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Understanding the role of policy in ongoing food environment transitions in Zambia and opportunities to build a healthy and sustainable environment

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The food environment across Zambia is undergoing unhealthy transitions. This study aimed to understand the role of, and opportunities for food system policy to support a healthier environment in a Zambian context. A combined approach of key informant interviews with policy makers (n = 18), and content review of food system policies since 2005 (n = 10) was applied. Analysis was based on an inductive, and deductive approach following a framework combining food environment and multiple streams theories. Unhealthy transitions including decreasing diversity of healthy foods and increasing availability and desirability of inexpensive unhealthy foods were noted, alongside unregulated marketing. Transitions are underpinned by monocultural agriculture, economic-driven investment policies without explicit public health safeguards, and lower investments in wet markets amidst supermarket growth. Policy places emphasis on improving public awareness, but implementation is slow due to inadequacies in educational strategies and local government's capacity. Fragmented and uncoordinated government actions result in contradictions across different policies. To bridge gaps, stakeholders suggested a multi-tiered policy, integrating education reforms, strengthening local governments to institutionalise implementation and leveraging digital platforms. Additionally, structural strategies were proposed including public-private partnerships that incentivise healthier foods through diversified production, formalising wet markets into structured regulated systems with traceability mechanisms through vendor co-designed solutions, front of the pack labelling and in-store nudging guidelines for indigenous foods. Zambia's food environment is increasingly obesogenic due to fragmented policies. Overall, cross-sectoral, integrated policy bundles that align economic incentives across agricultural, trade and processed food value chains with nutrition guidelines are needed.

KEYWORDS
food environment transformations, nutrition transitions, policies, Sub-Saharan Africa, Zambia

1 Introduction

Sub-Saharan African (SSA) countries, including Zambia, are experiencing dietary transitions characterized by a shift towards unhealthy diets (higher in refined carbohydrates, sugar, salt, and saturated fat and lower in fruits, vegetables and whole grains) (Harris et al., 2019; MOH Zambia, 2017; Mukanu et al., 2022a, 2022b; Phelps et al., 2024). Diets are transitioning from unrefined maize, pulses and vegetables to refined maize, and foods high in fat, salt and sugar especially among the majority urban poor population. For example, an estimated 90% of Zambians do not meet the recommended fruit and vegetable requirements under the Zambia's Food-Based Dietary Guidelines (FBDG) (MOH Zambia, 2017). Zambia is suffering a double burden of malnutrition which is largely attributed to the ongoing dietary transitions (Phelps et al., 2024). While undernutrition is still highly prevalent in rural areas, overweight and obesity have disproportionately increased in urban Zambia, with no signs of slowing (MOH Zambia, 2017). The internationally agreed targets to halt the double burden of malnutrition by 2025 have not been met in Zambia (Phelps et al., 2024). Malnutrition is considered a comorbidity and major risk factor for non-communicable diseases (NCD) (Cuthbertson and Wilding, 2021; Després, 2012). Evidence shows a protracted polarized model of the epidemiological transition in SSA, where the middle class and rich experience a high NCD risk while the poor experience both NCDs and infectious diseases (Abrahams et al., 2011). Africa is the only region in the world with a projected increase in Type 2 Diabetes prevalence of more than 100% (134%) by 2045 (International Diabetes Federation, 2021). In Zambia, the prevalence of overweight and obesity particularly among women of reproductive age (currently 53%), alongside type 2 diabetes (@10% in urban areas) are on an upward trajectory (MOH Zambia, 2017).

Evidence highlights the food environment as a central driver of food consumption within the wider food system, encompassing the physical availability, accessibility, and marketing of food (Holdsworth and Landais, 2019; Turner et al., 2018). The food environment includes both the physical and macro-level components (Holdsworth and Landais, 2019; Turner et al., 2018). The physical food environment refers to settings where food is produced, purchased, prepared, or eaten, collectively determining the types of foods that are available and accessible to the public (Glatzel et al., 2024; Holdsworth and Landais, 2019; Turner et al., 2018). Macro-level components including policies, social-culture, and marketing practices further shape tastes and preferences, determining dietary habits in the long run. Creating healthy and sustainable food environments is a pressing public health priority, with the potential to address and prevent the double burden of malnutrition, currently experienced in SSA (Holdsworth and Landais, 2019).

Like most SSA countries, Zambia has policies in place to address undernutrition, but these policies may not holistically address the food environment drivers of the ongoing unhealthy obesogenic dietary transitions and attendant double burden of malnutrition (Government of Republic Zambia, 2020; Harris et al., 2019; NFNC, 2019). Some policies such as the vitamin A fortification of sugar may instead unintentionally contribute to obesogenic food environment. Recognising the gap, discussions on potential double duty, do no harm policies strategies have started gathering pace in SSA over the last decade (Laar et al., 2022). In Zambia, for example the government recently ratified the "Zambia Food Systems Transformation Pathway Road to 2030" with one pathway emphasizing a focus on strategies to realise a healthy and sustainable food environment (Office of the Vice President, 2021). Accordingly, the Zambia government has initiated several strategies to tackle dietary transitions including development of FBDG and discussions to roll out a tax on sugar sweetened beverages (Ministry of Agriculture Zambia, National Food and Nutrition Commission, Food and Agricultural Organisation, 2021; Mukanu et al., 2021). However, stakeholders have raised concerns over limitations in policy contextualisation and implementation gaps (Mukanu et al., 2023). A topical study shows that some of the rolled-out policy strategies to address unhealthy food environment transitions are perceived by stakeholders as not feasible or effective in SSA settings due to gaps in contextualization (Mukanu et al., 2023).

Optimising the food environment necessitates policies tailored to ongoing unhealthy food environment transformations and contextual factors in terms of interests and influences of different actors (Turner et al., 2018). A thorough understanding of the dynamics of how and why the food environment and system at large is changing will be crucial to designing the appropriate policies, incentive structures and regulations (Holdsworth and Landais, 2019; Laar et al., 2022; Turner et al., 2018). However, these aspects remain largely understudied and unclear particularly in Southern and Eastern African settings like Zambia (Harris et al., 2019; Holdsworth and Landais, 2019; Turner et al., 2018). Therefore, this study explored Zambia's agri-nutritional policy response to manage the unhealthy food environment, how the context shapes the policy response, the arising policy gaps, impact of gaps, and potential strategies to bridge the policy gaps.

We adopt a theoretical framework combining and adapting the food environment framework described by Turner et al. (2018) and the multiple streams theory (Béland and Howlett, 2016) (Figure 1). Combining the two theories provides a framework for understanding how policy can shape a multidimensional food environment. Compared to other food environment theoretical models (Food and Agricultural Organization, 2016; Swinburn et al., 2013), the Turner et al. (2018) framework constitutes measurable dimensions and enables a holistic empirical characterisation of the food environment, particularly in LMIC settings. Building on the work of Swinburn et al. (2013) and the Food and Agricultural Organization (2016). Turner et al. (2018) conceptualised the food environment to encompass an external domain including dimensions of availability, prices, vendor and product properties, and marketing, and personal domain with dimensions of accessibility, affordability, convenience and desirability of food sources and products. The dimensions continuously interact in a complex manner to shape people's food acquisition and consumption. For example, marketing has been hypothesised to shape desirability. At the same time, availability through continuous exposure may also shape desirability. In the current research, Turner et al. (2018) framework was contextualised to four main dimensions: (1) desirability (preferences, social cultural norms, knowledge, and skills), (2) availability (presence of a diversity of food groups), (3) accessibility and vendor/product properties (affordability and types of retail systems including food properties in terms of convenience, and nutritional and safety quality), and (4) marketing (types and channels of advertising). On the other hand, the multiple streams theory enables understanding of public policy prioritisation through analysing how policy makers perceive three streams; (1) the problem, (2) the potential solutions, and (3) the contextual factors, for example influences and interests of different actors who could either impact or be impacted by the potential solutions (Béland and Howlett, 2016). The theory hypothesises that

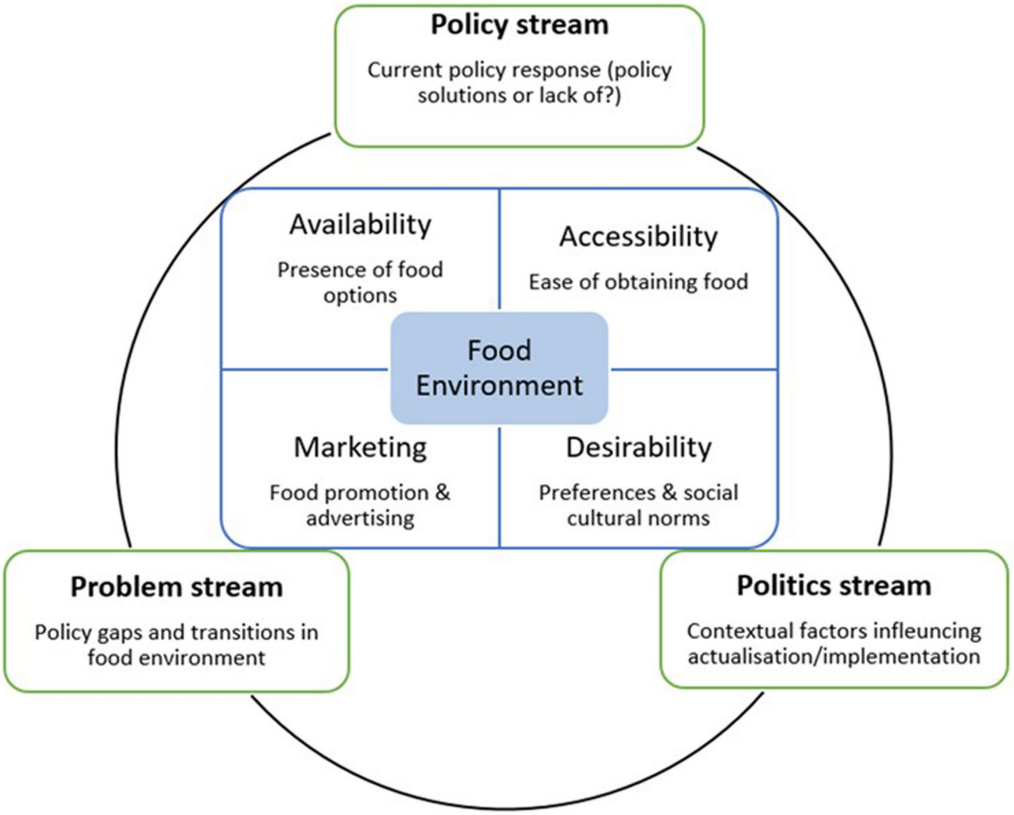

FIGURE 1
Modified theoretical framework for structuring and analysing KII, source – the multiple streams theory (Béland and Howlett, 2016) (green boxes) and the food environment framework (Turner et al., 2018) (blue boxes).

once these three streams align, a policy window opens, allowing for significant changes in the problem.

In combination, the framework directs us to consider the interaction between problem, politics and policy within each of the food environment domains to build a comprehensive and holistic picture of the opportunities and challenges for policy influence in supporting a more sustainable and health food environment.

2 Methodology

This study was part of a larger mixed-methods project examining dietary transitions in Zambia and their health implications. The broader project included: (1) policy analysis and key informant interviews (KII) with policy makers and implementers to examine the food environment policy landscape and implementation gaps, which forms the focus of this paper; (2) KII with food vendors; and (3) a photo-voice study with consumers to explore lived experiences of ongoing food environment transitions. A consolidated criteria for reporting qualitative research was followed as a guideline to report this study (Tong et al., 2007) (Supplementary Table 1).

2.1 Study design, participants and data collection

Applying the principle of data saturation (Hennink et al., 2017), the qualitative study involved KII with 18 key stakeholders working in food and nutrition policy formulations and implementation at national and provincial levels in Zambia. Participants were purposively sampled and invited via snowballing from key organisations. Participants were initially contacted via email and subsequently followed up by telephone; the email correspondence included detailed information about the study and the research information sheet. In total, 25 invitations were issued, and seven did not respond. Recruitment continued until thematic saturation was reached, where no substantial new policy themes emerged. Key informants included those with leading roles at institutions tasked with developing, ratifying, and implementing agri-food and nutrition policies/programmes and those involved in food and nutrition research particularly researching the food environment; from national government agencies (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; $n = 4$), local government bodies (Lusaka City Council and Central Provincial ministries; $n = 4$), Civil Society Organizations (CSOs)/Non-Governmental Organizations ($n = 5$), United Nations (UN) system and other development partners ($n = 2$), and research institutions ($n = 3$). These organisations were mapped from policy documents and publications on food and nutrition work within Zambia. Development partners were included as are key for resource mobilisation while research institutions generate evidence for agenda setting and are part of multisectoral nutritional policy formulation committee framework in Zambia. At provincial level, stakeholders from Central Province were targeted to reflect peri-urban and rural perspectives and align with the broader FOSTA-Health project focus. To understand the ongoing food system transformations in Southern Africa, the wider project FOSTA-Health, used Lusaka and Central

Province of Zambia as case studies. Key informant interviews were conducted between February and March 2024 using a semi-structured guide (Supplementary Table 2), informed by the theoretical frameworks described in the background section. The KII guide was piloted with an academic at the University of Zambia with expertise on Zambian food systems and refined accordingly. Following the multiple stream's theory, for each of the four dimensions of the food environment framework, the KII explored how the stakeholders perceive the problem (transitions and policy gaps), the current policy response (policy solutions or lack of, and potential policy opportunities), and the contextual factors that influences actualisation/implementation of current policies/identified potential policy opportunities to address the transitions. Face-to-face KIIs were conducted in English in private office spaces at participants' workplaces. Interviews were audio-recorded and lasted between 40 and 90 min. Open-ended questions were followed up by more specific probes to clarify and extend responses. A researcher with experience in qualitative research moderated the KIIs with a trained silent observer who took notes on non-verbal behaviour. Each participant signed an informed consent.

Multi-sectoral national policies and action plans across the nutrition, health, agricultural, education, food safety, and national development sectors enacted between 2005 and March 2024 were reviewed. Policies were included if they contained provisions with potential implications for the food environment. The selected documents were validated with key stakeholders during the KII to ensure inclusion of all major relevant policies and action plans. The year 2005 was selected as the starting point due to increasing recognition of nutrition transition and rising diet-related NCD in LMICs (Popkin, 2002), alongside growing global calls for policy initiatives to address these transitions (World Health Organization, 2002). Overall, 10 policies and action plans published between 2005 and 2024 were retrieved and analysed, Table 1.

2.2 Data analysis

Analysis of the interviews was based on a combined deductive and inductive thematic content analysis approach, following the principles outlined by Elo et al. (2008). The deductive analysis was guided by the modified theoretical framework described in the background section while the inductive component allowed for the emergence of new themes from the data. Two researchers independently conducted the coding to develop an initial coding framework. Coding units represented meaningful expressions with regards to policies and contextual factors to manage the food environment. Following independent coding, the researchers compared and discussed their frameworks to identify similarities and differences. Generated codes from all transcripts were then organized into a second coding framework. Correspondingly, using theoretical ideas from the modified theoretical framework, overlapping categories were clustered into themes capturing (1) perceived transitions, and policy gaps, (2) the current policy solutions or lack of, and potential policy opportunities, and (3) the contextual factors that influences policy actualisation/implementation to generate the final coding framework. For policy review, a qualitative content deductive document analysis was applied to synthesis the retrieved policies. The policies were synthesised for strategies/policy gaps with regards to optimising the four food environment domains (availability, accessibility, marketing and desirability). NVivo 14 software was used for data management and coding.

3 Results

Four interconnected case studies emerged from the analysis, reflecting key policy tensions shaping Zambia's food environment transitions. Although derived inductively from the data, each case study cuts across multiple domains of the food environment framework, highlighting the interconnected nature of policy influences, Table 2. The case studies are presented following the multiple streams theory, including: (1) identified problems; (2) existing policy responses and implementation gaps; and (3) implications for the food environment.

3.1 Inadequacies in regulation and educational policies to manage unhealthy food industry

Stakeholders indicated an increasingly unhealthy food environment, which they attributed to non-explicit guidelines to regulate unhealthy foods. Since the 2013 NCD strategy (MOH Zambia, 2013), several action plans have recommended enacting regulations to limit availability and marketing of unhealthy foods to children (Ministry of Education Zambia, 2020; MOH Zambia, 2006; NFNC, 2019), but these have not been actualised. The Food Safety Act 2019 (Government of Zambia, 2019) and Food and Nutrition Act 2020 (Government of Republic Zambia, 2020) regulate the food industry, but lack enforceable provisions to regulate foods high in salt, sugar, and trans fats, and zoning of unhealthy fast-food chains as per the WHO guidelines (Government of Zambia, 2019; Government of Republic Zambia, 2020). For example, the labelling and advertising regulation is overly general and only covers health claims,

> *"Prohibition to label, or advertise any food in a manner that is false, misleading or deceptive as regards to its character, nature, quality, composition, or as treatment, preventative or cure for a disease, disorder or abnormality"* (section 10, p. 15 and 14, p. 17 of food safety act) (Government of Zambia, 2019).

The current labelling and advertising regulation provisions are insufficient to regulate unhealthy food nor enable public to make informed healthier choices (Government of Zambia, 2019). There are no regulations governing in-store marketing and product placements (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; MOH Zambia, 2006; Office of the Vice President, 2021). Over the last decade a collaborative platform spearheaded by the Scaling Up Nutrition Business Network has piloted a 'Good Food Logo' (GFL), a voluntary 'front of the pack labelling' (FOPL) innovation, but bigger private sector players have not been responsive.

> *"Policies are there, but are not explicit, because the government is there also to promote private investment, for example, there's no regulation on advertising, if I have money, I go to the service provider and say air my advert", KII4 representing CSO.*

Despite recognition of these policy gaps, stakeholders stressed that contextually, regulatory actions are difficult and constrained by the private sector's role as an economic anchor. Implementation was considered difficult due to the outsized commercial and political influence of retail and food service chains. The "Zambia National

TABLE 1 Zambia's current food and nutrition policy landscape mapped against the four food environment domains.

Availability	Accessibility	Marketing	Desirability
Current provisions within policy			
Current provisions 1. Promote provision and availability of healthy foods in all public and private institutions (MOH Zambia, 2013) 2. Multisectoral actions to design and implement reformulation and economic interventions to promote healthy foods availability (MOH Zambia, 2013; NFNC, 2019) 3. Put in place multisectoral actions to design and implement interventions to increase availability and affordability of fruits and vegs (MOH Zambia, 2013) 4. Put in place regulations to limit availability of foods rich in salt, sugar and trans fats, and increase healthy offers in school tuckshops, and guidelines on foods supposed to be brought by learners at school (Ministry of Education Zambia, 2020; MOH Zambia, 2006; NFNC, 2019) 5. Invest in agricultural production diversification, biofortification and post-harvest handling technology (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; MOH Zambia, 2006; NFNC, 2019; Office of the Vice President, 2021). Recommendation for diversification to be aligned with the six food groups of Zambia food based dietary guidelines (Office of the Vice President, 2021). 6. Enhance collaboration with private sector to increase processing foods into diverse nutritious products (Ministry of National Development and Planning, 2022; NFNC, 2019; Office of the Vice President, 2021) 7. Recommendation to put in place a policy to incentivise nutritious foods with low taxes and subsidies and increase tax on nutrient poor foods (Office of the Vice President, 2021).	*Current provisions* 1. Avoid selling unhealthy foods rich in salt, sugar and trans fats in school tuckshops (Ministry of Education Zambia, 2020; NFNC, 2019). 2. Put in place system to link smallholder farmers to school markets within the same district (Ministry of Education Zambia, 2020; Office of the Vice President, 2021). 3. Improve food distribution infrastructure (construction and maintenance of markets, innovative cold technologies) (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; MOH Zambia, 2006; Office of the Vice President, 2021).	*Current provisions* 1. Put in place multisectoral actions to design and implement regulations to promote healthy foods (MOH Zambia, 2013) 2. Put in place regulations to limit marketing of foods high in saturated and trans fats, free sugars and salt to children by 2016 (MOH Zambia, 2013). 3. Prohibition to "label, package, sell or advertise any food in a manner that is false, misleading or deceptive as regards to its quality, composition,"(Government of Zambia, 2019). 4. Prohibition to "advertise any food as treatment, preventative or cure for a disease"(Government of Zambia, 2019). 5. Recommendation to "enforce regulations against selling and marketing unhealthy foods and promote front of package labelling" (Office of the Vice President, 2021)	*Current provisions* 1. Scale-up promotion of healthy diets (traditional diets proven to be nutritious) to the public through: 2. Nutrition education public awareness campaigns (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of Education Zambia, 2020; Ministry of National Development and Planning, 2022; MOH Zambia, 2006, 2013; NFNC, 2019; Office of the Vice President, 2021), align campaigns to six food groups as outlined in Zambia FBDGs (Ministry of Agriculture Zambia, National Food and Nutrition Commission, Food and Agricultural Organisation, 2021; Office of the Vice President, 2021) 3. Capacity building of health workers and nutritionists in prevention and management of nutrition related NCDs across all education levels (curriculum enrichment) (MOH Zambia, 2006, 2013; Office of the Vice President, 2021) 4. Establishment of undergraduate programmes in food and nutrition (MOH Zambia, 2006) 5. Establish school nutrition clubs and model gardens of indigenous foods (Ministry of Education Zambia, 2020; MOH Zambia, 2006; NFNC, 2019)

(Continued)

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TABLE 1 (Continued)

Availability	Accessibility	Marketing	Desirability
Tensions and gaps across policies			
Over emphasis on staple crops vs diversification • Nutritional policies recommend diversification, but agricultural policies and action plans remain maize-centric to attain food security goals • Limited incentives to invest in other food systems *Limited action on reducing unhealthy food availability* • Regulations to restrict unhealthy foods (composition standards, reformulation, fiscal strategies) are framed in recommendation tone. No clear legislation and enforcement mechanisms are in place. • Incentivise private sector investment in processed food value chains but no mandatory regulatory frameworks to limit unhealthy options. *Gaps in public procurement systems* • School Health and Nutrition Guidelines (2020) exist, but implementation is inconsistent and lacks strong monitoring frameworks. Plus, procurement nutrition standards for other public institutions are lacking.	*Limitations in addressing infrastructure to enable equitable physical access to diverse foods* • Distribution networks: particularly insufficiency in wet market infrastructure is systematically not addressed despite policy mention. *Limited focus on fiscal and subsidy mechanisms to ensure affordability of healthy foods* • Despite mention, policies lack concrete measures to reduce cost barriers for fruits and protein-rich foods for low-income groups. Market systems and pricing structures are still maize centric. *Lack behavioural healthy food nudges in retail and public settings* • Nudges (pricing, placement and promotion) to make healthy foods the default choice are lacking. *Social protection integration gaps* • Poor alignment between social protection poverty reduction programmes, agriculture and nutrition	*No comprehensive mandatory regulation/ nutrient profiling system* • Current regulatory framework is targeted towards health claims and lacks specificity to unhealthy foods • Front-of-package labelling (e.g., Good Food Logo) is recommended, yet to be operationalized • Limited comprehensive coverage and scope across platforms: TV, digital including social media, billboards, product placements, and child targeted marketing tactics (celebrity endorsements, cartoons etc) are not regulated *No clear enforcement/monitoring framework* • Propositions are framed in a recommendation tone without accompanying legislation. • Mention cross sectoral efforts to promote healthy foods but non-alignment with agriculture, marketing and trade systems	*FBDG provide technical guidelines* but are not aligned to agricultural policies and there is no robust national campaign. *Absence of cultural integration and behaviour economic strategies to support behavioural change* • No policy provisions for pricing incentives product placements or nudges in retail systems and institutions to make healthy choices the default • Lack positive branding strategies to reinforce indigenous nutrient rich foods as aspirational by addressing negative social norms • Growing need for convenience due to modern lifestyles, and hence preference for convenient unhealthy choices is not addressed. *Fragmented approach* • School programs are not extended to communities who possess strong influence on children's tastes and preferences.
Fragmentation: inter-sectoral coordination is highlighted and even a coordinating committee to oversee in an integrated manner, nutrition policies development and implementation established by 2020 Nutrition Act (Government of Zambia, 2020; Ministry of Education Zambia, 2020; MOH Zambia, 2013; NFNC, 2019; Office of the Vice President, 2021) but remains poorly actualized (Government of Zambia, 2019; Ministry of Education Zambia, 2020; MOH Zambia, 2013; Office of the Vice President, 2021). Policies remain siloed across ministries of (Health, Agriculture, Education, Trade, and Finance and Planning) with weak coordination mechanisms. *Implementation and enforcement gaps*: Strong policy language but enforcement mechanisms, and monitoring systems and accountability structures to track progress are absent *Weak coordination* of research activities and translation of evidence into policy (MOH Zambia, 2013)			

Numbered references refer to the following policy document sources: Food and Nutrition policy 2006 (MOH Zambia, 2006); NCD Strategy 2013 to 2016 (MOH Zambia, 2013); National Food and Nutrition Strategic Plan 2017 to 2021 (NFNC, 2019); School Nutrition and Health Programme implementation guidelines (2020) (Ministry of Education Zambia, 2020); Food and Nutrition Act 2020 (Government of Zambia, 2019); National Agricultural Policy 2016 (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016); Food Safety Act 2019 (Government of Zambia, 2019); Eighth National Development Plan 2022–2026 (Ministry of National Development and Planning, 2022); Zambia food systems transformation pathway, the road to 2030 (Office of the Vice President, 2021); Zambia Food Based Dietary Guidelines (Ministry of Agriculture Zambia, National Food and Nutrition Commission, Food and Agricultural Organisation, 2021).

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TABLE 2 Mapping levels of influence of emerging themes across the four food environment domains.

Themes	Availability	Accessibility	Marketing	Desirability
Inadequacies in regulation and educational policies to manage unhealthy food industry	Primary	Primary	Primary	Primary
Monocultural and export oriented agricultural policies	Primary	Secondary	–	Primary
Low investments in wet markets in the context of supermarket growth	Secondary	Primary	Secondary	Secondary
Fragmented and uncoordinated government actions	Cross-cutting	Cross-cutting	Cross-cutting	Cross-cutting

Development Plan", specifically the latest 8th National Development Plan 2022–2026 (Ministry of National Development and Planning, 2022), incentivise the private sector to invest in food service and processed food value chains to spur the economy.

> *"The government will promote the development and operationalisation of multi-facility economic zones and industrial parks including through the provision of appropriate incentives. The value chains that will be prioritised include processed foods"* (Section 5.4.3, p. 36, 8th Development Plan).

While public health safeguards are acknowledged in the plan through commitments to strengthen health systems and operationalisation of the Food and Nutrition Act, these measures are largely government-centric and do not impose mandatory compliance obligations for the food industry. Stakeholders re-echoed the pro-private sector policies without explicit public health safeguards, and how combined with widespread low levels of food literacy among the public, these policies are driving unhealthy dietary transitions.

> *"We are trying to attract foreign investors" and "the industry would not want to be controlled, it is a liberal economy", KII3 representing national government agency and KII 12 representing CSO.*

As an alternative, current nutritional policy framework including the latest Food and Nutrition Act 2020 (Government of Republic Zambia, 2020), School Nutrition and Health guidelines 2020 (Ministry of Education Zambia, 2020), and Food Systems Transformation Pathway, the road to 2030 (Office of the Vice President, 2021) is primarily concentrated on improving public nutritional literacy. This was emphasised as the most practical approach (enact demand for healthier choices) to influence private sector practices in the prevailing context.

> *"The key thing to minimise getting those exposures, it's actually nutritional education, now that is where the focus is", "I don't think we should have policies to stop supermarkets from, don't put this here, put it at the back of the store. But rather give the people information to make informed decisions. So, there's nothing like that coming up in Zambia for now", KII 3 representing national government agency.*

However, education policies lacked clear strategies to address nutrition illiteracy among professionals, the public, and the food industry. The current policy has a focus on; (1) professional development in prevention and management of nutrition related NCDs across all education levels (MOH Zambia, 2006, 2013; Office of the Vice President, 2021) and, (2) public nutrition education campaigns (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of Education Zambia, 2020; Ministry of National Development and Planning, 2022; MOH Zambia, 2006, 2013; NFNC, 2019; Office of the Vice President, 2021). Yet, stakeholders opinionated that implementation has been slow; there is still limited university programmes in nutrition science creating a shortage of qualified experts, weakening local governments' capacity.

> *"Some time back in this country, nutrition was only at diploma level, only offered at the Natural Resources Development College (NRDC), and so some districts have got officers who don't have nutrition qualifications". KII7, representing provincial ministry.*

Public nutrition education is still focused on undernutrition and rural areas. Meanwhile, the food industry operates without mandatory training on nutritional standards or ethical marketing, prioritising profit-driven production of energy-dense, nutrient-poor foods.

> *"All along nutrition was more of under nutrition, until last 10 years, it was just under nutrition. Now we are saying we are having problems of overweight, we should strengthen" KII5 representing national government agency.*

The absence of explicit regulations has unintentionally accelerated obesogenic transitions in the food environment. A remarkably rapid growth of investments in unhealthy processed foods and fast-food outlets which has increased availability and accessibility to unhealthy foods across urban Zambia over the last decade was noted.

> *"Fast food outlets have really penetrated the communities, you wake up, it's the first smell you get" and "10 years ago, you would*

> *have to move to find a restaurant serving chicken and chips, but now it's at every corner", KII 1 and 15 representing a UN agency and CSO, respectively.*

There is an increased aggressive unhealthy food marketing targeting mostly children. Main advertising channels comprise billboards in key locations including school neighbourhoods, food placements in prominent locations in supermarkets, and celebrity social media adverts, as well as on electronic media (TV and Radio) during prime time.

> *"Actually, they use the wall fence of the schools to advertise". "It's worse on social media and there the celebrities show it's good life, eating all these unhealthy foods" KII 1 and12 representing a UN agency and CSO, respectively.*

Aggressive marketing or advertising is propagating social cultural misconceptions depicting unhealthy food choices as fashionable and healthy. As a result, consumption of fast and processed foods has become trendy among young people.

> *"It's fashionable for the young ones to go for the fast foods" and "if you are a high-level person you want to eat pizza, chicken and KFC and all those". KII5 and13 representing national government agency and provincial ministry.*

To bridge the policy gaps, stakeholders opinionated four strategies that do not ban but encourage innovations towards healthier choices including: (1) a multi-tiered policy framework integrating education reforms, workforce development, and public engagement. Accredited university programmes in nutrition science and dietetics, co-developed with global experts to equip professionals with skills to manage nutrition transitions, and refresher courses tailored for policymakers and implementers were suggested. Concurrently, embedding nutritionists within local government structures, under the Public Health Department, to institutionalise evidence-based policy implementation and public nutrition education leveraging community networks, digital platforms, and influencers were proposed. (2) Reinforcing school food environment regulations through; integrating FBDGs into school curriculum, and zoning laws to restrict advertising and establishment of unhealthy food vendors within a designated radius around schools and health centres. To incentivise compliance, it was suggested that local councils should lower the cost of advertising and establishment of healthy foods within school and health centre environments.

> *"Regulating the level of advertising of unhealthy foods, like I was talking about a big billboard, maybe you limit the premises where it can be advertised", and "also apart from the tuck shop, the school environment is littered with all the vendors. They should be strict instructions that whoever is selling, must be selling this profile of foods", KII 1 and 5 representing a UN agency and national government agency, respectively.*

(3) the recommendation to "scale-up FOPL innovations"(Office of the Vice President, 2021) was reinforced. Intentional engagement with the private sector was advocated to aid operationalisation of the GFL pilot scheme. Likewise, participants saw an opportunity in adopting nudging guidelines to implore supermarkets to include seasonal indigenous and nutrient-dense food offers in prominent locations such as checkout counters and eye-level shelves. (4) incentivizing "Matebeto" restaurants offering nutrient-dense indigenous menus, whose popularity has picked up among the urban upper social class was highlighted as a potential catalyst to rebrand indigenous foods.

> *"Of late, the middle- and high-income people, go to the Matebeto for traditional food. So, if we can encourage Matebeto, a deliberate policy, to promote that as a way of promoting healthy food, KII 6 representing research institutions.*

3.2 Low food supply diversity amidst monocultural and export oriented agricultural policies

Stakeholders outcried an increasingly low food supply diversity due to monocultural policies. To boost food security and the national economy through improved export revenues, agricultural policies have consistently prioritised maize monoculture and export-oriented crop systems (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; Office of the Vice President, 2021). There is increased emphasis on soyabean production but as an export commodity for animal feeds, and minimal investments towards value-addition technology to transform soya into an affordable nutrient-dense protein source for local consumption. Seed companies have limited impetus to diversify investments in unprioritized nutrient-dense indigenous foods, creating availability gaps in inputs. Agricultural policies were discussed to be key drivers of limited food diversity and prevailing dietary patterns.

> *"Biggest dietary change came with the agricultural reforms, we invest very huge funds, on one crop, and that has translated into the kitchen, you find that probably it's the three types of food every day" KII 4, representing CSO.*

As a policy response, agricultural diversification investments have been re-emphasised across several periodic policy documents since 2006; however, implementation remains a big challenge (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; MOH Zambia, 2006; NFNC, 2019; Office of the Vice President, 2021). Recently, the Zambia "Food System Transformation Pathway, Road to 2030", has re-emphasised the need to align agricultural systems to Zambia's FBDGs (Office of the Vice President, 2021). However, the 2025 Comprehensive Agriculture Transformation Program (CATSP) and 8th National Development Plan (Ministry of National Development and Planning, 2022), unintentionally contradicts the transformation pathways; for example, limited priority is given to fruit and vegetable systems. Maize and soyabean monocultural and export crop systems are still prioritised, signifying competing interests and uncoordinated actions.

The two conflicting policies are unintentionally creating negative externalities in availability and desirability domains of the food environment. Farmers are increasingly focusing on exotic fruits and vegetables for export, indirectly neglecting cheaper nutrient-dense indigenous foods. Stakeholders noted an increased availability of refined maize meal and cooking oil, alongside a persistently decreasing diversity of healthy foods, particularly fruits, animal-based protein, and vegetables. Indigenous fruits are only available on seasonal

basis, translating to a heavy dependence on expensive imports from South Africa.

> *"Now we're just coming off a mango season, the mangoes are no longer there. What fruits are people eating? Nothing. But when you go in supermarket, you find apples, pears, but how affordable is it for an ordinary Zambian family?" KII 4 representing CSO.*

Across the desirability domain, a trend of cultural norms associating exotic foods with high social class and formal education were noted to be arising. Indigenous foods are considered inferior to exotic foods, and this happens across the entire food chain, accelerating the erosion of indigenous crop varieties. The agricultural system, in efforts to boost exports, prioritises exotic and high value foods. This results in supermarkets offering fewer indigenous foods, and prioritising "exotic" foods.

> *"There is an indigenous fruit, I found it in supermarket, when I brought them to the checkout, the guys asked me, oh, why are you buying this? In fact, these are not supposed to be in the supermarket, they should be outside there", KII 6, representing research institutions.*

Aligning incentive systems and public expenditure to FBDGs to attract private sector investments in diversification systems was considered a potential opportunity to bridge the policy gaps. Suggested components to incentivise included biofortification innovations, aquaculture, and agricultural and postharvest systems for fruits and vegetables. Financial incentives such as interest-free loans or subsidises for smallholder farmers investing in fruit systems were suggested.

> *"There's this whole development of the cold chain strategies for caving in the losses in horticultural products. So, there's a room for private sector to venture into the cold chain sector", KII 12 representing CSO.*

Government led procurement standards that prioritise indigenous foods in public institutions and events was discussed as an opportunity to revert social-cultural misconceptions. Co-creating standards with the food service sector based on FBDGs was recommended.

3.3 Low investments in wet markets in the context of supermarket growth

Wet markets are an important affordable food source, particularly for indigenous fruits and vegetables for the urban poor. However, wet markets suffer infrastructural deficits including cold chain facilities and consequently food safety challenges. Over the last two decades, policies have emphasised commitments to improve food distribution networks, particularly construction and maintenance of wet markets including installing innovative cold chain technologies (Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock, 2016; Ministry of National Development and Planning, 2022; MOH Zambia, 2006; Office of the Vice President, 2021). But infrastructure investments were noted to be still minimal and misaligned.

> *"Soweto, it's congested, there hasn't been a lot of effort to put up better infrastructure" and "You enter a market, and it is not hygienic, you are not drawn to buy there", KII 15 and 8, representing CSO.*

Stakeholders thought policy response efforts to improve wet market infrastructure have not been enough and where implementation has happened, utilisation has been minimal due to lack of community ownership. The major contextual challenge raised is that most market infrastructure projects are a political response rather than well researched systematic plans.

> *"Pronouncements have been there, but to translate the pronouncement into practicality, has been a challenge. Most of them are literally political, it's not something, the system sits to plan. So, you'll see that the kind of infrastructure that is there just responding to a response", KII 2, representing Lusaka local government.*

Slow and low investments in wet market infrastructure were discussed to be undermining access to affordable, safe, and healthy foods, especially among the urban poor, creating a public shift towards the fast-emerging supermarkets, perceived to offer higher food safety assurance. Coupled with an evolving attention to food safety albeit the centrality of affordability as a key food choice driver, participants noted a growing shift towards use of supermarkets as financial status improves.

> *"We got attracted to foreign well packaged products, people start shifting, trusting particular suppliers, maybe because of the way they package, they are smart, they are clean", KII 13 representing provincial ministry.*

Of concern was that supermarkets were noted to heavily promote energy-dense nutrient poor ultra processed foods, with limited, often exotic fresh offers. Public-private partnerships to formalise and modernise wet market infrastructures through prioritising community co-designed solutions was enlisted as an opportunity to explore and re-align the retail system. Co-designed wet market upgrades were hypothesised as a solution to contextual barrier of limited community ownership, ensuring relevance and sustainability.

> *"My suggestion is, we don't change the business model of the community but putting commensurate infrastructure that will accommodate their business model, that is very critical", KII 2, representing Lusaka local government.*

3.4 Fragmented and uncoordinated government actions: vitamin a sugar fortification policy paradox

Fragmented contradictory policy strategies due to fragmented coordination across ministries and agencies, operating in silos with conflicting priorities and resource allocation was a big concern among stakeholders. Fragmentation was elucidated to perpetuate un-coordinated strategies devoid of effectiveness considering the need for a holistic approach due to complexity of the food system. The Vitamin A sugar fortification policy paradox (e.g., fortifying a potentially obesogenic food) was raised as an example of a fragmented government action.

As a policy response, policy frameworks such as 2020 Food and Nutrition Act (Government of Zambia, 2019) stipulate establishment of multisectoral collaboration forum (established a coordinating committee consisting of members from 12 cross-cutting ministries and academia) to oversee nutritional policy formulation and implementation. However, weak enforcement mechanisms, underfunded mandates, and overlapping jurisdictions were noted to negatively impact implementation.

Fragmented actions like vitamin A sugar fortification policy paradox were opined as a potential to create obesogenic impacts on the food environment. Participants perceived that, the policy could be unintentionally, positioning sugar as a health product among the public.

> *"As we are saying, don't eat too much sugar, you're bringing vitamin A and putting it here which you are saying, itself should be minimised, so you are contradicting, but the good news, we are revamping the fortification alliance, the alliance should advise government", KII 5, representing national government ministry.*

4 Discussion

Overall, our findings demonstrate that fragmented and sometimes conflicting policy priorities across agriculture, health, urban development, education, and food systems may be contributing to an increasingly unhealthy food environment in Zambia, alongside broader socioeconomic, commercial, and sociocultural changes. These dynamics appear to influence the availability, accessibility, marketing, and desirability of foods, with implications for multiple forms of malnutrition, including obesity, undernutrition, and micronutrient deficiencies.

Maize-centred and export-oriented systems are constraining food diversity and affordability of healthier options, while investment-driven economic incentives operating in the absence of explicit regulatory frameworks across the food service and processed food industry favour expansion of unhealthy over healthier products. These broader structural and governance constraints not only shape market dynamics but also restructure and reinforce social-cultural preferences of unhealthy dietary behaviours. For example, aggressive and largely unregulated marketing, particularly targeting children and adolescents, may reinforce socio-cultural misconceptions depicting unhealthy food choices as fashionable or associated with higher social status (World Health Organization, 2023). Such evolving social norms present important challenges, given the strong influences of socio-cultural factors on food systems and dietary behaviours in SSA contexts (Osei-Kwasi et al., 2021; Yiga et al., 2020; Yiga et al., 2021). Evidence from Zambia similarly shows increasing desirability, consumption and association of unhealthy foods with higher social status (Harris et al., 2019; Mukanu et al., 2021; 2022a, 2022b; World Food Programme, National Food and Nutrition Commission, 2022). Collectively, the presented case studies, highlight the complexities of food environment policy making and implementation within SSA contexts and raise several critical questions: (1) how can competing health and economic priorities be balanced to address unhealthy food environment transitions? (3) how can evolving food retail systems be leveraged to improve equitable access to healthier food options in resource constrained settings? and (4) which policy strategies are most feasible in the short, medium, and long-term given the prevailing constraints? We reflect on these questions and identify pathways for addressing these interconnected challenges.

4.1 Governance constraints amidst competing health and economic priorities

Across SSA, the implementation of structural food environment regulations remains challenging due to the intricacy of balancing public health objectives with economic growth imperatives (Glatzel et al., 2024; Laar et al., 2022; Reardon et al., 2021). Governments often have limited leverage over the food industry, which is widely regarded as a key contributor to employment and economic expansion. Because the economic returns of public health investments are typically indirect, harder to quantify, and less immediately observable, public health priorities are frequently deprioritised. Although similar tensions exist in high-income countries (HIC), SSA food-environment policy strategies may benefit from more coordinated approaches that support healthy food choices through contextually appropriate regulations and incentives. However, implementation of such approaches is often constrained by limited deliberate public–private engagement to align health and economic objectives, as well as internal governance challenges within public institutions that result in fragmented and uncoordinated policy responses (Ameye et al., 2025). For example, different sectors operate under distinct institutional mandates and incentive structures, with agriculture prioritising food security and exports, finance sector focused on attracting investment, while health sectors emphasise prevention of under nutrition. In the absence of strong cross-sectoral accountability mechanisms, these competing priorities may contribute to policy incoherence and fragmented implementation.

Emerging evidence suggests that early and transparent engagement with the private sector can facilitate consensus-building around shared objectives and acceptable incentive structures (Reardon et al., 2021). Phased and negotiated transitions towards more robust structural regulations may therefore improve public health outcomes without undermining economic growth. Overall, effective adoption and implementation of food-environment policies in SSA will require proactive, transparent collaboration with the private sector, underpinned by strong governance capacity and coordinated cross-sectoral public institutions. However, as in many HICs, fragmented governance remains a major barrier across SSA (Ameye et al., 2025). Nutrition challenges are often narrowly framed as health sector issues rather than broader societal concerns, limiting coordinated policy action. Lessons from the COVID-19 pandemic demonstrate that framing systemic challenges as affecting multiple sectors and population groups can strengthen political commitment and enable timely, collaborative responses. Similarly, ongoing unhealthy food-environment transitions in SSA may be more effectively addressed when framed as shared challenges linked to health, economic productivity, education, child development, equity, and environmental sustainability. To support this shift, governments may need to accelerate the development of incentive-based institutional frameworks that align stakeholder priorities and reduce the perceived costs of cross-sectoral collaboration. A high-level nutrition champion could play a central

role in coordinating stakeholders and developing strategies that clearly define roles, responsibilities, and shared performance indicators. Such a coordination approach could foster a more coherent policy environment for engaging the private sector. In Zambia, this approach could enable the reassessment of existing policies such as vitamin A sugar fortification, sugar taxation, and monocultural agricultural strategies in favour of more balanced, cross-sectoral approaches. For instance, tensions between health and manufacturing priorities have been identified as contributing to the adoption of a relatively weak sugar-sweetened beverage tax (Mukanu et al., 2021). Concurrently, greater emphasis could be placed on "double-duty" (bio)fortification strategies that do not exacerbate obesogenic risks, including provitamin A maize, cassava, and fortified flours etc.

While further research is needed to identify effective models of private sector engagement in SSA, immediate lessons can be drawn from regional countries such as South Africa and Ethiopia, which have recently introduced structural food environment policies. Additional insights may also be gained from regional experience with regulating breast-milk substitutes and tobacco during periods of rapid industry expansion.

4.2 Changing food retail systems: a challenge but also opportunity for safe affordable healthier choices

The expansion of supermarkets alongside persistent deficiencies in wet-market infrastructure is reshaping food access and availability across several SSA settings (Holdsworth and Landais, 2019; Reardon et al., 2021). In Zambia, Lusaka experienced a 500% increase in the number of supermarkets between 2004 and 2020 (from 9 to 54), compared with only a 25% increase in wet markets (from 52 to 65) over the same period (Blekking et al., 2023). Driven by regulatory convenience and economic development framing, urban food-system modernisation agendas in SSA have tended to prioritise super-marketisation over investment in wet-market infrastructure (Battersby and Muwowo, 2018; Hannah et al., 2022). Evidence from urban SSA contexts shows a positive association between wet market expenditures and healthy food purchases whereas supermarket spending is linked to greater consumption of unhealthy foods and higher obesity risk (Hannah et al., 2022). If this trajectory continues, ongoing shifts in retail systems may further undermine access to affordable, safe, and nutritious foods, particularly for the urban poor (Battersby, 2017; Battersby and Muwowo, 2018; Hannah et al., 2022). Hence, two key challenges emerge from this transition. First is the need for a supportive policy environment to reorganise and strengthen wet-market infrastructure and regulatory governance. Second is the need to orient supermarkets toward increasing the availability of healthy, sustainable, and affordable food choices. A coordinated hybrid approach that combines supermarket expansion with deliberate investment in wet-market upgrading may be more equitable and nutrition sensitive, as wet markets remain key source of affordable, healthier foods and livelihoods for the urban poor (Battersby and Muwowo, 2018; Hannah et al., 2022). Even with the absence of guiding regulations, supermarkets currently provide organised supply chains with established food safety and traceability mechanisms (Hannah et al., 2022). With appropriately designed and context-sensitive retail policies, both wet markets and supermarkets could play complementary roles in supporting healthier and more sustainable food environments in SSA settings (Asante et al., 2020).

4.3 How feasible are the suggested strategies to bridge policy gaps in Zambia and SSA'S context at large?

Evidence largely from HICs shows that carefully crafted, contextualised policies, regulations and incentive structures are potential levers to build a healthy and sustainable food environment. However, like most SSA settings (Glatzel et al., 2024), our findings show a lack of well-coordinated policy strategies in Zambia's context. Given the complexity and interrelatedness of the identified policy gaps and determinants, a holistic package of "double-duty, do-no-harm" strategies, across the socio-ecological framework levels, is warranted (Hawkes et al., 2020). Nevertheless, within the prevailing constraints and based on evidence from LMICs, different strategies are likely to vary in their implementation feasibility.

In the short term, bottom-up approaches that prioritise nutrition transition focused lifestyle interventions to address intra-individual determinants and sociocultural misconceptions may be more feasible due to their relatively lower implementation costs (Osei-Kwasi et al., 2021; Yiga et al., 2023). However, scaling up such interventions, particularly in urban settings, remains challenging in SSA. Existing community platforms, including religious institutions and wet markets, alongside digital platforms and strategic use of local influencers, represent potentially scalable implementation channels (Glatzel et al., 2024; Yiga et al., 2023). Despite their relevance in addressing persistent intra-individual and sociocultural barriers, lifestyle nutrition education-based interventions alone are unlikely to achieve sustained impact. Evidence suggests that they must be complemented by structural changes within the food environment (Glatzel et al., 2024; Harris et al., 2019; Laar et al., 2022; Reardon et al., 2021; Yiga et al., 2023; Hawkes et al., 2020). A phased approach that combines feasible short-term educational strategies with progressively strengthened structural interventions may therefore offer a more realistic and impactful pathway in resource-constrained settings.

Structural strategies such as fiscal measures, food reformulation, front-of-pack labelling (FOPL), and retail standards are likely to have greater population level impact but may be more feasible over the longer term (Laar et al., 2022; Ameye et al., 2025). These strategies require deliberate and sustained engagement between governments and the private sector. Given the central role of the private sector as an economic driver, and the resulting sensitivity around regulatory reforms, progress on these structural fronts will likely be gradual. In addition, establishing effective governance coordination platforms that bring together multiple stakeholders to build trust, legitimacy, and shared commitments may require significant time and institutional capacity investments. Limited and mixed evidence on the effectiveness of these strategies in LMIC settings may further slow policy uptake in SSA (Laar et al., 2022; Ameye et al., 2025).

Feasibility is therefore likely to depend on policy design and implementation approach. Strategies that encourage innovation rather than impose outright bans may be more politically acceptable and operationally feasible. For example, fiscal measures that combine subsidies for healthier foods with taxes on foods high in fat, salt, and sugar can incentivise product reformulation while enabling

supply chains to promote healthier options in competition with aggressively marketed unhealthy products (Pineda et al., 2024). Similarly, codesigned voluntary reformulation targets for salt, sugar, and trans fats supported by incentives such as tax rebates for compliance or for healthier product lines may encourage early industry action before a transition to mandatory standards.

With appropriate contextual adaptation, FOPL and in-store healthy-food nudging strategies also present potentially feasible policy levers (Laar et al., 2022). However, evidence from LMICs remains limited, and findings from HICs are mixed, particularly regarding the behavioural effects of FOPL (Courbet et al., 2024; Shangguan et al., 2019). Notwithstanding this variability, experiences from South Africa and Mexico where "high in" warning labels for sugar, salt, and trans fats have shown promising effects on consumer choices underscore the potential relevance of these approaches in SSA contexts (Bopape et al., 2021). This highlights the need for context-specific research in Zambia to determine whether promoting healthier options through guideline-based labels, discouraging unhealthy purchases via warning labels, or adopting a hybrid system would be most effective. Moreover, evidence largely from HICs suggests that FOPL can stimulate product reformulation toward healthier profiles. Beyond labelling, behavioural nudges that modify choice architecture within retail environments such as placing healthier foods adjacent to popular but less healthy options in prominent store locations have been shown to increase healthier food purchases (Durao et al., 2024; Samad et al., 2024). While these interventions may be incremental, their relatively low implementation costs and compatibility with existing retail systems suggest potential feasibility as part of a phased, long-term structural strategy package.

This study analyses the policy gaps, their critical role in undesirable transitions in the food environment, and potential strategies to address the policy gaps. Using an adapted theoretical framework that integrates the food environment framework with multiple streams theory enabled a clear and comprehensive understanding of both food environment transitions and the policy processes shaping them. The food environment framework systematically highlighted where and how unhealthy dietary changes are occurring across key domains, while the multiple streams theory revealed persistent policy delays, fragmentation, and inconsistencies within and beyond the health sector. Linking these complementary perspectives revealed important policy interactions, trade-offs, competing sectoral priorities, and contradictions within and across sectors. Overall, this integrative approach offers a stronger explanation of how political institutional dynamics and structural food system drivers jointly influence the food environment and nutrition outcomes in LMIC settings. While the analysis highlights key structural challenges, further and rigorous research investigations, especially quantitative evaluation studies, are needed to test the proposed interventions and inform policy with definitive impact assessments.

5 Conclusion

The food environment in Zambia is increasingly becoming unhealthy, largely attributable to regulatory gaps in managing these unhealthy transitions and contradictions across agri-nutritional policies with regards to diversification. These gaps are likely to perpetuate unhealthy dietary transitions across all socio-economic demographics independent of income profiles. The current policy landscape and perceptions among policy makers emphasize a focus on public nutrition education approaches, to force industry into fundamental changes. However, a combination with structural approaches encompassing key dialogues with the private sector, inter-sectoral coordination and cultural norms, is essential to address these nutritional policy complexities in Zambia. The policy strategies suggested in this study represent a comprehensive package of interventions with buy-in from key stakeholders. Rigorous implementation research is needed to explore their contextual suitability and effectiveness.

Data availability statement

The datasets used and/or analysed during the current study are available from the corresponding author upon reasonable request.

Ethics statement

The study was approved by Research Ethics committee of University of Zambia (reference number 2023-June-022) and University of Leeds REC of Business, Environment, Social Sciences (AREA FREC) (reference number 1011). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

PY: Conceptualization, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. SW: Conceptualization, Formal analysis, Funding acquisition, Methodology, Supervision, Writing – review & editing. PT: Writing – review & editing. CC: Data curation, Writing – review & editing. AM: Data curation, Writing – review & editing. CK: Writing – review & editing. PK: Data curation, Writing – review & editing. TM: Data curation, Writing – review & editing. CS: Conceptualization, Writing – review & editing. WC: Data curation, Writing – review & editing. YG: Conceptualization, Formal analysis, Funding acquisition, Methodology, Supervision, Writing – review & editing.

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References

Abrahams, Z., McHiza, Z., and Steyn, N. P. (2011). Diet and mortality rates in sub-Saharan Africa: stages in the nutrition transition. *BMC Public Health* 11:801. doi: 10.1186/1471-2458-11-801

Ameye, H., Hülsen, V., Glatzel, K., Laar, A., and Qaim, M. (2025). Urbanizing food environments in Africa: challenges and opportunities for improving accessibility, affordability, convenience, and desirability of healthy diets. *Food Policy* 137:102981. doi: 10.1016/j.foodpol.2025.102981

Asante, L. A. (2020). Urban governance in Ghana: the participation of traders in the redevelopment of Kotokuraba market in Cape Coast. *Afr. Geogr. Rev.* 39, 361–378. doi: 10.1080/19376812.2020.1726193

Battersby, J. (2017). Food system transformation in the absence of food system planning: the case of supermarket and shopping mall retail expansion in Cape Town, South Africa. *Built Environ.* 43, 417–430. doi: 10.2148/benv.43.3.417

Battersby, J., and Muwowo, F. (2018). "Planning and governance of food systems in Kitwe, Zambia: a case study of food retail space," in *Urban Food Systems Governance and Poverty in African Cities*, eds. J. Battersby and V. Watson (London: Routledge), 128–140.

Béland, D., and Howlett, M. (2016). *The role and impact of the multiple-Streams Approach in Comparative Policy Analysis*. London: Taylor and Francis, 221–227.

Blekking, J., Waldman, K., Davies, J., Kaputula, M., Nelson, E., and Robeson, S. M. (2023). Rapid urbanization and uneven development of the food retail environment. *Geoforum* 147:103893. doi: 10.1016/j.geoforum.2023.103893

Bopape, M., Taillie, L. S., Frank, T., Murukutla, N., Cotter, T., Majija, L., et al. (2021). South African consumers' perceptions of front-of-package warning labels on unhealthy foods and drinks. *PLoS One* 16:e0257626. doi: 10.1371/journal.pone.0257626

Courbet, D., Jacquemier, L., Hercberg, S., Touvier, M., Sarda, B., Kesse-Guyot, E., et al. (2024). A randomized controlled trial to test the effects of displaying the Nutri-score in food advertising on consumer perceptions and intentions to purchase and consume. *Int. J. Behav. Nutr. Phys. Act.* 21:38. doi: 10.1186/s12966-024-01588-5

Cuthbertson, D. J., and Wilding, J. P. (2021). Metabolically healthy obesity: time for a change of heart? *Nat. Rev. Endocrinol.* 22, 1–2. doi: 10.1038/s41574-021-00537-7

Després, J.-P. (2012). Body fat distribution and risk of cardiovascular disease: an update. *Circulation* 126, 1301–1313. doi: 10.1161/CIRCULATIONAHA.111.067264

Durao, S., Wilkinson, M., Davids, E. L., Gerritsen, A., and Kredo, T. (2024). Effects of policies or interventions that influence the school food environment on children's health and nonhealth outcomes: a systematic review. *Nutr. Rev.* 82, 332–360. doi: 10.1093/nutrit/nuad059

Elo, S., and Kyngäs, H. (2008). The qualitative content analysis process. *J. Adv. Nurs.* 62, 107–115.

Food and Agricultural Organization (2016). *Food and Agriculture Organisation of the United Nations*. Rome: FAO.

Glatzel, K., Ameye, H., Hülsen, V., and Qaim, M. (2024). *Changing Food Environments in Africa's urban and peri-urban Areas: Implications for Diets, Nutrition, and Policy (No. 235)*. Lusaka: ZEF Working Paper Series.

Government of Republic Zambia (2020). *Food and Nutrition Act*. Lusaka: Government of the Republic of Zambia.

Government of Zambia (2019). *Food Safety Act*. Lusaka: Government of the Republic of Zambia.

Hannah, C., Davies, J., Green, R., Zimmer, A., Anderson, P., Battersby, J., et al. (2022). Persistence of open-air markets in the food systems of Africa's secondary cities. *Cities* 124:103608. doi: 10.1016/j.cities.2022.103608

Harris, J., Chisanga, B., Drimie, S., and Kennedy, G. (2019). Nutrition transition in Zambia: changing food supply, food prices, household consumption, diet and nutrition outcomes. *Food Secur.* 11, 371–387. doi: 10.1007/s12571-019-00903-4

Hawkes, C., Ruel, M. T., Salm, L., Sinclair, B., and Branca, F. (2020). Double-duty actions: seizing programme and policy opportunities to address malnutrition in all its forms. *Lancet* 395, 142–155. doi: 10.1016/S0140-6736(19)32506-1

Hennink, M. M., Kaiser, B. N., and Marconi, V. C. (2017). Code saturation versus meaning saturation: how many interviews are enough? *Qual. Health Res.* 27, 591–608. doi: 10.1177/1049732316665344

Holdsworth, M., and Landais, E. (2019). Urban food environments in Africa: implications for policy and research. *Proc. Nutr. Soc.* 78, 513–525. doi: 10.1017/S0029665118002938

International Diabetes Federation (2021). *IDF Diabetes Atlas Tenth Edition, 2021*. Brussels, Belgium: International Diabetes Federation.

Laar, A. K., Addo, P., Aryeetey, R., Agyemang, C., Zotor, F., Asiki, G., et al. (2022). Perspective: food environment research priorities for Africa—lessons from the Africa food environment research network. *Adv. Nutr.* 13, 739–747. doi: 10.1093/advances/nmac019

Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock (2016). *Second National Agriculture Policy*. Lusaka: Ministry of Agriculture Zambia and Ministry of Fisheries and Livestock.

Ministry of Agriculture Zambia, National Food and Nutrition Commission, Food and Agricultural Organisation (2021). *Zambia Food-Based Dietary Guidelines Technical Recommendations*. Lusaka: Ministry of Agriculture Zambia, National Food and Nutrition Commission, Food and Agricultural Organisation.

Ministry of Education Zambia (2020). *Guidelines for Implementing School Health and Nutrition Programme Activities*. Lusaka: Government of the Republic of Zambia.

Ministry of National Development and Planning. (2022). Eight National Development Plan 2022–2026. Lusaka: Ministry of National Development and planning Zambia.

MOH Zambia (2006). *The National Food and Nutrition Policy*. Lusaka: Ministry of Health Zambia.

MOH Zambia (2013). *Zambian Strategic plan 2013–2016 Non-Communicable Diseases and thier risk Factors*. Lusaka: Ministry of Health Zambia.

MOH Zambia (2017). *Non-Communicable Disease Risk Factor Baseline Survey Report*. Lusaka: Ministry of Health Zambia, World Diabetes Foundation.

Mukanu, M. M., Abdool Karim, S., Hofman, K., Erzse, A., and Thow, A. M. (2021). Nutrition related non-communicable diseases and sugar sweetened beverage policies: a landscape analysis in Zambia. *Glob. Health Action* 14:1872172. doi: 10.1080/16549716.2021.1872172

Mukanu, M. M., Delobelle, P., Thow, A. M., and Mchiza, Z. J. R. (2022a). Determinants of dietary patterns in school going adolescents in urban Zambia. *Front. Nutr.* 9:956109. doi: 10.3389/fnut.2022.956109

Mukanu, M. M., Mchiza, Z. J.-R., Delobelle, P., and Thow, A. M. (2023). Nutrition policy reforms to address the double burden of malnutrition in Zambia: a prospective policy analysis. *Health Policy Plan.* 38, 926–938. doi: 10.1093/heapol/czad053

Mukanu, M. M., Thow, A. M., Delobelle, P., and Mchiza, Z. J.-R. (2022b). School food environment in urban Zambia: a qualitative analysis of drivers of adolescent food choices and their policy implications. *Int. J. Environ. Res. Public Health* 19:7460. doi: 10.3390/ijerph19127460

NFNC (2019). *National Food and Nutrition Strategic Plan 2017 to 2021. Towards Eliminating all Forms of Malnutrition across the Zambian Population by 2030*. Lusaka: National Food and Nutrition Commission, Ministry of Health Zambia.

Office of the Vice President (2021). Zambia food systems transformation pathway, the road to 2030. Available online at: https://www.unfoodsystemshub.org/docs/unfoodsystemslibraries/national-pathways/zambia/2023-07-21-zambia-national-pathway---english.pdf?sfvrsn=d16e0333_1 (accessed July 21, 2023).

Osei-Kwasi, H. A., Laar, A., Zotor, F., Pradeilles, R., Aryeetey, R., Green, M., et al. (2021). The African urban food environment framework for creating healthy nutrition policy and interventions in urban Africa. *PLoS One* 16:e0249621. doi: 10.1371/journal.pone.0249621

Phelps, N. H., Singleton, R. K., Zhou, B., Heap, R. A., Mishra, A., Bennett, J. E., et al. (2024). Worldwide trends in underweight and obesity from 1990 to 2022: a pooled analysis of 3663 population-representative studies with 222 million children, adolescents, and adults. *Lancet* 403, 1027–1050. doi: 10.1016/S0140-6736(23)02750-2

Pineda, E., Gressier, M., Li, D., Brown, T., Mounsey, S., Olney, J., et al. (2024). Effectiveness and policy implications of health taxes on foods high in fat, salt, and sugar. *Food Policy* 123:102599. doi: 10.1016/j.foodpol.2024.102599

Popkin, B. M. (2002). The shift in stages of the nutrition transition in the developing world differs from past experiences! *Public Health Nutr.* 5, 205–214. doi: 10.1079/PHN2001295

Reardon, T., Tschirley, D., Liverpool-Tasie, L. S. O., Awokuse, T., Fanzo, J., Minten, B., et al. (2021). The processed food revolution in African food systems and the double burden of malnutrition. *Glob. Food Secur.* 28:100466. doi: 10.1016/j.gfs.2020.100466

Samad, N., Bearne, L., Noor, F. M., Akter, F., and Parmar, D. (2024). School-based healthy eating interventions for adolescents aged 10–19 years: an umbrella review. *Int. J. Behav. Nutr. Phys. Act.* 21:117. doi: 10.1186/s12966-024-01668-6

Shangguan, S., Afshin, A., Shulkin, M., Ma, W., Marsden, D., Smith, J., et al. (2019). A meta-analysis of food labeling effects on consumer diet behaviors and industry practices. *Am. J. Prev. Med.* 56, 300–314. doi: 10.1016/j.amepre.2018.09.024

Swinburn, B., Sacks, G., Vandevijvere, S., Kumanyika, S., Lobstein, T., and Neal, B. (2013). INFORMAS (International Network for Food and Obesity/non-communicable diseases Research, Monitoring and action Support): overview and key principles. *Obes. Rev.* 14, 1–12. doi: 10.1111/obr.12087

Tong, A., Sainsbury, P., and Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int. J. Qual. Health Care* 19, 349–357. doi: 10.1093/intqhc/mzm042

Turner, C., Aggarwal, A., Walls, H., Herforth, A., Drewnowski, A., Coates, J., et al. (2018). Concepts and critical perspectives for food environment research: a global framework with implications for action in low-and middle-income countries. *Glob. Food Secur.* 18, 93–101. doi: 10.1016/j.gfs.2018.08.003

World Food Programme, National Food and Nutrition Commission (2022). *Report for the Review of the Healthy Diets Campaign in Zambia*. Rome: World Food Programme, National Food and Nutrition Commission.

World Health Organization (2002). *The World Health Report 2002: Reducing Risks, Promoting Healthy life*. Geneva: World Health Organization.

World Health Organization (2023). *Policies to protect children from the Harmful impact of Food Marketing: WHO Guideline*. Geneva: World Health Organization.

Yiga, P., Ogwok, P., Achieng, J., Auma, M. D., Seghers, J., and Matthys, C. (2021). Determinants of dietary and physical activity behaviours among women of reproductive age in urban Uganda, a qualitative study. *Public Health Nutr.* 24, 3624–3636. doi: 10.1017/S1368980020003432

Yiga, P., Seghers, J., Ogwok, P., and Matthys, C. (2020). Determinants of dietary and physical activity behaviours among women of reproductive age in urban sub-Saharan Africa: a systematic review. *Br. J. Nutr.* 124, 761–772. doi: 10.1017/S0007114520001828

Yiga, P., Van der Schueren, B., Seghers, J., Kiyimba, T., Ogwok, P., Tafiire, H., et al. (2023). Effect of a complex lifestyle intervention to optimize metabolic health among females of reproductive age in urban Uganda, a randomized controlled trial. *Am. J. Clin. Nutr.* 117, 436–443. doi: 10.1016/j.ajcnut.2022.12.005