercial actors influence health and equity—often highlighting tensions between corporate profit motives and public health goals(140).

MFBCs is not yet targeting these communities. Understanding this exposure warrants further investigation.

Finally, changes in food availability grounded these systemic forces in the physical environment. Participants noted that modern foods are increasingly visible and accessible across retail type—while traditional foods have become scarce, expensive, or inconvenient—an observation supported by literature(18). In urban areas especially, the rise in eating FAFH leaves people largely at the mercy of vendors in shaping their daily food choices(9,18,82).

Whilst shifts in food availability were felt at the physical level, participants traced them to structural forces such as land loss, policy-driven prioritization of export-oriented agriculture, and the rise of industrial farming. These links are well characterised in literature on the reasons of agricultural transformations in Tanzania(214,215)— illustrating the interconnection between physical environments and macro-level drivers.

As documented in broader SSA contexts, participants felt that changes in food availability reduced their agency over food choices and deepened dependence on the commercial food system—echoing critiques that neoliberal reforms erode food sovereignty(73,74,154,216). As local production pivots toward exportable monocrops, domestic availability of culturally familiar and nutritious crops shrinks, forcing reliance on market-based food systems and global commercial actors(217) with long-term implications for diet quality and cultural continuity.

7.4.2 Sociocultural norms and identities

Food as a signal of social status emerged as a powerful influence on dietary choices, unsurprising given food's well-established role in expressing identity and social status in Tanzania and beyond(177,218–220). Elders raised this more, though it remains unclear if they personally feel greater social pressure on food choice or are simply more attuned to its effects on wider society. The latter seems more plausible, aligning with Fischler's observation that older generations are more vocal about and perceptive of dietary change, drawing on a longer view of cultural shifts(219).

Modern foods—such as chips, fried chicken, and packaged snacks—evidently carry social cachet in Kilimanjaro's communities, used to signal wealth, success, and progressiveness. This reflects literature suggesting UPFs are often aspirational in LMICs, associated with modernity and high SES(46,203,221). Their perceived prestige is reinforced by their relatively higher cost compared to traditional foods in Tanzania(222), marking them as symbols of affluence. However, as Tanzania experiences a "supermarket revolution" and processed foods become more widely accessible and affordable through economies of scale(74,89,154), this status dynamic could flip—echoing trends in HICs where UPFs are now associated with lower SES(223).

In contrast, traditional foods were framed as outdated, stigmatised as "peasant" foods, even embarrassing to serve to guests—especially in formal or celebratory settings. This reflects class-

based food shaming observed elsewhere(224), and reinforces evidence from Tanzania of negative perceptions toward traditional foods(78,170).

These insights suggest Kilimanjaro's nutrition transition is not driven solely by structural factors or access, but also by the symbolic power of modern food in conferring social status. Social expectations appear to play a central role in steering people towards modern diets. As such, efforts to shift dietary behaviours must go beyond nutrition education and engage with the social meanings and emotional dimensions attached to food. Reframing traditional foods as aspirational could tap into the same peer dynamics that currently elevate modern foods. Campaigns such as the 'Slow Food' movement(225) and 'My Food is African'(226) demonstrate the potential of shifting narratives to successfully restore the prestige of local foods.

7.4.3 Individual-level factors

On top of the external social pressures outlined above—where food choices become performative, status-driven, and shaped by peer norms—individuals also navigate tangible constraints, most notably income, which dictates what, where, and how they can eat. Chiming with the conclusions of the Grains of Truth report across 31 countries(227), many aspire to eat better but feel constrained by their circumstances.

Participants consistently linked low income as barrier to dietary diversity and quality, corroborating the finding that 75% of Tanzanians cannot afford the EAT-Lancet healthy reference diet(153,228). Reports of simplified, repetitive diets dominated by starchy staples and lacking vegetables mirrored national data on low dietary diversity, particularly among the urban poor who often rely on energy-dense staples(116,147,229).

Strikingly, income was cited as a determinant of dietary behaviour four-fold more by urban-dwellers—despite having double the average income of rural folk(18,82). This may point to the high cost of diverse, fresh, nutritious produce in urban settings(81,148), linking with macro- and physical-environment-level influences, and means even relatively higher income does not guarantee access to healthier diets.

Perceptions of food affordability were inconsistent. Some described traditional foods as more expensive and inaccessible, others as cheaper fall-back options. This ambiguity may stem from varying interpretations of "traditional" and "modern" foods, as well as differences in local availability. As such, income emerged as both a constraint and an enabler—limiting access to nutritious traditional foods for some, while facilitating access to unhealthy modern foods for others. This aligns with findings that the DBM affects households at both ends of the wealth spectrum(113), and challenges the assumption that economic growth will necessarily lead to improved diets, a warning echoed by scholars(111,170,230). Without smart policy intervention, rising incomes may reinforce rather than reverse unhealthy dietary trends(111).

Indeed, participants often framed rising incomes not as a path to healthier eating, but as an enabler of indulgence in modern-style diets. Several participants described using newfound

disposable income to “take revenge” on previously restricted diets, opting for meat-heavy, oil-rich, processed meals over boiled traditional staples. This aligns with findings from both Tanzanian and global literature: as wealth increases, so too does consumption of UPFs, imported modern goods, and FAFH(20,20,74,231).

7.5 Implications for interventions and policy

This section explores how the findings hold policy relevance, highlighting where reported structural, social, and individual drivers of the nutrition transition in Kilimanjaro align with opportunities or risks for public policy and intervention.

Protecting food environments from global commercial pressures

Caution is needed to protect Tanzania’s FE from being flooded with unhealthy products like SSBs due to free trade policies that undermine national dietary guidelines and erode traditional diets(85,135,180). Globalisation is reshaping food values, and the social prestige of modern foods calls for culturally-sensitive approaches that elevate traditional foods without suggesting people reject modernity. Experiences from other LMICs suggest that narrative-shifting campaigns—especially those targeting youth—can guide healthier dietary transitions(226).

Concerns over agrochemical use

Participants’ mistrust of the safety and quality of traditional produce due to agrochemical use signals a critical regulatory gap in promoting and monitoring safe agricultural practices, but also a communication gap—highlighting the need for clearer public information and guidance on food safety, agrochemical use, and trust in traditional food systems.

Industry influence and safeguarding policymaking arenas

Community awareness of commercial incentives promoting processed modern products presents the opportunity of public support for tighter regulation of food company activity, misleading marketing, and protecting policy arenas from commercial interference which has proven adverse consequences(140,160). Of particular concern is the marketing of UPFs to children, which research shows can establish unhealthy dietary preferences that persist into adulthood(232–234). Lessons from countries like Chile, which implemented front-of-pack warning labels and strict marketing bans on unhealthy foods to children, resulting in significantly reduced purchase and consumption(235)—underscore the potential of marketing regulation as a protective measure.

Creating healthier food environments

The declining physical availability of traditional foods, especially in urban settings, flags a structural challenge requiring strategic urban planning and broader policy shifts promoting and protecting agricultural practices to ensure supply of quality traditional foods. Protecting space for traditional vendors and markets is essential as urbanization advances. Encouragingly, the continued dominance of traditional retail in Tanzania(92,93) provides a strong foundation for such efforts. To meet rising demand for convenience without compromising nutrition, minimally-

processed traditional fruits and vegetables present a viable and appealing alternative to UPFs, as already trialled in the East Africa context(236).

Digital media and youth influence

The pervasive role of digital media in shaping dietary preferences, especially of youth, brings challenge and opportunity. Given how much food knowledge is now sourced online, digital platforms present a powerful lever to shift the narrative in favour of healthier, traditional diets. Social and behaviour change communication strategies have been shown to significantly enhance nutrition knowledge, for example in Bangladesh(237).

Affordability and individual agency

Income emerged as both a constraint and a catalyst to dietary change: some participants were priced out of traditional foods whilst others used rising income to transition to more oil-rich and processed diets. Examples from Finland and South Korea demonstrate that economic growth need not entail unhealthy dietary shifts if supported by smart, coordinated policy(135,238). That cost of optimal diets remains a major barrier even in Kilimanjaro—one of Tanzania's more affluent regions(88)—signals the urgency of addressing economic accessibility to healthier diets nationwide.

Overall, Kilimanjaro, as a key agricultural region with well-preserved tribal food traditions, is well-positioned to pioneer coordinated, multisectoral strategies that promote healthier dietary transitions whilst protecting food-sovereignty and local heritage amidst pressures from globalization and urbanization. Section 8.1 operationalizes these insights into specific policy and intervention recommendations.

7.6 Strengths and limitations of the study method

This study drew on 13 FGDs to explore perceived drivers of dietary transition in Kilimanjaro, generating rich, context-specific insights. Using Mays and Pope's relativist criteria for assessing quality in qualitative research, the study demonstrated empirical grounding, theoretical coherence, and contextual depth(239). Credibility was strengthened by reflexive practice and inductive coding methods allowed for participants' narratives to emerge free from pre-existing assumptions. Stratified group design enabled gender- and age-specific insights, while local stakeholder-led recruitment aided community acceptance of the research and appropriate participant selection to enhance local relevance.

The study sample (Section 6.1: Participant characteristics) was representative of regional demographics(97): reflecting the region's ethnic diversity, participants represented 20 distinct tribes, with Chagga and Pare most common—the dominant tribes in Kilimanjaro. Religious affiliation also mirrored national trends with a mix between Christian and Muslim. Notably, 26 of 27 participants who reported living in a different setting from that of their birth had moved from rural to urban areas, reflecting urbanisation patterns.

However, several limitations should be acknowledged. Social desirability bias may have arisen from how the study was framed in information (Annex C). Transcripts were translated from Swahili to English for analysis, risking losing nuance. Due to resource constraints, one analyst coded the data. While this heightens interpretive bias, some scholars argue it promotes deep reflexive engagement(17). Group dynamics varied, with some FGDs (notably with youth and women) less vocal, potentially skewing findings toward more outspoken participant groups—reflected in considerable code variation across transcripts (e.g., 15 codes applied in urban female adults vs. 118 in urban male elderly). The present study therefore identifies the need for further research into how gender intersects with perceptions of the nutrition transition and its drivers.

Assessing saturation across six demographic strata was complex, requiring attention not only to theme recurrence but also their distribution. While thematic saturation may have been reached before the final focus groups, data collection continued as planned to ensure balanced representation across all strata. Pre-specifying 12 FGDs provided a robust sample, but also limited flexibility to stop early—even when saturation started to appear sufficient—in the name of demographic equity in the dataset.

Incomplete sociodemographic data and occasional inclusion-checking errors reduced the demographic precision of the FGDs. The decision to report only codes that differed markedly across urban and rural settings here means that some high-frequency, cross-cutting drivers were excluded, to be reported separately. While qualitative findings are not strictly generalisable to wider settings, they can offer theoretical transferability.

8 Conclusion and Recommendations

This study sheds light on community perceptions of key drivers of the nutrition transition across urban and rural areas in Kilimanjaro, revealing how global, structural, social, physical, and individual factors are collectively reshaping local diets and food cultures. While valued for their cultural significance and health benefits, traditional foods are increasingly marginalised by shifting social norms, changing infrastructure, demand for convenience, and the competing presence of modern foods.

Stratified focus groups elucidated how perceptions of the transition's drivers varied by setting, age, and gender. Urban youth seem most susceptible to globalized modern diets, while rural elders expressed the most concern over cultural and health consequences of changing diets. A more targeted gender-sensitive analysis would be needed to unpack how gender further shapes these perceptions and experiences.

Beyond a simple matter of personal preference, dietary change in Kilimanjaro is embedded in broader socio-economic transformations—including urbanization, globalization, commercialization—that alter FEs, identities, and daily routines. The aspirational appeal of modern diets signals not just a nutritional but a profound cultural transition, with implications for health and heritage.

Importantly, participants voiced scepticism toward modern foods, reflecting an awareness that increased consumption often results from systemic pressures rather than genuine preference. This nuance highlights that health-worsening dietary transitions are not inevitable and offers a critical entry point for intervention.

Strategies supporting healthier dietary futures must consider modern realities—like digital influence and social pressures—while enabling healthy, culturally-rooted diets to be accessible, affordable, and socially desirable. Revitalizing traditional food knowledge across generations and empowering communities to reclaim agency over their diets are essential steps to balancing modernity with heritage.

While many themes uncovered echo global patterns, this study flags uniquely Tanzanian features, emphasizing that effective solutions must be context-specific and place-based. Managing the transition to advance health without sacrificing cultural identity means meeting people where they are and helping communities reconnect with the joy of traditional food culture.

8.1 Recommendations for policies and interventions

These recommendations are grounded in unprompted participant proposals and build upon insights from Section 7.5. Participants strongly advocated for the revival of traditional diets

through education, regulation, and community action. Recommendations included school-based cooking lessons, cultural campaigns, clearer food labelling, stricter industry regulation, and preservation of elders' food knowledge. Celebrating traditional practices—especially during festive holidays—was seen as a powerful way to reshape norms and restore pride in local diets.

Government and policymakers

Strengthen regulation and market incentives

- Introduce subsidies for healthy, locally-sourced traditional foods and implement taxes on unhealthy UPF imports.
- Enforce standardized, front-of-pack nutrition labelling tailored to national literacy and language contexts, paired with public education on label interpretation.
- Regulate the marketing of UPFs—particularly to children—and restrict misleading claims on packaging.
- Strengthen oversight of agrochemical use in farming and ensure transparent public communication about food safety to rebuild trust in traditional produce.

Urban planning and food environments

- Protect space in urban areas for traditional food vendors and community markets through inclusive infrastructure planning.
- Incentivize the local production of minimally-processed convenience foods (e.g., dried fruits, pre-cut vegetables) to provide healthy nutritious alternatives to UPFs and FAFH.

Media and technology sector

Rebrand and promote traditional food culture

- Launch culturally resonant counter-marketing campaigns on social media and digital platforms that promote traditional recipes and reframe traditional foods as aspirational.
- Collaborate with local influencers, chefs, and youth voices to shape positive narratives around healthy eating and traditional diets.

Community institutions and civil society

Mobilize trusted community networks

- Train community health workers and religious leaders to incorporate messages on the value of traditional foods into their routine outreach.

- Organize community seminars and cooking demonstrations in trusted local settings to encourage intergenerational knowledge transfer and promote positive narratives around traditional food practices.

Education sector

Integrate food culture into formal education

- Incorporate traditional food knowledge into school curricula, aligned with Tanzania's exemplary FBDGs.
- Support school-based initiatives that celebrate traditional food practices—such as themed food days or storytelling sessions that connect food to heritage and health.

8.2 Recommendations for future research

Building on the insights from this study, several directions for future research are recommended:

- Longitudinal research would be valuable to trace intergenerational dietary shifts and how evolving food environments and social norms shape consumption over time.
- Comparative studies across Tanzanian regions could reveal how local contexts shape unique nutrition transitions.
- Future studies should also capture the voices of children and adolescents, who likely have unique insights and be the most affected by the nutrition transition.
- Explore the gendered dimensions of the nutrition transition, examining how gender roles, norms, and power dynamics shape individuals' perceptions of dietary change and influence their exposure and response to its underlying drivers.
- Understanding digital food marketing exposure—what people encounter, how they engage, and its influence—could inform healthier digital food narratives.
- Quantitative assessments of traditional vs. modern food intake, alongside qualitative understandings of food perceptions, would deepen understanding of how consumption patterns relate to nutrition outcomes.
- Exploring the relationship between dietary shifts and DR-NCD risk could support more holistic, health-driven nutrition policies.

Personal reflections

Conducting this project offered an incredibly valuable opportunity to live and work in East Africa, allowing me to deeply engage with Tanzanian culture, which I grew to admire, respect, and deeply connect to. The experience provided exposure and learnings I will treasure for a lifetime—both personally and professionally.

One of the key lessons I took away was the need for flexibility in qualitative research. Although I began with an extensive, clear plan, it quickly became apparent that rigid adherence to it was unrealistic. The emergent nature of this design meant continuously adapting to field realities, with data collection and analysis unfolding in a non-linear, iterative dialogue. This taught me that openness, reflexivity, and responsiveness are essential for research in dynamic real-world settings.

A particularly challenging area was navigating the ethics of compensating participants. While it is unethical to offer coercive incentives, it also felt unjust to expect people's time and insights without tangible benefit. This reaffirmed for me the importance of returning findings to communities in meaningful ways—whether through feedback sessions or follow-up nutrition education activities to ensure some benefit is felt beyond the focus group discussions, which many participants did comment they found an incredibly valuable and thought-provoking forum!

The ethics review process was another key learning opportunity. I initially hadn't considered separating focus groups by gender but doing so proved essential as participants shared sensitive, gendered experiences that may not have surfaced in mixed groups. It reminded me of the ethical imperative to create safe, respectful spaces for honest dialogue.

When analysing the data, I was struck by the richness of Tanzanian storytelling. The data were highly anecdotal and metaphorical, often reflecting individual experiences and cultural wisdom. While this brought depth and vivid lived experiences, it sometimes made it difficult to cut through to the meaning, and extrapolate broader patterns or generalisable drivers of change. Careful interpretation and contextual sensitivity were needed to make meaningful inferences from these narratives.

I was especially inspired by the strong cultural belief in food as medicine. As I spent time in the country's beautiful nature, locals frequently pointed out the healing properties of plants and trees—a clear foundation on which to build future nutrition interventions. I also found the Tanzanians to be incredibly invested and interested in the origins of their food—something I feel on the whole we in European countries have largely become detached from.

Overall, this experience and research project was a profound personal learning journey—deepening my understanding not only of the nutrition transition, but of the ethics, complexity, and cultural nuance embedded in global health research.

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Appendix

Appendix A: The effects of dietary intake and body composition on non-communicable diseases

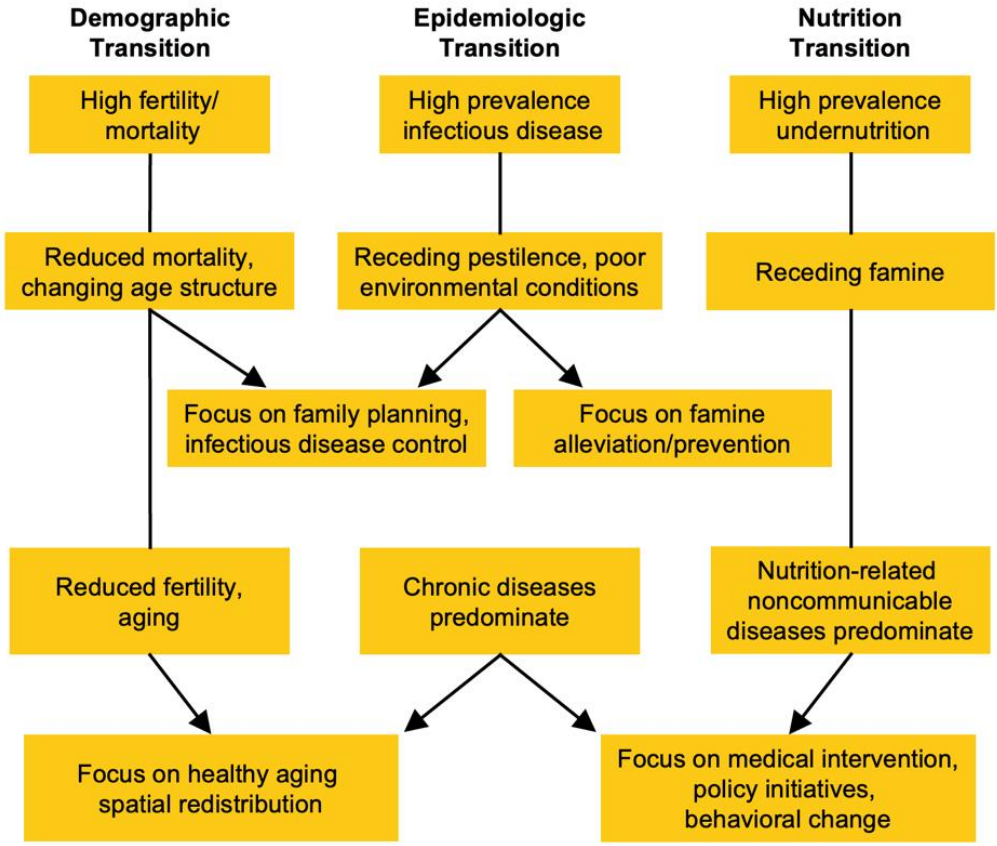
Dietary factor	Mechanisms	Health outcomes
Excess energy intake↑	Adipose tissue development ↑, metabolic changes	NIDDM ↑(a), CHD ↑(a), hormone-dependent (e.g., breast) or GI (e.g., colon andrectal) cancers ↑(a), osteoarthritis ↑(a), gallbladder disease ↑(a)
Total fat ↑	Passive overconsumption, IR↑	NIDDM↑(b), CHD↑(a), prostate cancer ↑(b), breast cancer ↑(c), colon and rectal cancer ↑(b)
Animal fat↑	Unclear, fat metabolism byproducts	Colon cancer ↑(b)
Saturated fat ↑	TC↑, LDL-C↑, TG ↑, HDL-C ↓	Atherosclerosis ↑(a) , CHD ↑(a), hypertension ↑(b), NIDDM ↑(b)
Trans fatty acids ↑	LDL-C ↑, HDL-C ↓,TC ↑, immune system ↓	Cancers ↑(d), CHD ↑(c)
Monounsaturated fatty acids↑	LDL-C ↓	Cancers ↓(c), CHD ↓(b)
Polyunsaturated fatty acids↑	HDL-C↑, some are antiinflammatory	Cancers ↑(b), CHD ↓(b)
Sodium ↑	Abnormal renal function ↑, disturbed electrolyte balance↑	Hypertension ↑(a), stroke ↑(a)
Antioxidants ↓	Oxidize LDL-C, change functions	CHD ↑(b)
Dietary fiber ↓	TC↑, HDLC ↓, IR↑, TG↑	CHD ↑(b), NIDDM ↑(b), stroke ↑(c), colon cancer (c)↑
Fetal malnutrition/ stunting↑	Central adipose tissue ↑, IR↑, metabolic changes	NIDDM ↑(b), hypertension ↑(b), CHD ↑(b)
Fruit and vegetable ↑	Prevent oxidization LDL-C, fiber ↑	Stroke ↓(b), cancers ↓(a)

The relationships between dietary factors and health outcomes are categorized as (a) well-established; (b) fairly well-established but data not complete; (c) still under debate; and (d) indicative data to date. Epidemiological studies support much of what is presented here but the literature is controversial, especially with respect to mechanisms. This table omits the effects of reduced physical activity, which are most important in increasing obesity, reducing fitness, and increasing insulin resistance.

CVD = cardiovascular diseases; GI = gastrointestinal; HDL-C = high density lipoprotein cholesterol IR = insulin resistance; LDL-C = low density lipoprotein cholesterol; NIDDM = noninsulin dependent diabetes mellitus; TC = total cholesterol; TG = total glycerides.

Appendix Figure A: The impact of various dietary factors and the mechanisms via which they lead to certain health outcomes.
Source: Popkin et al. 2001(27)

Appendix B: Parallel and linked stages of demographic, epidemiological, and nutrition transitions



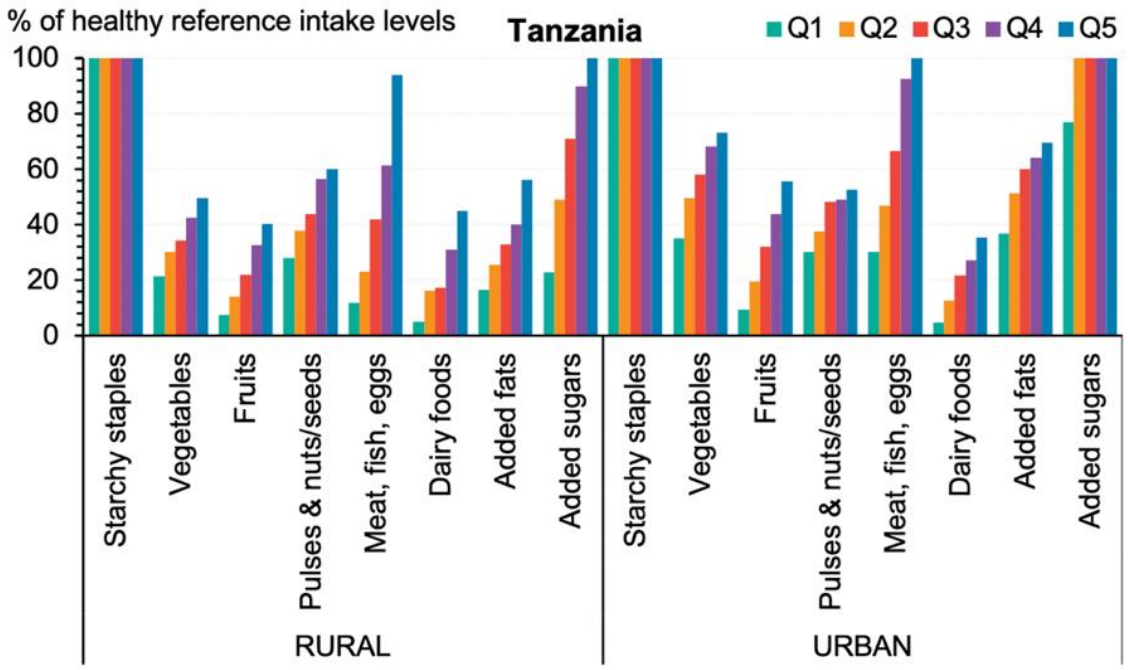
Appendix Figure B: Parallel and linked stages of demographic, epidemiological, and nutrition transitions
The demographic transition describes the shift from a pattern of high fertility and high mortality to one of low fertility and low mortality; the epidemiologic transition describes the shift from a pattern of prevalent infectious diseases associated with malnutrition, periodic famine, and poor environmental sanitation to a pattern of prevalent chronic and degenerative diseases associated with urban-industrial lifestyles; the nutrition transition describes changing dietary patterns and corresponding diet-related diseases.
Source: Popkin, 2002(44)

Appendix C: Processed food categories and examples in Sub-Saharan Africa

Processing category	Degree of processing	Explanation	African examples
Unprocessed	None	Foods that have not been processed (such as raw fruit or dried beans)	Raw grain, live chicken, raw/dried fruit
Minimally processed	First stage	Single-ingredient foods and beverages with no or very slight modifications (e.g., cleaning, removal of inedible or unwanted parts, grinding, drying, fermentation, pasteurization, cooling, freezing)	Flour, edible oil, packaged milk, dried fish, butchered meat
Highly processed	Second stage	Multiple ingredient manufactured	Noodles, bread, cheese, foods preserved in salt or oil, multi-ingredient foods
Ultraprocessed	Second stage	Highly processed with products with added salt, sugar, oil, or other culinary ingredients to make processed foods and beverages more palatable or to extend preservation; these can be by SMEs or by large industrial firms that also add inputs like emulsifiers or high-fructose corn syrup	SSBs (bottled/canned sodas), packaged cookies, beer; traditional mandaazi
Ultraprocessed prepared FAFH	Third stage	Cooked dishes and snacks with many ingredients and high in added saturated fats, sugar, or salt bought away from home	Rice with sauce, chicken and potato fries, millet porridge and yogurt, cowpea fritters

Appendix Figure C: Processed food categories in Sub-Saharan Africa.
The rows show ascending levels of processing, and the explanation column gives the criteria in terms of the number of ingredients and processes. The example foods are relevant to the SSA context.
Source: Reardon et al. 2021(40)

Appendix D: Intake of food groups in Tanzania compared with the EAT-Lancet healthy reference diet



Appendix Figure D: Intake of food groups in Tanzania compared with the EAT-Lancet healthy reference diet.

Intake of food groups by income quintile in rural and urban areas. The poorest consistently show largest consumption gaps, and higher dietary adequacy is seen with increasing wealth. A similar pattern seen across rural and urban areas with slightly less sufficient intake across the board for rural residents. Added sugars are overconsumed by highest wealth quintile in rural and all but the lowest income quintile in urban.

Source: Headey et al. 2021(111)

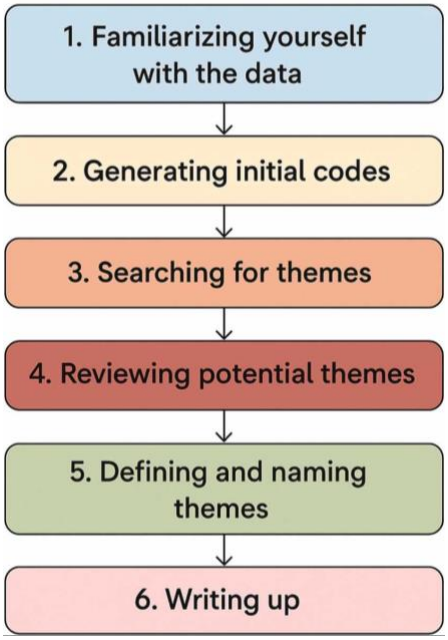
Appendix E: Summary table of Tanzania's Food-Based Dietary Guidelines

	Guidelines	A set of recommendations
1	Increase dietary diversity through consumption of six foods groups daily, focusing on variety within the food groups to prevent malnutrition and reduce the risk of NCDs.	**Recommendation 1.1**: Everybody, young and old, should enjoy eating a variety of foods from different food groups every day to stay healthy and strong. **Recommendation 1.2**: Eat staples such as cereals, starchy roots, tubers, plantains or green bananas every day for a strong and active body. **Recommendation 1.3**: Eat different vegetables every day to prevent and reduce risk of diseases. **Recommendation 1.4**: Eat at least two types of fruit every day for better health. **Recommendation 1.5**: Eat pulses (legumes), nuts and oil seeds every day for good health. **Recommendation 1.6**: Eat animal-source foods every day to stay strong. **Recommendation 1.7**: Choose unsaturated fats and oils and eat in small amounts.
2	Attain optimal nutrition for pregnant and lactating mothers, infants and children to ensure the mother's wellbeing and the child's healthy growth and development.	**Recommendation 2.1**: When pregnant or breastfeeding, eat a variety of foods from the six food groups for your health and the health of your foetus or baby. **Recommendation 2.2:** Feed your baby only breast milk for the first six months of life and no food or water because mother's milk contains all the nutrients the baby needs. **Recommendation 2.3**: From six months, feed your baby a variety of foods from animal-source foods, pulses, fruits and vegetables and continue breastfeeding up to 2 years of age and beyond for healthy growth and development of your baby. **Recommendation 2.4**: Give a variety of foods from the six food groups to children between the ages of 2 and 5 to help them grow to their full potential. **Recommendation 2.5**: Provide healthy meals and snacks for school-aged children throughout the day. **Recommendation 2.5a**: School-aged children should eat breakfast before going to school to enable them to be productive and perform well. **Recommendation 2.5b**: Encourage school-aged children to eat healthy snacks such as fresh fruits, vegetables and nuts. **Recommendation 2.5c:** Provide school-aged children with food when they are at school to increase their learning ability.
3	Limit intake of deep-fried foods, saturated and trans fats, sugar and salt.	**Recommendation 3.1:** Limit your intake of deep-fried foods to prevent heart diseases, diabetes and obesity. **Recommendation 3.2**: Limit intake of ultraprocessed foods to reduce cardiovascular diseases, cancer, overweight, obesity, and early mortality. **Recommendation 3.3:** Limit intake of saturated fats and avoid intake of trans-fats to reduce the risk of cardiovascular diseases, increased cholesterol and type 2 diabetes. **Recommendation 3.4:** Reduce intake of free sugars to prevent weight gain and dental caries. **Recommendation 3.5**: Reduce salt intake to reduce the risk of incident stroke, fatal stroke, and fatal coronary heart disease.
4	Ensure a clean home environment and safe food and water.	**Recommendation 4.1:** Keep your home environment, food and water safe and clean to prevent diseases. **Recommendation 4.2:** Drink clean, safe water instead of sweetened drinks every day for good health.
5	Keep an active lifestyle for optimal health and weight.	**Recommendation 5:** Be physically active every day to stay strong and maintain a healthy body weight.
6	Avoid other risk behaviours such as using tobacco and drinking alcohol to reduce the risk of diseases.	**Recommendation 6:** Avoid drinking alcohol and using tobacco to reduce the risk of diseases.

Appendix Figure E: Summary of key recommendations in Tanzania Food Based Dietary Guidelines

Source: United Republic of Tanzania et al. 2023(125)

Appendix F: Braun and Clarke's six-phase approach to thematic analysis



Appendix Figure F: Braun and Clarke's six-phase approach to thematic analysis

Familiarization involves reading transcripts multiple times while annotating excerpts and making analytic memos to identify emerging ideas; an open coding process involves descriptive and interpretive codes systematically assigned to excerpts that were relevant to the research question and refined into a preliminary codebook; coded data is grouped into candidate themes and subthemes based on shared patterns; themes are reviewed for consistency and distinctiveness and refined; each theme is clearly defined and named; themes are written up with supporting quotes and contextual detail.

Source: Braun and Clarke, 2006(17)

Appendix G: Audit trail of thematic analysis and codebook development process

This appendix outlines the step-by-step process of developing and refining the codebook used for TA of the qualitative FGD data. A hybrid deductive–inductive approach was employed, grounded in the Osei-Kwasi framework but responsive to themes emerging directly from the data.

Step 1: Development of Preliminary Deductive Codebook

A preliminary codebook was developed based on deductive codes derived from the Osei-Kwasi framework, which served as the theoretical foundation for the study. 14 key sub-domains from the Osei-Kwasi framework, relevant to the nutrition transition, highlighted in yellow in Figure G(a), were used as initial 'parent' codes in the *Dedoose* software.

Step 2: Inductive expansion through open coding

Through open coding, several (n=7) new themes emerged from the data that were not covered by the framework. These inductive codes were mapped to the broader Osei-Kwasi framework categories where applicable. Figure G(b) shows these additional codes highlighted in green.

Step 3: Refinement of deductive codes

Some broad deductive codes were either removed (due to redundancy – not applied to the data) or split into more granular child codes to capture distinct meanings more precisely. These refined codes were aligned with individual factors from the original framework. Figure G(c) shows the revised codebook with refined sub-codes highlighted in blue.

Step 4: Re-grouping and re-naming codes into themes

All codes were systematically reviewed to improve clarity, consistency, and relevance. As broader patterns of shared meaning emerges, related codes were clustered into preliminary themes, marking a shift from descriptive coding to interpretive TA. These themes were named to reflect the specific language and sentiments used by participants, and to ensure each code captured a distinct idea. While the final code list retained broad alignment with the original Osei-Kwasi framework, these adaptations ensured that the codes and themes remained analytically meaningful and grounded in participants' lived experiences.

Step 6: Construction of final codebook

Once the codebook had been finalized, all excerpts were reviewed again to ensure consistent and appropriate code application. This iterative process allowed for refinement of the code

definitions and accurate categorisation of meaning across transcripts. The final codebook is found in Appendix H.

a

	FOOD INDUSTRY	MARKETING/MEDIA	GOVERNMENT	CLIMATE
Macro Environment	Food production	Food prices	Taxes or levies	Seaonanily
	Ready meals	TV/radio/media	Food/agriculture policy	Weather
	Shelf life	Advertising	Access to transport	Home-gardening
	Market structure	Social media use	Societal norms	
	Presentation/packaging		Social welfare policy	
	Quality/freshness of food		War	
	Food labelling		Religion	
			Zoning policies	
			Road safety	
			Resource of nutrionists	
			Dietary guidelines	

	NEIGHBOURHOOD	SCHOOL	HOME
Physical Environment	Community spaces	Foods sold near schools	Housing condition
	Area deprivation	Healthiness of school meals	Home food stocks
	Availability/distance of food outlets		Food storage facilities
	Convenience		Cooking facilities
	Type of food available		
	Household sanitation and hygiene		
	Neighbourhood sanitation and hygiene		
	Food adulteration/contamination		

	FAMILY	FRIENDS	SOCIETAL
Social Environment	Family food practices	Peer/friends	Social norms
	Family support		Culture
	Food habits		Gender
	Food allocation		Role modelling
	Communal eating		Traditional taboos
	House-help		Food vendor reputation
	Marital status		
	Household composition		

	BIOLOGICAL	DEMOGRAPHIC	COGNITIONS	PRACTICES
Individual	Age	SES	Appetite	Skipping meals
	Sex	Income	Hunger	Sleeping pattern
	Ethnicity	Education	Texture	Cooking skills
	Allergies	Employment	Mood and emotions	Time constraints
	Puberty	Land use	Stress	Eating out
	Weight status	Household food security	Wellbeing	Eating at home
	Pregnancy/lactation	Women's empowerment	Body satisfaction	Physical/mental health
		Female headed house	Knowledge	Familiarity with food
		Workload in home	Preferences	Smoking
		Migration history	Locus of control	Alcohol
		Shift work	Risk perception	Physical activity
		Wealth	Taste	Speed eating
			Aroma	Dieting
			Food appearance	
			Diet quality	
			Portion size	

b

Macro Environment

FOOD INDUSTRY	MARKETING/MEDIA	CLIMATE	GOVERNMENT	GLOBALIZATION	URBANIZATION
Food production	Food prices	Seaonanily	Taxes or levies		
Ready meals	Advertising	Weather	Food/agriculture policy		
Shelf life	Social media use	Home-gardening	Access to transport		
Market structure	TV/radio/media		Societal norms		
Presentation/packaging			Social welfare policy		
Quality/freshness of food			War		
Food labelling			Religion		
Chemical/pesticide use			Zoning policies		
Commercial determinants of health			Road safety		
			Resource of nutrionists		
			Dietary guidelines		

Physical Environment

NEIGHBOURHOOD	SCHOOL	HOME
Community spaces	Foods sold near schools	Housing condition
Area deprivation	Healthiness of school meals	Home food stocks
Availability/distance of food outlets		Food storage facilities
Convenience		Cooking facilities
Type of food available		
Household sanitation and hygiene		
Neighbourhood sanitation and hygiene		
Food adulteration/contamination		

Social Environment

FAMILY	FRIENDS	SOCIETAL
Family food practices	Peer/friends	Social norms
Family support		Culture
Food habits		Gender
Food allocation		Role modelling
Communal eating		Traditional taboos
House-help		Food vendor reputation
Marital status		Copying others
Household composition		Social status
Inter-generational differences in food preferences		

Individual

BIOLOGICAL	DEMOGRAPHIC	COGNITIONS	PRACTICES
Age	SES	Appetite	Skipping meals
Sex	Income	Hunger	Sleeping pattern
Ethnicity	Education	Texture	Cooking skills
Allergies	Employment	Mood and emotions	Time constraints
Puberty	Land use	Stress	Eating out
Weight status	Household food security	Wellbeing	Eating at home
Pregnancy/lactation	Women's empowerment	Body satisfaction	Physical/mental health
	Female headed house	Knowledge	Familiarity with food
	Workload in home	Preferences	Smoking
	Migration history	Locus of control	Alcohol
	Shift work	Risk perception	Physical activity
	Wealth	Taste	Speed eating
		Aroma	Dieting
		Food appearance	
		Diet quality	
		Portion size	

c

	FOOD INDUSTRY	MARKETING/MEDIA	CLIMATE	GOVERNMENT	GLOBALIZATION	URBANIZATION
Macro Environment	Food production	Food prices	Seaonanily	Taxes or levies		
	Ready meals	Advertising	Weather	Food/agriculture policy		
	Shelf life	Social media use	Home-gardening	Access to transport		
	Market structure	TV/radio/media		Societal norms		
	Presentation/packaging			Social welfare policy		
	Quality/freshness of food			War		
	Food labelling			Religion		
	Chemical/pesticide use			Zoning policies		
	Commercial determinants of health			Road safety		
				Resource of nutrionists		
				Dietary guidelines		

	NEIGHBOURHOOD	SCHOOL	HOME			
Physical Environment	Community spaces	Foods sold near schools	Housing condition			
	Area deprivation	Healthiness of school meals	Home food stocks			
	Availability/distance of food outlets		Food storage facilities			
	Convenience		Cooking facilities			
	Type of food available					
	Household sanitation and hygiene					
	Neighbourhood sanitation and hygiene					
	Food adulteration/contamination					

	FAMILY	FRIENDS	SOCIETAL			
Social Environment	Family food practices	Peer/friends	Social norms			
	Family support		Culture			
	Food habits		Gender			
	Food allocation		Role modelling			
	Communal eating		Traditional taboos			
	House-help		Food vendor reputation			
	Marital status		Copying others			
	Household composition		Social status			
	Inter-generational differences in food preferences					

	BIOLOGICAL	DEMOGRAPHIC	COGNITIONS	PRACTICES		
Individual	Age	SES	Appetite	Skipping meals		
	Sex	Income	Hunger	Sleeping pattern		
	Ethnicity	Education	Texture	Cooking skills		
	Allergies	Employment	Mood and emotions	Time constraints		
	Puberty	Land use	Stress	Eating out		
	Weight status	Household food security	Wellbeing	Eating at home		
	Pregnancy/lactation	Women's empowerment	Body satisfaction	Physical/mental health		
		Female headed house	Knowledge	Familiarity with food		
		Workload in home	Preferences	Smoking		
		Migration history	Locus of control	Alcohol		
		Shift work	Risk perception	Physical activity		
		Wealth	Taste	Speed eating		
			Aroma	Dieting		
			Food appearance			
			Diet quality			
			Portion size			

Appendix Figure G: Development process of the codebook for thematic analysis.
(a) Tabular representation of the Osei-Kwasi framework: 103 factors organised by 14 sub-categories and 4 levels. For the preliminary codebook, the 14 sub-categories (highlighted yellow) were used as codes. They were deemed 'parent' codes as each encapsulated multiple 'child'-codes, but it was deemed impractical to begin the preliminary codebook with all 103 distinct factors. **(b)** Additional inductive codes generated through open-coding (n=7) shown in green. Each of these inductive codes was mapped to the corresponding 'parent' code and organisational category of the O-K framework where possible. Yellow highlighted codes show the 14 codes initially taken from the framework to construct the preliminary codebook (as described in Step 1 and Figure F1). **(c)** Removal of deductive broad 'parent' codes (previously highlighted yellow in Figure F2) and creation of child-codes (highlighted blue).

Appendix H: Final codebook

Cat.	Theme		Code	Description	Deductive or inductive
Macro-environment	Structural	1	**Globalization eroding traditional food culture**	Globalization promoting modern dietary habits via increased availability/ accessibility of novel foods and food-related equipment/technology, and greater exposure to global culinary influences.	Inductive
		2	**Urbanization creating modern food environments**	Urbanization modifying food environments to favour modern dietary patterns over traditional ones, via greater exposure to modern food retail and products and lifestyle changes.	Inductive
	Food industry	3	**Decline in production of traditional foods**	Declining production (especially home/self-production) of traditional agricultural products (including crops, livestock, and foraged wild foods) has decreased their availability and thus consumption in favour of purchase of largely modern foods.	Semi'-'deductive: combines 'Food production' ('Food Industry') and 'Home gardening' ('Climate') factors from O'-'K framework.
		4	**Concerns over agrochemical use reducing traditional food appeal**	Health and safety concerns about the mis-use of agrochemicals in the production of food (especially traditional crops) deterring the purchase and consumption of traditional ingredients.	Inductive
		5	**Commercial incentives driving modernization of diets**	Profit motives of commercial actors (including large multinational food companies and small local food vendors/business owners) result in dangerous business practices which affect the quality/safety of foods available to buy and increase the promotion/availability of less healthy modern foods.	Inductive
	Marketing/ media	6	**Advertising & marketing driving demand for modern foods**	Advertising and marketing practices (including food labelling/packaging) of food industry actors increases awareness of and generates demand for modern foods more so than for traditional foods.	Semi'-'deductive: 'Advertising and Marketing' included as factor in O'-'K framework. Narrowed scope to specify the advertising of modern foods and combined with 'Food labelling'.
		7	**Digital media amplifying exposure to modern foods**	Use of digital media (internet, social media, radio, and television) increases exposure to modern foods and recipes that generate awareness and demand for them.	Semi'-'deductive: 'Social media' is a factor in O'-'K framework. Broadened scope to include other forms of media like TV, radio, and general internet use.
Physical environment	Home environment	8	**Lack of tools for home-preparation of traditional meals**	Home food cooking facilities (including culinary tools, equipment, and fuel) are inadequate for the preparation of traditional foods and increasing access to novel/modern cooking technologies/ equipment facilitates the preparation of modern meals.	Semi'-'deductive: 'Home environment' (under 'Social Environment') included as factor in O'-'K framework. Narrowed scope to specifically refer to inadequate cooking facilities and equipment to prepare traditional foods and moved from 'Social' to 'Physical' level due to the focus on the physical tools/ equipment/ facilities to prepare traditional foods, rather than any broader family/social dynamics in the home (coded separately under 'Family').

	Neighbourhood environment	9	**Proximity & type of food retail driving access to modern foods**	Changing type of and proximity to food retail (from traditional to modern i.e. supermarkets) impacts food acquisition practices and the type of food that is available.	Deductive
		10	**Shifting availability from traditional to modern foods**	Increasing/high physical availability of modern foods and decreasing/limited availability of traditional foods in the environment in which someone lives/works, impacting dietary choice and purchasing/consumption patterns.	Deductive
Social environment	Family	11	**Evolving family food practices favouring modern diets**	Changes in the structure and content of family/at-home meals favouring modern dietary practices, and in doing so moulding the dietary habits of younger generations.	Deductive
		12	**Generational clashes: domination of youth food habits & preferences**	Inter-generational differences in traditional versus modern food habits/ preferences, especially relating to younger generations creating pressure to shift household diets from traditional to modern options.	Inductive
	Societal	13	**Social influence & norms driving modern food consumption**	Dietary preferences for modern foods are influenced by the behaviour and preferences of peers (friends, colleagues, family members, neighbours, role models) via peer pressure, role modelling, and conforming with social and cultural 'norms' by imitating others.	Semi'-'deductive: 'Friends' and 'Role modelling' included in O'-'K framework (under 'Social environment') are combined, with the inductive addition of 'imitation/copying'.
		14	**Social status conferred by modern food**	Modern foods are associated with wealth, modernity, respect, prestige and high social status, motivating their use.	Inductive: not included as a factor in the O'-'K framework, although related to 'Social norms' and 'Role modelling' (under 'Societal').
		15	**Taboos & myths discouraging traditional food use**	Negative taboos, myths, and negative connotations about traditional foods which dissuade their use.	Deductive
		16	**Tribal mixing diluting distinct traditional food practices**	Internal migration and inter-tribal marriage bring distinct tribal traditional food practices/cultures into one household, where incompatible preferences lead to the abandonment of both and replacement by 'middle-ground' modern diets.	Inductive: not included in the O'-'K framework. Links to 'Migration history' (under 'Demographics') in the O'-'K framework, but more nuanced in referring to the mixing of tribes due to internal migration.
Individual	Sociodemographic	17	**Employment type & demands constraining traditional dietary practices**	Employment status, type, and work schedule of an individual affects their dietary habits, including work commitments reducing the time available for traditional food preparation.	Deductive
		18	**Income determining affordability of traditional foods**	Income and relative food prices dictate what foods are affordable for an individual/family - either inadequate income as a barrier to acquiring traditional foods, or sufficient income to purchase more expensive modern foods.	Deductive
	Practices	19	**Eating away from home prompting modern food choices**	Increasing consumption of food-away-from-home/'on the go' pre-prepared meals increases intake of modern foods over traditional ones.	Deductive
		20	**Time constraints hindering**	Time constraints deter the consumption of traditional meals, which require lengthy preparation,	Semi'-'deductive: 'Time Constraints' ('Practices') is included as factor in O'-'K

			traditional food preparation	while modern ready-to-eat or quick-to-cook options are favoured for their convenience.	framework. Narrowed scope to specify how traditional food is time consuming to prepare.
	Cognitions	21	**Loss of traditional food knowledge & familiarity**	Limited and declining traditional food knowledge (including the beneficial qualities of traditional foods, preparation methods, recipes), especially amongst the younger generation, result in their waning presence, familiarity, and consumption.	Semi'-'deductive: 'Knowledge' is included as a factor in OK framework. Narrowed scope to specify 'Food knowledge' and combined with 'Cooking Skills' (under 'Practices').
		22	**Preferences moulded by heightened sensory appeal of modern foods**	Perceptions of the superior sensory appeal (taste, texture, aroma) of modern foods over traditional ones, resulting in heightened consumer demand.	Semi'-'deductive: combines 'Preferences', 'Taste', Texture' 'Aroma' 'Food appearance' (all under Cognitions) included in the O'-'K framework.
		23	**Overlooking or misunderstanding health risks of modern foods**	Limited knowledge or understanding of the potential health risks of modern packaged foods—including difficulty interpreting food labels—leading to uninformed food choice and reduces deterrence to consume traditional foods.	Deductive

Table H1: Final codebook detailing the full list of codes generated via thematic analysis (n=23), organised by theme (n=10) and category (n=4) aligning with Osei-Kwasi framework. Includes code descriptions. Column 'Deductive or Inductive' explains how each code was developed – whether deductive (retained an initial idea from the O-K framework) or inductive (generated as a new theme emerging from the data).

Annex

Annex A: Participant information sheet and consent form

CRERC FORM 15 PARTICIPANT INFORMATION SHEET

KILIMANJARO CHRISTIAN MEDICAL COLLEGE UNIVERSITY

(A Constituent College of Tumaini University Makumira)

Dietary Transitions and the Loss of Traditional Foods: Understanding the Driving Factors Across Urban, Peri-Urban, and Rural Communities in Kilimanjaro, Tanzania

COMPOSITION OF THE RESEARCH TEAM

- Carly Brown, Master of International Health Student at KIT Institute, Amsterdam, The Netherlands.
- Dr. Quirijn de Mast MD, Internist-infectious diseases specialist and researcher at Radboud Nijmegen and Coordinator of Radboud KCMCU collaboration
- Mary Vincent Mosha, Nutritionist, Lecturer, Head of Community Medicine Department at KCMCU
- Dr Godfrey Temba PhD, Assistant Lecturer & Post Doc researcher at KCMCU in collaboration with Radboud University Medical Centre-Nijmegen
- KCMCU personnel

WHAT IS THE PURPOSE OF THIS STUDY

In the Kilimanjaro region of northern Tanzania, people have long relied on traditional diets made up of fresh, local foods like vegetables, fruits, whole grains, and legumes, often prepared at home in ways that have been passed down through generations. These diets, high in nutrients and fibre, have supported the health and well-being of communities for years, helping to prevent chronic diseases such as diabetes, heart disease, and obesity. However, traditional diets are increasingly being replaced by more Western-style, highly-processed, imported foods that are quick to prepare, convenient, and tasty, but often high in sugar, unhealthy fats, and preservatives. This shift is suspected to be contributing to a rise in health problems including diabetes, heart disease, cancer, and obesity.

In this study, we **aim to understand what drives people to make these dietary changes**—looking at economic, cultural, social, and individual reasons—and whether this differs across different groups based on their gender, age, level of wealth, and where they live (rural or urban). By understanding these changes, we hope to support healthier, more nutritious diets that allow communities to keep the benefits of traditional diets and maintain good health.

HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

In total, approximately 72-96 individuals will be invited to participate in this research.

WHAT IS INVOLVED IN THE STUDY?

Focus group discussions

Small groups of people will be invited to gather to **discuss their views and opinions on changes in diet across the Kilimanjaro region**. Each discussion group will include 6-8 participants, and everyone will have a chance to share their views in a respectful, open conversation. In these discussions, participants will be prompted to talk about reasons for the shift from traditional to Westernized foods and explore how social, cultural, and economic factors may influence food choices. We also want to hear individual's thoughts on the importance of traditional foods and any concerns about their decline.

We plan to hold 12 separate discussion groups across urban and rural areas of Kilimanjaro, to hear from communities in each setting. People will be divided into groups with others like themselves – adult women, adult men, young women, young men, elderly women, and elderly men. Each participant will be invited to join the group that fits their background.

CONFIDENTIALITY OF THE INFORMATION

All personal data collected in this study will be anonymized. This will ensure that the identity of the participants cannot be linked to the information provided. Any personal information will be treated confidentially and stored in a secure place.

FUTURE USE OF MATERIAL

The data collected will be analysed by the study team and written into an article. This article will then be submitted to a scientific journal for publication. Important results and findings will be shared with community leaders of the communities that participated in the research.

THE RISK AND BENEFITS OF PARTICIPATING IN THIS STUDY

Taking part in this study means you can help us learn more about food and health in Kilimanjaro. This research could lead to programs that support the community's needs and improve diets and health. If you participate in Part 1 of this study [separate], you will be offered a free health check-up (height, weight, waist circumference, hip circumference, and blood pressure). This can give you helpful information about your general health.

RIGHTS TO WITHDRAW FROM THE STUDY

Participation in this study is voluntary. You can refuse to answer any of the questions and withdraw from the study at any time, without negative consequences.

WHAT ABOUT COMPENSATION?

Participants will not receive payment for participation in this research. Light refreshments will be provided during the interviews and discussions, and any travel costs will be reimbursed.

WHOM DO I CALL IF I HAVE QUESTIONS OR PROBLEMS?

For questions about the study or a research-related injury, or if you have complaints, concerns, or suggestions about the research, contact Mary Vincent Mosha (PI) at the Kilimanjaro Christian Medical University College Tel. +255 754 371544 or Carly Brown (study coordinator) at KIT Institute Amsterdam Tel. +44 7758 710901.

Either if you need to report or obtain more information related to ethical misconduct in this study, please contact the ethics office via phone number 0272753909, or email: kcmc.rec@kcmuco.ac.tz*STATEMENT OF CONSENT*

"The purpose of this study, procedures to be followed, risks and benefits have been explained to me. I have been allowed to ask questions, and my questions have been answered to my satisfaction. I understand that I have the right to voluntarily participate of withdraw my participation from the study without any penalty or loss of medical care that I am entitled to. I have been told whom to contact if I have questions, to discuss problems, concerns, or suggestions related to the research, or to obtain information or offer input about the research.

I have read this consent form and agree to be in this study, with the understanding that I may withdraw at any time. I have been told that I will be given a signed and dated copy of this consent form together with a copy of the document with detailed information about the study that has been explained to me if I need it.

_____ _____

Name of the Participant *Date*

_____ _____

Signature of participant *Date*

_____ _____

Name of Person Obtaining Consent *Date*

_____ _____

Signature of Person Obtaining Consent *Date*

Annex B: Participant sociodemographic questionnaire

Template sociodemographic questionnaire that each FGD participant completed to help better understand group characteristics and contextualise the findings.

For FGD facilitator to complete:

FGD location type (Urban / Rural)	
FGD location (village name)	
FGD age group (young / adult / elder)	
FGD gender group (male / female)	

For participant to complete:

ID Namba (Participant ID number)	
Jinsia (Gender)	
Umri (Age)	
Kabila (Ethnicity / Religion / Tribe)	
Hali ya ajira kwa sasa? (Current employment status?)	
Aina ya ajira/chanzo kikuu cha kipato? (Type of employment/ occupation)	
Kiwango cha elimu: Idadi ya miaka ya elimu rasmi iliyokamilika? (Educational level: number of years of formal schooling/education completed?)	
Kiwango cha juu zaidi cha elimu rasmi kilichokamilika? (Educational level: highest level of formal schooling/education completed?)	
Mahali pa kuzaliwa? (Place/setting of birth)	Mjini (Urban) Kando ya mji (Peri-urban) Vijijini (Rural)
Je, mshiriki ni kiongozi wa kaya? (Household headship: are you the head of the household?)	Ndio (Yes) Hapana (No)

Annex C: Focus Group Discussion guide

English version, subsequently translated into Swahili for use by facilitators.

Dietary Transitions and the Loss of Traditional Foods: Understanding the Driving Factors Across Urban, Peri-Urban, and Rural Communities in Kilimanjaro, Tanzania

Focus Group Discussions – Facilitator Guide

Purpose of this guide

This guide is designed to support facilitators in conducting Focus Group Discussions (FGDs) smoothly and effectively. Facilitators using this guide will have completed comprehensive training to prepare them for leading these FGDs. The guide is intended for reference on the day of the FGD to help ensure that conversations are structured but open-ended, encouraging participants to share freely. Following this guide allows facilitators to gather deep, qualitative insights into the community's dietary transition drivers while maintaining a light-touch approach to remain adaptable. This flexibility lets the discussion flow naturally, while still ensuring that core themes are addressed.

Facilitators are also encouraged to review Guidance for Conducting Focus Group Interviews by Richard A. Krueger for additional tips and insights that may further enhance the quality and depth of their facilitation skills.

Purpose/ objectives of the FGD

The primary objective of the FGDs is to explore and understand the various social, economic, cultural, political, and other factors driving dietary shifts from traditional to Westernized foods within the community. These FGDs are designed to foster open conversations around community-wide observations and shared experiences related to these dietary changes. To capture diverse perspectives, **FGDs will be conducted across three geolocations** (urban, peri-urban, and rural settings), starting with **four FGDs per location**. Each FGD will focus on a specific community group—adult women, adult men, community leaders, and youth—to ensure a well-rounded understanding of the dietary transition. The FGDs will continue until a saturation point is reached, where no new themes or insights are emerging.

The FGDs will follow a traditional approach in which **participants engage in open-ended discussions guided by the facilitator**. The emphasis is on collective dialogue with minimal structure, allowing participants the freedom to explore topics in depth. The **facilitator will deliver broad, open-ended probes and allow the conversation to flow** organically, fostering interaction and idea-sharing among participants. This method promotes rich, dynamic discussions and enables participants to build on each other's insights, leading to deeper, more nuanced understanding of the topics.

Content: suggested themes to explore in the FGD

To meet the objectives of the FGD, several key themes/topics will be explored.

- Current dietary habits and preferences
- Recent observed changes in dietary patterns and possible drivers behind these shifts
- Perceptions of traditional foods versus Western/highly-processed foods.
- Factors influencing food choices including media, availability, taste, accessibility, affordability, convenience, cultural acceptability, social status, and others.
- Cultural significance of traditional foods, including any perceived erosion or loss of these practices over time.

Suggested probes to explore these themes are detailed below in the 'script' section.

On the day FGD protocol/agenda

All FGDs will follow a standardized sequence to ensure a consistent approach across all sessions:

1. Arrival of participants
    - Welcome and registration of participants. Attendance verified against a participant list.
    - Introduction of moderator and assistant/other study team members.
    - A brief 'icebreaker' activity to help participants feel comfortable and engaged.
2. Informed consent
    - Distribution of the paper informed consent forms to all participants.
    - Facilitator verbally explains the purpose of the form, ensuring participants understand their rights (voluntary participation, confidentiality, and the option to withdraw at any time) and highlight that the session will be audio-recorded for analysis purposes, but all data will remain anonymous.
    - Participants read, complete, and sign the consent forms.
    - Facilitator collects all consent forms and ensures they are all completed and signed before proceeding.
3. Introduction to the research study
    - Facilitator provides an overview of the research study (background, objectives, expected outcomes).
4. Ground rules
    - Overview of etiquette and expectations including (see 'Script' section).

5. FDG discussion
    - Initiation – facilitator delivers opening probe (see 'Script' section).
    - Moderation – facilitator guides discussion, using probes (see 'Script' section) where needed.

6. Conclusion
    - Facilitator offers brief summary of discussion
    - Participants given opportunity to ask any questions to the study team.
    - Thank you and closing (including explanation of next steps).

It is expected each FGD will take between 1-2 hours. It is the responsibility of the facilitator to keep discussions on topic and not overrun.

Script for use on the day

Welcome… Introduce yourself as the facilitator (and assistant/others if applicable)

Our topic is the changing patterns in the types of foods people eat here in your community. Specifically, we will be exploring your perceptions on the shift from consuming exclusively traditional foods to more Westernized foods. We want to understand the different reasons that might be driving these changes – including social, economic, cultural, political, or individual reasons.

The results of this discussion will be used to help us better understand the factors driving these dietary changes in your community. This information will be used to support healthier, more nutritious diets that allow communities to keep the benefits of traditional diets and maintain good health.

You were selected to participate in this discussion because your experiences and perspectives are valuable in helping us understand these changes. We're interested in hearing your thoughts, ideas, and observations on how diets have changed in this region.

Guidelines/ground rules…

- There are no right or wrong answers, only differing points of view.
- We are tape recording this session, so we do not miss any important comments. For this reason, we appreciate if only one person speaks at a time.
- You do not need to agree with others, but you must listen respectfully as others.
- We encourage you to share your views and talk to each other.
- We ask you take it in turn to speak and ensure everyone has a chance to speak
- We ask you to keep everything shared within the discussion confidential
- We ask that your turn off your phones. If you cannot and if you must respond to a call, please do so as quietly as possible and rejoin us as quickly as you can.
- My role as moderator will be to guide the discussion.

Opening probe…

"Can you share with us what kinds of foods are most commonly eaten in your household today, and if you've noticed any changes in the types of foods you and people your community prefer or eat now compared to the past?"

Follow up probes (per theme) …

These suggested probes are provided as probes to help guide the discussion and cover the various themes relevant to dietary transitions. The list is not intended to be prescriptive and exhaustive, meaning facilitators are not expected to use every probe; instead, use them flexibly and exercise judgment in selecting the most appropriate probe as the conversation unfolds.

Certain topics may resonate more with specific demographic groups (e.g., social media and role models may be particularly relevant for the youth FGD).

THEME	SUGGESTED PROBES
Food Preferences & Taste	● What types of foods do you enjoy the most, and how do those preferences compare to foods you remember from childhood? ● Have you noticed any new foods becoming popular here? What do you think makes them appealing?
Socio-economic Status & Wealth	● As people's incomes have changed, have you noticed any shifts in the types of foods that are commonly bought or prepared? ● Do you feel that certain foods, particularly imported or packaged foods, carry a sense of status or prestige? If so, why do you think that is?
Time Constraints - Convenience of Processed & Easy-to-Prepare Foods	● How does your daily schedule influence your food choices and the types of meals prepared at home, particularly regarding quicker meal options? ● Have you observed a trend in your community toward busier lifestyles affecting food choices, specifically an increased preference for processed or convenience/ easy-to-prepare foods? If so, what factors do you think contribute to this shift?
Cooking Skills	● How often do people prepare traditional dishes from scratch, and is this skill still common among younger generations? ● Do you think there's a difference in cooking knowledge between older and younger community members? How does this affect the types of foods people eat?

Food and Beverage Advertising	• Have you noticed any changes in how food is advertised in the community, especially for processed or packaged foods? • How much do you think advertisements and promotions influence people's food choices here?
Social Media Use	• Are there certain foods that are popular on social media, and do you think this influences what people choose to eat? • Do you see role models such as celebrities or athletes consuming certain foods on social media? Does this influence what people want to consume?
Peer Influence	• How much influence do you think friends or social circles have on what people eat? • Is there a sense that eating certain foods, like Western or packaged foods, is more socially acceptable or desirable?
Cultural Influence	• How has the culture around food changed here over time, if at all? • Do you think certain foods are seen as more 'modern' or aspirational?
Traditional Food Taboos	• Are there any myths or taboos around traditional food? Does this influence whether people choose to eat them?
Availability & Proximity to Food Outlets	• Have you noticed any changes in the types of food available in the market? How accessible are traditional foods compared to Western or packaged foods? • Do people tend to eat out of the home more often now, and how does that affect the types of foods they consume?
Packaging & Food Labelling	• Do people here pay attention to labels on food packaging, and do you think they understand them well?
Education	• Do you think education plays a role in shaping people's food choices? How? • Have people become more aware of good nutrition through education, and has this awareness changed eating habits?
Gender & Women's Empowerment	• How have women's roles in the home and workplace changed? And do you think this has influenced the type of food they prepare for their families?

Employment	● How do different types of jobs, for example agricultural versus office work, impact food choices and eating patterns? ● Do you see that people with longer or more demanding work schedules choose different foods than before?

Close of session…

Offer a brief summary of discussion and ask the group if they have any questions to the study team. Thank all participants for their time and contributions and explain what will happen next (if/when the results will be available).

Annex D: Declaration on use of generative Artificial Intelligence

KIT Institute (Masters or Short course) Participants
Declaration for Use of Generative AI (GenAI)

Check the box that applies to your completion of this assignment:

☐ I confirm that **I have not used** any generative AI tools to complete this assignment.

☒ I confirm that **I have used** generative AI tool(s) in accordance with the ***"Guidelines for the use of Generative AI for KIT Institute Master's and Short course participants".*** Below, I have listed the GenAI tools used and for what specific purpose:

Generative AI tool used	Purpose of use
1. ChatGPT	Checking grammar and spelling; searching for additional references; checking all tables and figures are correctly labelled; removing repetition across a paragraph; condensing sentence to reduce word count; helping develop creative titles for theme and code labels; suggesting sensible structures for sections of the thesis; as a sounding board for developing some of the theories and conclusions I developed from the data.