Indigenous Foods as a Climate-Smart Nutrition Alternative: Consumption Patterns, Barriers, and Cancer-Risk Awareness among Urban Youth in Kenya

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ABSTRACT

Urbanization and dietary transition are reshaping food choices in Kenya, while climate variability and the growing burden of diet-related non-communicable diseases create a need for food strategies that are both health-promoting and environmentally resilient. Indigenous foods including traditional cereals, legumes, roots, tubers and African leafy vegetables remain important components of Kenya's food heritage but are often less visible and less convenient in urban food environments. This exploratory mixed-methods study examined consumption patterns, perceptions, barriers and cancer-risk awareness related to indigenous foods among urban youth in Nairobi. Fifty participants completed a structured cross-sectional questionnaire, and 15 participants from the survey sample provided qualitative narratives. Quantitative data were analysed using descriptive statistics, Fisher's exact tests, chi-square tests and one-way ANOVA; qualitative responses were analysed thematically and integrated with the quantitative findings. Processed and packaged foods were commonly consumed, while actual indigenous-food consumption was generally lower than respondents' positive perceptions of these foods. Sixty-two percent of respondents scored 4 or 5 on the belief scale concerning the potential of indigenous foods to reduce cancer risk. No statistically significant associations were observed between occupation and indigenous-food consumption (Fisher's exact $p = .70$), occupation and processed-food consumption ($p = 1.00$), age and indigenous-food consumption ($p = .07$), or age and processed-food consumption ($\chi^2(4, N = 50) = 0.90$, $p = .92$). Qualitative narratives identified market accessibility, cost, preparation time and social perceptions as key barriers. Climate awareness had limited direct influence on food choices. The findings suggest that the main challenge is not lack of appreciation of indigenous foods, but the structural conditions that make them less accessible and convenient in urban settings. Policy and programme responses should therefore strengthen urban availability, affordability, culinary convenience, cultural visibility and climate–nutrition education. Because the study is small and cross-sectional, the findings should be interpreted as exploratory and should not be taken as evidence that indigenous-food consumption prevents cancer.

Keywords: indigenous foods; African indigenous vegetables; urban youth; food environments; ultra-processed foods; climate-smart nutrition; cancer-risk awareness; Kenya

INTRODUCTION

Kenya is experiencing a rapid nutrition transition in which traditional food practices increasingly coexist with, and in some urban settings are displaced by, commercially prepared and ultra-processed foods. This transition is occurring alongside urbanisation, changing lifestyles and persistent inequalities in food access. Across sub-Saharan Africa, dietary change has been associated with a shift from traditional diets towards more energy-dense, commercially processed foods, contributing to the emerging double burden of malnutrition and diet-related non-communicable diseases (Abrahams et al., 2011; Vorster et al., 2011; Popkin et al., 2012). In Nairobi, food environments characterised by extensive availability of prepared foods and differences in affordability, convenience and access can shape dietary choices, particularly among populations with constrained time and resources (Downs et al., 2022).

The health implications of this transition warrant careful attention. Evidence from prospective studies has linked higher consumption of ultra-processed foods with greater risks of overall cancer and selected cancer outcomes, although the magnitude and causal interpretation of these associations remain subjects of ongoing research (Fiolet et al., 2018; Chang et al., 2023; Wang et al., 2022). More broadly, dietary patterns rich in minimally processed plant foods, whole grains, legumes, fruits and vegetables are consistently associated with healthier outcomes, while dietary patterns characterised by high energy density and low nutritional quality are associated with greater risk of several non-communicable diseases (Afshin et al., 2019; Willett et al., 2019). These findings do not mean that every processed food is harmful or that every indigenous food is inherently protective; rather, they underscore the importance of overall dietary quality, food processing, diversity and the food environment.

At the same time, climate change is placing pressure on food systems through drought, heat, rainfall variability, land degradation and other environmental stresses. Food-system responses therefore need to consider not only nutritional adequacy but also resilience, ecological sustainability, affordability and cultural acceptability (Willett et al., 2019; Fanzo et al., 2021). Indigenous and underutilised crops may contribute to these goals because many are locally adapted, culturally embedded and capable of providing dietary diversity under variable production conditions. Recent work in Kenya has highlighted the nutritional and livelihood value of African indigenous vegetables and the importance of strengthening their production, value chains and consumption (Bokelmann et al., 2022; Merchant et al., 2023; Kubitza et al., 2024). A recent review further argues that indigenous crops can contribute to climate-resilient nutrition, although post-harvest losses, limited value-chain infrastructure and inadequate investment can constrain their potential (Olarewaju et al., 2026).

Indigenous foods are also culturally meaningful. Traditional vegetables such as amaranth, African nightshade, spider plant and cowpea leaves, alongside staples such as sorghum, millet, cassava and sweet potatoes, form part of diverse food traditions across Kenya and other African countries. Their value extends beyond nutrient composition to food identity, knowledge transmission and local livelihoods (Bokelmann et al., 2022; Oniang'o et al., 2025). However, cultural appreciation does not automatically translate into regular consumption. Urban food environments can make foods that require longer preparation or are less readily available less attractive than inexpensive, ready-to-eat alternatives (Downs et al., 2022; Adundo & Annys, 2025).

This study responds to a gap at the intersection of nutrition, culture and climate resilience. Existing literature has documented African indigenous vegetables, dietary transition and food environments, but comparatively little empirical work has examined how urban youth perceive indigenous foods while simultaneously considering their actual consumption, perceived cancer-risk implications and climate-related awareness. The study therefore explores whether positive perceptions of indigenous foods translate into practice and identifies the structural and cultural barriers that may explain any gap between attitudes and behaviour.

MATERIALS AND METHODS

The study used an exploratory mixed-methods, cross-sectional design. The quantitative component described dietary practices and perceptions, while the qualitative component explored participants' experiences and explanations of those practices. The two components were integrated during interpretation so that quantitative patterns could be contextualized using participants' narratives. The target population was urban youth aged 18–35 years residing in Nairobi. The study protocol described a multi-stage stratified approach using age and occupation categories; however, recruitment was conducted primarily through youth networks, universities/colleges, workplaces and community settings, with survey links shared online. Interested individuals self-selected into the study by completing the questionnaire. Responses were screened for completeness, and duplicates were removed. The final quantitative sample comprised 50 respondents. Because recruitment was constrained by time and resources, the sample should be regarded as an exploratory convenience-based sample rather than a probability sample representative of all youth in Nairobi. Fifteen respondents from the quantitative sample were purposively selected to provide qualitative narratives, with attention to variation in participant circumstances, including students, young professionals and informal workers. The qualitative component was intended to provide depth rather than statistical representativeness.

A structured questionnaire assessed frequency of processed/packaged food consumption, frequency of indigenous-food consumption, beliefs about indigenous foods and cancer-risk reduction, and factors influencing food choice, including price, convenience and social influence. Frequency was reported per week in categories of 1–2 times, 3–4 times, or 5+ times. Beliefs about cancer-risk reduction were measured using a 5-point Linear scale (1 being "Not at all, "5 being "very likely). The questionnaire was developed from research objectives/ research questions and piloted for clarity. The qualitative component invited participants to describe their perceptions of modern and traditional diets, barriers to indigenous-food consumption, the influence of climate awareness on food choices, and changes they would like to see in urban food environments. The narratives were coded thematically by two independent reviewers, and findings were triangulated with quantitative results to highlight convergence and divergence.

To improve clarity and reproducibility, the table below describes the main indigenous and processed foods considered in the study:

Category	Examples included in the questionnaire
Indigenous foods	Sweet potatoes, Cassava, Millet, Amaranth, Cowpea leaves
Processed foods	Sweetened beverages, Packaged snacks, Chips, Samosas

The original fieldwork was conducted within a compressed two-week period, which limited the depth and breadth of recruitment.

Data analysis

Descriptive statistics were generated using Microsoft Excel. Inferential analyses were conducted in SPSS. Fisher's exact tests were used for categorical comparisons where expected cell counts were insufficient for conventional chi-square assumptions. A chi-square test was retained for age and processed-food consumption because the assumptions were considered acceptable. One-way ANOVA was used to compare mean belief scores across age and occupation groups. Effect sizes were considered alongside p-values because the sample was small and the study was exploratory. Qualitative responses were analysed thematically, focusing on recurring explanations, barriers and perceptions. Quantitative and qualitative findings were then triangulated to identify convergence, complementarity and divergence.

Ethical considerations

The manuscript reports that an ethics protocol was prepared for submission to the Maseno University Institutional Ethics Review Committee and that a NACOSTI permit application was planned; however, formal approvals had not been obtained before data collection. Informed consent was obtained from participants, confidentiality was maintained, and procedures were designed to minimise risk. Because formal approvals were not in place at the time of data collection, this issue should be transparently disclosed to any journal and addressed according to the requirements of the target journal and relevant Kenyan research regulations.

RESULTS

The 50 respondents as shown in table 1 represented several occupational groups: 38% were employed, 26% were students, 22% were unemployed or seeking work, and 14% were self-employed or business owners. This distribution provided perspectives from participants occupying different positions within Nairobi's urban food economy.

Table 1: Structure of Respondents

Occupation	Percentage
Employed	38%

Student	26%
Unemployed/seeking work	22%
Self-employed/business owner	14%

As shown on table 2, half of respondents reported consuming processed or packaged foods one to two times during the reference period, approximately one-third reported three to four occasions, and a smaller group reported five or more occasions. Indigenous-food consumption was generally concentrated in the one-to-two-times category despite generally positive perceptions of indigenous foods. This suggests an attitude–practice gap: participants may value indigenous foods without consuming them frequently.

Table 2: Occupation and processed food consumption Fisher's exact test results

Occupation	Moderate (3-4) to High (5+) processed food consumption	Low (1-2) processed food consumption
Formal (students and employed)	16	14
Informal (unemployed and self-employed)	10	10

Most respondents expressed favourable views of indigenous foods, with 62% scoring 4 or 5 on the belief scale concerning their potential to reduce cancer risk. This finding should be interpreted as a measure of perception rather than evidence of an established protective effect. The study did not measure cancer incidence, biomarkers, dietary exposure with sufficient precision, or clinical outcomes.

As shown in table 3, No statistically significant association was found between occupation and indigenous-food consumption (Fisher's exact $p = .70$; Cramér's $V = .06$) or between occupation and processed-food consumption ($p = 1.00$; Cramér's $V = .03$). Age was not significantly associated with indigenous-food consumption ($p = .07$; Cramér's $V = .23$), although participants aged 25–35 showed a descriptive tendency towards higher indigenous-food consumption than those aged 18–24. Age was also not associated with processed-food consumption ($\chi^2(4, N = 50) = 0.90$, $p = .92$; Cramér's $V = .13$).

Mean cancer-risk belief scores varied descriptively by occupation, with unemployed respondents reporting the highest mean ($M = 4.2$), followed by self-employed respondents ($M = 4.0$) and employed respondents ($M = 3.2$); however, the occupational difference was not statistically significant ($F(3,46) = 2.00$, $p = .13$, $\eta^2 = .12$). Similarly, younger respondents aged 18–25 had a lower mean belief score ($M = 3.5$) than those aged 26–30 ($M = 4.2$) and 31–35 ($M = 4.1$), but the difference was not statistically significant ($F(2,47) = 2.10$, $p = .14$, $\eta^2 = .08$).

Table 3: Inferential findings on dietary preference

Comparison	Test	Statistic	p	Interpretation
Occupation × indigenous-food consumption	Fisher's exact	—	0.7	Not significant; Cramér's V = .06
Occupation × processed-food consumption	Fisher's exact	—	1	Not significant; Cramér's V = .03
Age × indigenous-food consumption	Fisher's exact	—	0.07	Not significant; Cramér's V = .23
Age × processed-food consumption	Chi-square	$\chi^2(4)=0.90$	0.92	Not significant; Cramér's V = .13
Occupation × cancer-risk belief	ANOVA	$F(3,46)=2.00$	0.13	Not significant; $\eta^2 = .12$
Age × cancer-risk belief	ANOVA	$F(2,47)=2.10$	0.14	Not significant; $\eta^2 = .08$

Table 4 shows that participants generally described traditional foods as healthier, more nutritious and closely connected to cultural identity. Modern diets were more often characterised by convenience, sweetness and processing. Some participants did not perceive a sharp boundary between the two, reflecting the hybrid nature of urban diets. A minority preferred modern foods because they were easier to access or prepare.

Table 4: Age group and indigenous food consumption Fisher's exact test results

Age group	Moderate (3-4) to High (5+) Indigenous food consumption	Low (1-2) indigenous food consumption
18-24	13	15
25-35	15	7

Market accessibility was the most recurrent barrier. Participants reported difficulty finding indigenous foods consistently in urban markets, while cost was also identified as a constraint. Preparation time and effort further reduced their appeal relative to ready-to-eat foods. Social pressure was mentioned less frequently but reflected the perception that some modern foods are more fashionable or socially acceptable.

Most participants did not describe climate change as a direct determinant of what they ate. Some recognised indirect effects through drought, crop availability and seasonality, while a smaller number connected food choices to soil health, sustainability or perceived food quality. Overall, climate considerations were not yet integrated into everyday dietary decision-making.

Participants described urban diets as a mixture of traditional and modern foods and proposed practical ways to increase indigenous-food consumption. Suggestions included improving availability in markets and restaurants, reducing prices, increasing media visibility, and incorporating indigenous ingredients into familiar or convenient foods.

The strands of evidence converged around the importance of structural conditions. Quantitative tests found no statistically significant differences in dietary practices by age or occupation, while qualitative narratives consistently pointed to market access, affordability and preparation time. The qualitative data therefore provided a plausible explanation for why demographic differences alone were insufficient to account for dietary practices.

The findings also revealed an attitude–practice gap. Positive perceptions of indigenous foods coexisted with relatively low reported consumption. Qualitative accounts suggested that health and cultural values were insufficient to overcome barriers of convenience and availability. Climate awareness represented a second gap: respondents recognised some environmental changes but rarely incorporated climate considerations into routine food decisions. Together, these findings suggest that interventions focused only on information may have limited impact unless they also change the urban food environment.

DISCUSSION

This exploratory study examined indigenous foods as a possible bridge between healthier diets, cultural continuity and climate resilience among urban youth in Nairobi. The central finding is that participants generally valued indigenous foods, yet their reported consumption was constrained by the realities of the urban food environment. This distinction is important because dietary behaviour is not determined by knowledge or preference alone. Food prices, physical availability, convenience, time and social norms shape what people can realistically choose (Downs et al., 2022; Adundo & Annys, 2025).

The findings are consistent with the broader literature on nutrition transition in Africa. Urbanisation and economic change have contributed to shifts in dietary patterns, while traditional diets are increasingly complemented or replaced by commercially processed foods (Abrahams et al., 2011; Vorster et al., 2011). The present study adds a youth-centred Nairobi perspective by showing that positive cultural attitudes toward indigenous foods can coexist with limited routine consumption. This suggests that cultural acceptance is a useful foundation for intervention, but not a sufficient condition for dietary change.

The barriers identified by participants—especially accessibility, affordability and preparation time, are consistent with food-environment research in Nairobi. Downs et al. (2022) found that income, time, convenience and preferences influenced how residents interacted with their food environments. More recent spatial analysis similarly demonstrates differences in food diversity across Nairobi markets and highlights the importance of local food-environment conditions (Adundo & Annys, 2025). From this perspective, promoting indigenous foods requires more than awareness campaigns; it requires interventions that make those foods visible, affordable, convenient and consistently available.

The study also supports the argument that African indigenous vegetables can contribute to nutrition security when supported by appropriate production, culinary and value-chain interventions. Evidence from Western Kenya indicates that interventions combining production, culinary skills and nutrition education can improve the role of African indigenous vegetables in household food systems (Merchant et al., 2023). HORTINLEA experience further demonstrates the potential of strengthening indigenous-vegetable value chains and urban linkages (Bokelmann et al., 2022), while evidence from Kenyan smallholder systems indicates that market-oriented indigenous-vegetable production can affect livelihoods and nutrition-related outcomes (Kubitza et al., 2024).

The climate dimension requires a similarly nuanced interpretation. Indigenous foods should not automatically be labelled climate-smart simply because they are traditional. Climate-smartness depends on the crop, production system, water and input requirements, processing, transport, storage and broader environmental context. Nevertheless, indigenous crops can provide valuable options for diversification and resilience, particularly where they are adapted to local agroecological conditions. Recent synthesis identifies indigenous crops as potentially important assets for nutrition and climate resilience in sub-Saharan Africa while also highlighting post-harvest constraints (Olarewaju et al., 2026).

The cancer-risk findings require particular caution. A majority of participants believed that indigenous foods could reduce cancer risk, but the present study did not establish a causal relationship between indigenous-food consumption and cancer prevention. Evidence from prospective studies indicates that higher consumption of ultra-processed foods is associated with some cancer outcomes (Fiolet et al., 2018; Chang et al., 2023; Wang et al., 2022), but replacing those foods with a specific category of indigenous foods cannot be assumed to produce a corresponding reduction in cancer risk without direct evidence. The most defensible interpretation is that diets emphasising diverse minimally processed plant foods may align with established principles of healthy dietary patterns, while indigenous foods may be culturally appropriate vehicles for achieving greater dietary diversity.

The absence of statistically significant age and occupation effects should also be interpreted in light of the small sample. The observed effect sizes were generally small, although the age–indigenous-food association (Cramér's $V = .23$) and occupational difference in cancer-risk belief ($\eta^2 = .12$) suggest areas that could be examined in larger studies. Rather than concluding that demographic factors are irrelevant, the findings suggest that structural food-system conditions may be more immediately important than simple demographic segmentation within this exploratory sample.

Implications for policy and practice

Improve urban availability and affordability

Local governments, food-system actors and community organisations could support dedicated market spaces, producer–consumer linkages, institutional procurement and other mechanisms that improve reliable access to indigenous foods. Pricing interventions should be designed carefully and evaluated for their effects on producers as well as consumers.

Make indigenous foods convenient for urban lifestyles

Food enterprises can develop cleaned, portioned, pre-cooked or ready-to-cook indigenous-food products while maintaining food safety and nutritional quality. Restaurants, workplaces and educational institutions could also incorporate indigenous ingredients into familiar menus.

Integrate climate and nutrition education

Nutrition communication should explicitly connect food choices with climate variability, biodiversity, local food systems and resilience. The aim should not be to portray indigenous foods as universally superior, but to help young people understand how dietary diversity, minimally processed foods and locally appropriate crops can contribute to healthier and more resilient food systems.

Strengthen cultural visibility

Youth-oriented campaigns, social media, culinary demonstrations and partnerships with chefs, schools and community leaders could reposition indigenous foods as desirable, contemporary and practical rather than as symbols of deprivation or the past.

Strengthen rural–urban food-system linkages

Policies that connect smallholder producers with urban consumers can potentially support both rural livelihoods and urban food diversity. Such interventions should include women and small-scale producers, who play important roles in indigenous-vegetable value chains (Bokelmann et al., 2022; Kubitza et al., 2024).

LIMITATIONS

Several limitations should guide interpretation. First, the sample was small (N = 50) and recruited through accessible networks; therefore, the findings cannot be generalised statistically to all urban youth in Nairobi. Second, the cross-sectional design captures perceptions and behaviours at one point in time and cannot establish temporal or causal relationships. Third, dietary information was self-reported and may be affected by recall or social-desirability bias. Fourth, the concept of ‘indigenous foods’ is broad and may be interpreted differently by participants. Future studies should provide explicit food lists and use validated dietary assessment tools. Fifth, the qualitative sample was small and purposively selected, so its purpose was explanatory depth rather than representativeness. Finally, the short study timeline constrained recruitment and interpretation, and the lack of formal ethics approval before data collection is an important methodological limitation that should be transparently addressed in any submission.

FUTURE RESEARCH

Future studies should use larger probability-based or carefully stratified samples across Nairobi’s neighbourhoods and socioeconomic groups. Longitudinal designs could examine whether changes in food environments or nutrition education alter indigenous-food consumption over time. Dietary assessment should be strengthened through repeated 24-hour recalls, food-frequency questionnaires or food diaries. Researchers should also examine the nutritional composition, affordability, carbon and water footprints, and post-harvest characteristics of specific indigenous foods rather than treating all indigenous foods as one category. Finally, prospective health research is needed before claims about cancer-risk reduction can be substantiated.

CONCLUSION

This study provides exploratory evidence that urban youth in Nairobi generally recognise the cultural and health value of indigenous foods, but practical consumption is constrained by the urban food environment. The absence of statistically significant differences across age and occupation suggests that broad structural factors, particularly availability, affordability and convenience—may be more important than simple demographic characteristics in shaping food practices within this sample. At the same time, climate change was rarely incorporated into everyday dietary decisions, revealing an opportunity for integrated climate–nutrition education.

Indigenous foods should therefore be approached not as a single solution to cancer or climate change, but as one potentially valuable component of diverse, culturally appropriate and environmentally resilient diets. Making these foods easier to find, afford, prepare and enjoy could help translate positive attitudes into practice while supporting local food systems and cultural continuity. Larger, rigorously designed studies are needed to test these propositions and to determine whether specific indigenous foods and dietary patterns are associated with measurable long-term health and environmental outcomes.

DECLARATIONS

Ethical statement

The study manuscript reports informed consent and confidentiality procedures. However, formal ethics approval and the relevant research permit had not been obtained before data collection. This should be resolved or explicitly addressed with the target journal before submission.

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Conflict of interest

No conflict-of-interest statement was reported in the source manuscript. The authors should confirm and revise this declaration before submission.

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