Kenya

Urban nutrition profile

INITIATIVE ON Resilient Cities

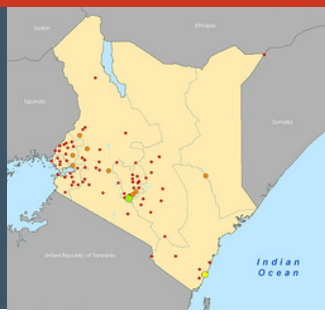
Total population: 55 million

Annual urban growth rate: 3.7%

31% of the urban population lives in Nairobi

51% of Kenyans live in informal settlements

Poverty rate (2022): 20% urban, 29% rural



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Key messages

- **Stunting in children under five years of age has declined since 2008 but remains significant, affecting one in five in rural areas and one in ten in urban areas.**
- **Obesity is twice as prevalent in women as men, affecting half of urban women and one-third of rural women, and it is rising faster in urban areas. Overweight, obesity, and unhealthy diets are driving an increase in noncommunicable diseases (NCDs).**
- **Urban diets are slightly more diverse than rural ones but remain poor due to unhealthy foods and low micronutrient intake, leading to nutrient deficiencies, especially among children, adolescents, and women.**
- **Half of urban Kenyans live in informal settlements and have low dietary diversity, relying mostly on cereals with minimal intake of fruits and vegetables. This contributes to child stunting, underweight, and a double burden of malnutrition (DBM), or concurrent under- and overnutrition at the population, household, and individual levels.**
- **The cost of a healthy diet increased from $2.79 to $3.54 per person per day, from 2017–2022 and the percentage of the population unable to afford a healthy diet fell from 72 to 79 percent. Currently, 43 million people are unable to afford a healthy diet.**
- **Updated data on micronutrient deficiencies are needed, as current information indicates insufficient micronutrient intake among both children and adults.**
- **Household-level DBM, in which child stunting coexists with maternal overweight, is prevalent in rural areas and low-income informal urban settlements.**
- **Urban programs, such as home-visit counseling, have reduced stunting, low birth weight, and improved breastfeeding, while facility or video-based models show mixed results.**
- **Kenya's nutrition policies focus on rural areas with limited urban actions. These policies are hindered by outdated plans, poor coordination, insufficient data, and low coverage.**
- **Policies for urban nutrition, such as the NCD Strategic Plan, Nutrition Action Plan and a soda tax aim to reduce obesity and NCDs through health promotion and fiscal measures.**
- **Evidence on urban food environments, primarily focused on Nairobi, is growing and includes evaluations of policies, regulations, and programs.**
- **Kenya needs to tackle the multiple burdens of malnutrition through integrated double-duty actions and policies that address both undernutrition and overnutrition.**

Summary

Despite progress in reducing child stunting over the past 15 years, Kenya is now facing new nutrition challenges, including overweight and obesity. The double burden of malnutrition (DBM), which is the coexistence of under- and overnutrition within individuals, households, and populations [1], manifests as child stunting and adult overweight (mostly in women) at the population and household levels. Dietary diversity is low and affects different population groups (particularly young children, adolescents, and women), predisposing them to micronutrient deficiencies. However, recent data on micronutrient intake and status are lacking. Households living in urban areas are vulnerable to being overweight, a consequence of increasingly unhealthy dietary patterns. In Kenya's informal urban settlements, limited dietary diversity, reliance on cereals, and widespread consumption of ultra-processed foods (UPFs) contribute to high rates of child stunting, underweight, and the DBM, with affordability and accessibility driving food choices. Compounding factors include food safety concerns, clustering of unhealthy food vendors, and external shocks. Urban nutrition interventions have had mixed results, with some programs improving child health and maternal knowledge, but others showing no significant impact. Kenya aims to eliminate malnutrition by 2027, but national policies focus mostly on rural areas, leaving urban nutrition challenges insufficiently addressed. Programs such as Afya Jiji and the Nairobi City County Food System Strategy target urban health, but gaps in urban-specific strategies, poor coordination, and limited funding hinder progress. The national school meals program serves only a small portion of schools, and urban food policies are still underdeveloped.

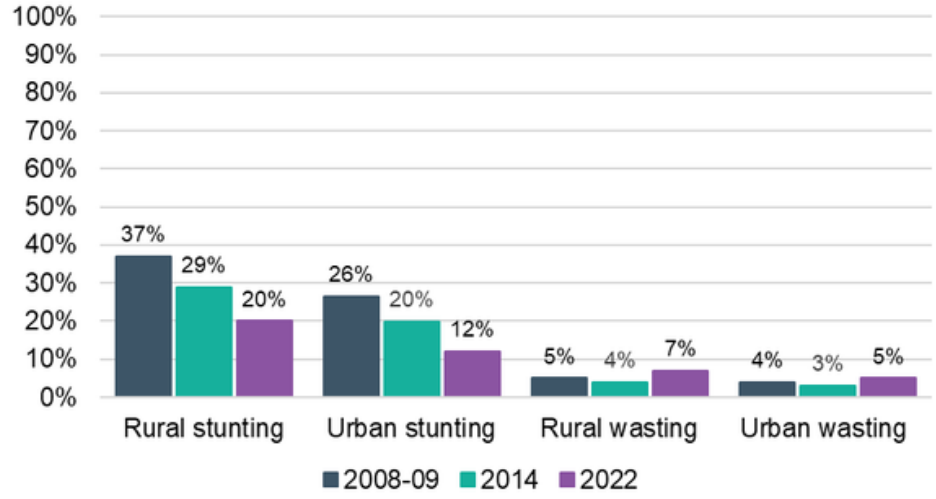
Evidence on urban food environments reveals that both healthy and unhealthy foods are available, but economic barriers impede access to diverse diets and increased concerns about food safety limit consumption among lower-income consumers. Preferences for convenience in sourcing food may result in overconsumption of packaged UPFs high in salt, sugar, and saturated fats. Food environment interventions in urban Kenya have had mixed impacts: market regulations disrupted food access, while vouchers benefitted urban markets, urban gardening improved food security, and food safety training reduced milk contamination. Targeted urban interventions are needed to address the DBM and unhealthy diets. Double-duty actions[i] integrated through urban social protection and the agricultural, health, and education sectors should be designed, implemented, and evaluated to tackle all forms of malnutrition [2].

From 2008 to 2012, Kenya reduced stunting among children under five years of age in both urban and rural areas. However, overweight and obesity in women is increasing, particularly in urban areas. Overall, while infants and women in Kenya's urban areas exhibit better dietary diversity and feeding practices than their rural counterparts, both groups suffer from suboptimal diets characterized by high consumption of unhealthy foods and beverages, low micronutrient intake, and, in informal settlements, a reliance on cereals and UPFs due to affordability challenges. Overall, urban areas have better diversity but higher unhealthy food consumption, while rural areas face limited diversity and reliance on staples, highlighting the need for targeted nutrition interventions. Diet-related noncommunicable diseases (NCDs), which are driven by low intake of fruits and vegetables and unhealthy urban diets, significantly contribute to mortality, with hypertension and underdiagnosed diabetes and cardiovascular disease highlighting healthcare gaps.

Undernutrition

Kenya has made considerable progress in reducing child stunting over the past 15 years. The overall prevalence of stunting decreased by half, dropping from 35 percent in 2008 to 18 percent in 2022. These reductions occurred in both rural and urban areas (by 17 and 14 percentage points, respectively) to rates that are now below the East and Southern Africa (ESA) regional prevalence of 33 percent (2020)[ii] [3]. Child stunting and wasting prevalences are much lower in urban areas (12 percent, 5 percent) than in rural areas (20 percent, 7 percent) (**Figure 1**). Child wasting remained steady between 2008 and 2022, with low prevalence ranging from 3 to 5 percent in urban areas, and 4 to 7 percent in rural areas. However, in rural areas, the current wasting prevalence of 7 percent exceeds the World Health Organization's (WHO) 2025 wasting reduction goal of less than 5 percent.

Figure 1: Child* nutrition status in Kenya, 2008–2022



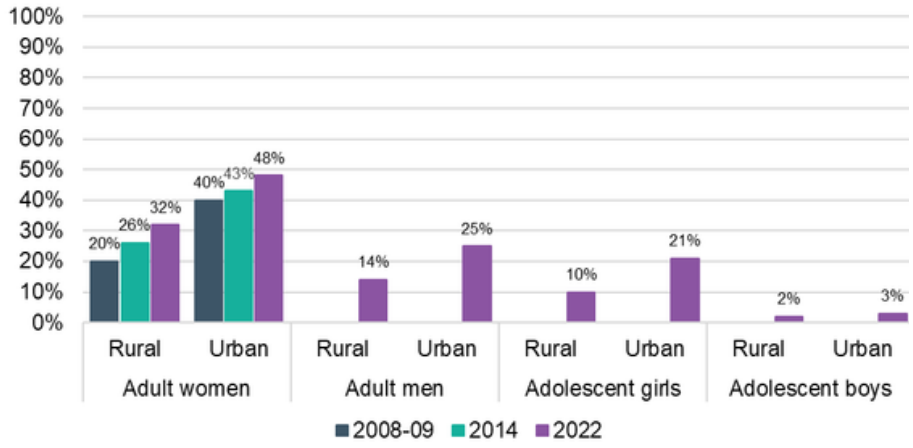
Source: DHS [4, 5, 6]. **Note**: *Among children under the age of five. DHS = Demographic and Health Surveys.

Undernutrition is especially concerning among vulnerable populations, such as those living in informal settlements and the peri-urban poor. In Nairobi County, 60 percent of residents live in extremely high-density informal settlements that represent only 5 percent of the county's land [7]. A study in these communities found that child stunting prevalence is 24 percent, which is higher than the national prevalence for both rural and urban areas. Further, 4 percent of children are severely stunted, and 10 percent are underweight, with boys experiencing higher rates of stunting and severe stunting than girls (28 percent versus 20 percent, and 6 percent versus 3 percent, respectively) [7].

Overnutrition

Since 2008, overweight prevalence in children under five years of age has remained low in both rural areas (3 percent) and urban areas (4 percent) (not shown in Figure 2) [4, 5, 6], falling slightly below ESA's regional average (4.5 percent) [3]. However, out of 23 countries in sub-Saharan Africa, Kenya has some of the highest rates of overweight and obesity in women in both rural and urban areas [8]. Overweight and obesity among adult women increased significantly from 2008 to 2022, with a higher urban prevalence (**Figure 2**), and among women ages 20 to 29 years (not shown in Figure 2) [4, 5, 6]. Over this period, overweight and obesity prevalence in urban and rural women increased from 40 percent to 48 percent and from 20 percent to 32 percent, respectively. Further, obesity prevalence is higher in Nairobi (17 percent), compared to other urban and rural areas (14 percent and 7 percent, respectively) (2014) [9].

Figure 2: Adult and adolescent overweight and obesity* in Kenya, 2008–2022



Source: DHS [4, 5, 6]. **Note**: *Defined as a body mass index (BMI) ≥ 25. Data for adult men and adolescents are not available from the 2008 and 2014 DHS surveys. Child overweight and obesity measurement guidelines: WHO.

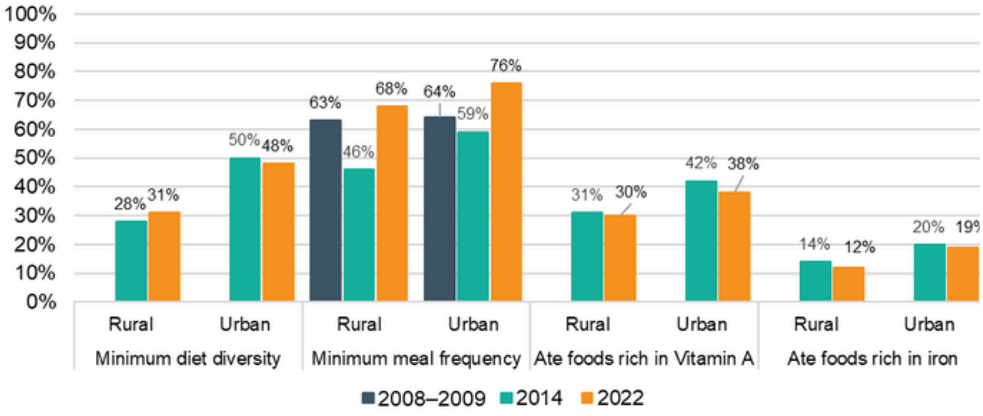
Adolescent overweight and obesity is higher in girls (13 percent) than boys (2 percent), with urban girls more affected than rural ones (21 percent vs. 10 percent). Overweight is also more prevalent among urban than rural men (25 percent vs. 14 percent) (**Figure 2**). The DBM is rising in both urban and rural areas [1]. Analyses found overweight/obese mothers with stunted children were less common in rural than urban households [10].

In rural western Kenya, 19 percent of adults had individual-level DBM (overweight with MN deficiency), but only 1 percent of children were affected. Household-level DBM was low for overweight mothers with underweight children but higher (13–17 percent) when stunting or micronutrient deficiencies were considered [11]. Quantifying individual-level DBM is challenging due to limited national micronutrient data, but evidence shows it is a significant issue, especially for the urban poor. In Nairobi's informal settlements, up to 43 percent of overweight and 37 percent of obese mothers had stunted children, and mothers and children both faced micronutrient deficiencies [12,13]. A 2010 study found a 13 percent prevalence of stunted child–obese mothers in settlements [14]. Targeted interventions must address both child undernutrition and maternal obesity.

Diets

Young child dietary patterns remain suboptimal, though feeding practices are better in urban than rural areas (2008–2022) (**Figure 3**). In 2022, 48 percent of urban children (6–23 months) met minimum dietary diversity, compared to 31 percent in rural areas. Minimum meal frequency was also higher in urban areas (76 percent vs. 68 percent), with both improving since 2008.

Figure 3: Infant and young child* feeding practices in Kenya, 2008–2022



Source: DHS [4, 5, 6]. **Note:** *Data for children aged 6–23 months. Consumption measured over the last 24 hours. The 2008 DHS data on vitamin A–rich and iron-rich foods is not shown due to differences in age range (6–35 months) and food groups (4+ vs. 5+), making it less comparable to the 2014 and 2022 DHS.

However, urban children's consumption of vitamin A–rich foods declined from 42 percent (2014) to 38 percent (2022), while rural levels remained at 30 percent. Less than 25 percent of children consumed iron-rich foods, with higher rates in urban (19 percent) than rural (12 percent) areas. This highlights a decline in vitamin A-rich food consumption in urban areas and consistently low iron-rich food consumption across both urban and rural areas.

Urban children (36 percent) consumed more animal-source foods (ASF) (defined as “egg and/or flesh foods”) than rural children (23 percent) in 2022 (not shown in Figure 3) [6]. However, urban children also had more unhealthy feeding practices, with 52 percent of urban and 48 percent of rural children fed sweet beverages [v] [6]. Over one-quarter of children in both urban (31 percent) and rural (24 percent) areas fed unhealthy foods [vi]. Up to 25 percent of young children had no fruits or vegetables, with rural areas (31 percent) having twice the rate of urban areas (15 percent) [6]. Unhealthy food and beverage consumption is higher in Nairobi’s informal settlements, where 79 percent of adolescents and adults consume sugar-sweetened beverages (SSBs) [15]. From 1990 to 2018, SSB consumption (248 g per serving) declined slightly among children and adolescents (ages 3 to 19 years), both in rural (0.42 servings/week) and urban (0.67 servings/week) areas [16, 17].

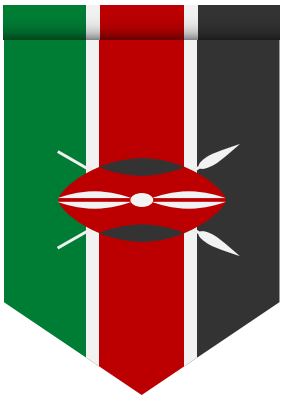
Only half of Kenyan women (15–49 years) meet the minimum dietary diversity (MDD-W), with 56 percent of urban women achieving it, compared to 43 percent in rural areas [1]. In Nairobi, 60 percent of women met MDD-W [18]. Urban women ate more vitamin A-rich fruits and vegetables (33 percent vs. 25 percent), other vegetables (61 percent vs. 51 percent), and fruits (50 percent vs. 36 percent) compared to rural women. Rural women ate more pulses (47 percent vs. 42 percent) and dark leafy greens (62 percent vs. 58 percent) [1]. Urban women also ate more ASF, including meat (45 percent vs. 31 percent) and eggs (18 percent vs. 9 percent). Rural areas rely more on maize as a primary calorie source [19].

Despite having more diverse diets, urban women consumed more unhealthy foods and beverages: 70 percent of women consumed sweet beverages and 35 percent consume unhealthy foods [6]. More urban than rural women (75 percent, 67 percent) drank sweet beverages in the previous day: 12 percent of urban women consumed SSBs such as sodas (Sprite, Coca-Cola) or energy drinks (such as Red Bull), as compared to 6 percent of rural women [6]. A higher proportion of urban women (42 percent) consumed unhealthy foodsii compared to rural women (29 percent) [6]. Irrespective of where they live, however, most women consumed sweet beverages, and one-third of rural women ate unhealthy foods. While urban women bear the brunt of the dietary transition and the influence of unhealthy food environments, rural women are also increasingly exposed to these challenges. Deep-fried food consumption is higher among urban adults (50 percent) compared to rural adults (41 percent), while fast-food consumption is low in both areas (3 percent) [20]. Although fruit and vegetable consumption can reduce NCD risk [21, 22], adults (18–69 years) do not consume them daily. On average, fruits are eaten 2.4 days a week, and vegetables 5 days a week, although this data is outdated [23]. Residents of Nairobi’s informal settlements have diets low in fruits, vegetables, and animal-source foods (ASF), relying heavily on cereals for energy [23] [24]. Ultra-processed foods (UPFs) are cheap and widely available from street vendors, contributing to unhealthy eating habits [24]. Shocks like COVID-19 have worsened diets, further reducing dietary diversity [25]. Other vulnerable urban groups include people living with HIV [vii] [26] [27], refugees [28], migrants [29], and unaccompanied rural girls seeking employment [30].

Data on micronutrient deficiencies are very outdated (13 years old), and at that time, vitamin A–deficiency levels were considered to be a “mild” public health concern, as defined by the WHO classification (≥2% – <10%) (4.7 percent in school-age children and 9 percent in preschool children) [31]. A recent review suggests levels have risen to moderate concern in children under five (23 percent), 6–12 years old (17 percent) and children ≤18 years old (18 percent) [33]. Folate is a concern for women in both urban and rural areas, as is Vitamin B12 in nonpregnant women [33]. A review of micronutrient deficiencies (2005–2015) in Kenyan children (0–19 years of age) found no data on zinc or iodine deficiency [34]. Children in informal settlements such as Kibera suffer from a high prevalence of soil-transmitted helminth infections, which have been associated with vitamin A and iron deficiency [35].

Diet-related noncommunicable diseases

In Kenya, dietary risk factors account for 13 percent of all deaths, representing the age-standardized proportion of all-cause mortality (2021) [36]. The main dietary cause of deaths from NCDs is not eating enough fruits and vegetables low consumption of fruits and vegetables. As noted earlier, urban residents face a greater risk of NCDs than rural populations due to their higher consumption of unhealthy foods [37]. Four major NCDs—cardiovascular disease, cancer, diabetes, and chronic respiratory disease—comprise 57 percent of all NCD deaths in Kenya [38]; of these, cardiovascular disease and diabetes are diet-related. The STEPS survey (2015), while outdated, found that one-quarter of adults had elevated blood pressure [39]. In the latest DHS (2022), 10 percent of urban and 8 percent of rural women were diagnosed with high blood pressure or hypertension, whereas prevalence among men was lower (3 percent urban and rural). Only one-third of men and women with the condition receive treatment [6]. Self-reported diagnoses (that is, if an individual received a diagnosis from a health worker) of high fasting glucose and diabetes were very low (1 percent in both urban and rural men and women), as were cardiovascular diagnoses (approximately 1 percent in urban and rural men and women) [6]. Given that some populations, such as the poor and others, may not have access to healthcare facilities, these figures are likely underestimates.



National urban nutrition plans and policies

Kenya committed to eliminating all forms of malnutrition by 2027, and nutrition is central to the Vision 2030 development plan. National nutrition policies guide progress and align with targets set by the World Health Assembly, the Sustainable Development Goals, and the United Nations Decade of Action on Nutrition. National policies mostly target rural areas, with few urban-specific policies despite rising rates of overweight, obesity, and diet-related NCDs in urban areas. The National Food and Nutrition Security Policy (established in 2012) recognizes urban populations, particularly low-income groups, and promotes diverse and healthy diets through strategies to enhance food availability, access, and safety while preventing NCDs [40]. Though outdated, the policy continues to guide multisectoral nutrition initiatives at county and national levels.

The now-defunct Kenya Nutrition Action Plan (KNAP) (2018–2022) implemented this policy, outlining both nutrition-specific and nutrition-sensitive actions, including efforts to reduce high rates of overweight in urban areas and manage diet-related NCD risks [41]. However, gaps remain without a new plan. The Kenya Nutrition Scorecard helps monitor progress on national and county-level nutrition goals, particularly those related to overweight, obesity, and NCD reduction [42]. The Agri-Nutrition Implementation Strategy (ANIS) (2020–2025) promotes nutrition-sensitive agriculture to combat malnutrition, incorporating urban-focused initiatives like capacity-building for safe, nutritious food production. Despite references to sack gardening (which uses bags of soil to grow crops) and urban agriculture, direct support for urban food production is minimal. The National Strategic Plan for the Prevention and Control of NCDs (2022–2026) takes a multisectoral approach to mitigate dietary risks by promoting healthy diets, physical activity, and early detection [36]. A national excise tax on soft drinks, introduced in 2015, imposes a 10-shilling charge per liter, but transitioning to a sugar-based tax could better incentivize manufacturers to reduce sugar, further improving public health outcomes [43. The Kenya Health Policy (2014–2030) also addresses urban health concerns, including overweight and inadequate housing [43], while supporting city health promotion campaigns such as “Afya Jiji” (Healthy City), which encourages healthier eating and physical activity.

Kenya's national nutrition programs are coordinated by the Nutrition Interagency Coordination Committee, a multi-stakeholder platform supported by the Nutrition Technical Forum and other technical working groups, such as those for nutrition-sensitive agriculture [41]. Multisectoral coordination also occurs through bodies such as the Council of Governors and the Scaling Up Nutrition movement. The National Information Platform for Food Security and Nutrition and SMART surveys track nutrition data, but urban-specific data on food security, obesity, and NCDs remain limited. Challenges include fragmented sectoral mandates, multiple coordination platforms, and difficulties in harmonizing stakeholder efforts to scale up nutrition [44].

The National School Meals Program, guided by the School Meals Strategy (2017–2022), provides one daily nutritious meal to pre-primary and primary school children [45] but reaches only 4 percent of rural and 11 percent of urban public schools due to a 56 percent funding shortfall and lack of urban-targeted funding [46, 47]. Kenya's devolution process has strengthened county-level nutrition efforts, with counties such as Makueni and Nairobi increasing funding for nutrition interventions. The Nairobi City County Food System Strategy (2022) promotes safe, affordable, and nutritious food, including guidance on food safety and consumer nutrition awareness [48], but broader policies for healthy food environments are still in development [49]. While Kenya demonstrates strong multisectoral commitment to nutrition, gaps persist in urban-focused policies, monitoring and evaluation, food safety regulations, and unhealthy food marketing restrictions, which are compounded by coordination and funding challenges.

Urban nutrition interventions

The nine studies on nutrition interventions in urban Kenya (2010–2022) yielded mixed results. Most studies targeted pregnant women or mother-child pairs [50, 51] [52] [53] [54] [55] with nutrition counseling, but used different delivery mechanisms (home-, facility- or video-based) to improve maternal, infant, and young child nutrition practices. Six studies originated from the Maternal, Infant and Young Child Nutrition (MIYCN) Project, a community health worker–based nutrition counseling intervention in informal urban settlements (**Table 1**). The MIYCN project showed promise for reducing stunting, low birth weight, and preterm births, and for improving exclusive breastfeeding rates, though not early breastfeeding initiation [56, 53, 57, 58]. The project's social return on investment—measured through value games that assigned financial values to nonmarket outcomes—improved mothers' health and confidence but stressed childcare providers due to a lack of support [59]. Mixed effects were observed in interventions involving facility-based counseling and postnatal care. Home-based counseling was generally more effective than facility-based or standard group health and nutrition education [51], resulting in reduced stunting prevalence, lower rates of low birth weight, and improved exclusive breastfeeding rates, though only in some cases [54]. Video-based education improved maternal knowledge and attitudes toward breastfeeding [55]. Postnatal counseling via home visits or phone calls helped address postnatal problems but did not significantly impact breastfeeding. Qualitative studies highlighted challenges in food hygiene practices and meal supervision [60, 61]. Gaps include a need for studies on adolescents, school-age children, interventions targeting obesity and diet-related NCDs, and the development and evaluation of effective double-duty urban interventions to address all forms of malnutrition [2].

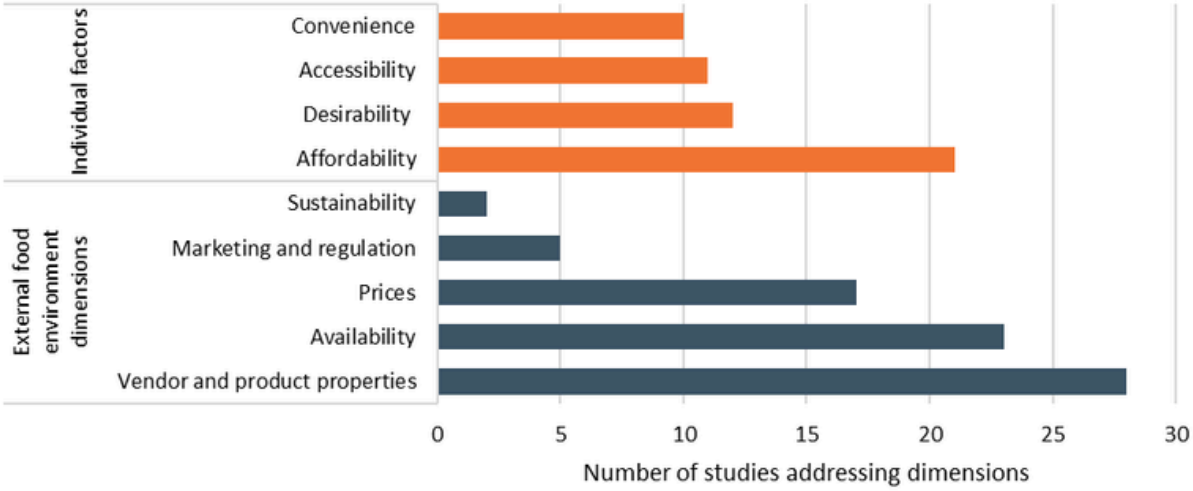
Table 1: Nutrition interventions in urban Kenya, 2010–2022

Randomized controlled trial	Population	Intervention	Results
Yes [50]	Pregnant women and girls in informal settlements	**Home-based nutrition counseling** (MIYCN project): Intervention group (IG) received counseling by CHWs trained in MIYCN and ANC; control group (CG) was visited by CHWs without MIYCN training, received basic nutrition messages and standard ANC.	**No significant effect.** No notable differences between IG and CG. Both groups saw an increase in EBF at 6 months.
No [53]	Mother-child pairs in informal settlements	**Home-based nutrition counseling** (MIYCN project): using data from three studies [50]: pre-intervention, MIYCN-Intervention, MIYCN-Control and Comparison (longitudinal study).	**Significant effect**. Adjusted odds ratios for EBF at 6 months was 67% (MIYCN-Intervention), 84% (MIYCN-Control), and 4% (comparison) compared to the pre-intervention group.
Yes [58]	Mother-child pairs in informal settlements	**Home-based nutrition counseling** (MIYCN project): Same as [50]	**Significant effect**. Reduced stunting prevalence in IG at 1 year (-1.42) and 5 years (-0.89) compared to CG.
Yes [57]	Mother-child pairs in informal settlements	**Home-based nutrition counseling** (MIYCN project): Same as [50].	**Significant effect**. Lower prevalence of LBW in IG (2.5%) compared to CG (6.7%).
Yes [56]	Pregnant women in informal settlements	**Home-based nutrition counseling** (MIYCN Project): Same as [50].	**Mixed effects.** Higher EBF rates in IG at 24 weeks gestation (45%) versus CG (15%), but no impacts on EBI.
No [59]	Pregnant and lactating women, mothers of young children	**Home based-nutrition counseling** (MIYCN project): Same as [50].	**Mixed effects**. Effective in promoting social value (social return on investment). Negative impacts on daycare centers and healthcare providers due to insufficient support.
Yes [51]	Pregnant women in informal settlements	**Home and facility-based nutrition counseling:** IG1 (intensive home-based peer counseling, 7 sessions), IG2: (semi-intensive facility-based prenatal counseling, 1 session), CG (standard group nutrition education, approximately one hour of nutrition a week).	**Mixed effects**. IG1 had higher EBF at 6 months compared to CG (4x more likely); no significant differences between IG2 and CG.
Yes [54]	New mothers	**Postnatal counseling (MIYCN):** IG1 (in-person early postnatal care 3 days after delivery with CHW), IG2 (care provided by phone); CG (standard care).	**Mixed effects.** No significant differences between IG and CG (EBF or BF frequency). Home visits increased the likelihood of mothers acting on postnatal problems.
No [55]	Mothers with children under five	**Maternal nutrition education videos:** Videos shown twice daily for 6 months at maternal health centers; CHWs used videos during health talks (weekly or less).	**Significant effect.** Higher BF and CF knowledge and attitudes among mothers who viewed videos frequently (3–4 times, 5+ times) compared to infrequent viewers (1–2 times).

Note: ANC = Antenatal care; BF = breastfeeding; CG = control group; CF = complementary feeding; CHW = community health worker; EBF = exclusive breastfeeding; EBI = early breastfeeding initiation; IG = intervention group; LBW = Low birth weight; MIYCN = Maternal and infant and young child nutrition.

Evidence on urban food environments includes 69 studies (Figure 4) and focuses on vendors and product properties (26 studies), food availability (21 studies) and affordability (19 studies). Most studies covered consumers (45 studies) and vendors (30 studies). Research centered on Nairobi should be expanded to other cities and marginalized peri-urban areas, as well as including institutions (such as schools) and exploring urban–rural food system linkages. We summarize the evidence by food environment dimension, starting with external factors and followed by individual factors. The section is organized around the number of studies reviewed.

Figure 4: Studies of urban food environments in Kenya, 2000–2023



Source: Authors. **Note**: Papers were categorized under multiple dimensions as appropriate.

Vendor and product properties

Research on vendor and product properties show that both formal and informal vendors offer a range of foods, including high-fat, fried products and cereals, as well as fresh healthy options such as vegetables produced by urban farms. These studies show that both unhealthy and nutritious foods are accessible to consumers across income levels [62] [63] [64] [65] [66] [67]. Food sold in open markets and by street vendors are affordable, available, and convenient, and these outlets are popular for purchasing fresh vegetables, especially for low-income consumers [68] [69]. Residents of Nairobi's informal settlements tend to buy food from traditional retail outlets, such as street vendors and kiosks, rather than supermarkets [23]. Unregulated food stands and street vendors target young people near schools [70].

Food safety knowledge and practices are limited among urban vendors, impacting the quality and safety of their products [71] [72] [73] [74] [75] [76] [77]. Vendors, who influence dietary behavior, work in unsanitary environments and often have poor hygiene [78]. Such practices have been associated with food contamination [79] [71] [73] [75] [80]. Particularly in informal markets, vendors operate in unhygienic conditions and have limited access to clean water and sanitation, further compromising food safety [81]. Safety issues extend to formal outlets like restaurants [72].

The rapid growth of milk ATMs, which are preferred by low- and middle-income consumers for affordability and convenience, raises safety concerns [82], given the ineffective governance and regulation of the dairy sector [83]. In informal settlements, consumers express concerns about ASF, such as uncertainties with sourcing, poor hygiene, and risks associated with undercooking [84]. The geographic clustering of vendors selling unhealthy foods (such as SSBs) in Kibera raises diet quality concerns for nearby households [63].

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Farmers, traders, and consumers perceive pesticide residues to be the greatest health risk in peri-urban vegetable supply chains. However, consumers in informal outlets perceive lower risks than farmers and traders, who are aware of their own unsafe practices [85]. A study in Nairobi found that informing consumers about safer kale reduced perceived health risks and influenced purchasing decisions, emphasizing the need for better food safety communication and market practices [86].

Availability

In urban Kenya, food availability varies geographically and by neighborhood socioeconomic status. The proportion of food outlets with high availability of healthy food was twice as high in Nairobi as in Kisumu, with healthier options more prevalent in wealthier neighborhoods [62]. Supermarkets promoting higher consumption of processed foods and lower consumption of unprocessed foods can significantly increase BMI, highlighting the impact of retail environments on nutrition and the need to incentivize the sale of healthier foods [87]. Resource-poor households rely less on foods available in supermarkets [88] [89] and choose convenient, cheap street foods high in saturated fat, salt, and sugar [65] [82] [90]. In informal settlements, food vendors often sell products near hazardous sites [81] and milk is purchased from unregulated milk ATMs [79], both of which increase food contamination risks.

Lower-income urban dwellers engage in urban agriculture, such as home gardens, to supplement their diet. A study in Nairobi showed that most urban farmers consumed their own agricultural production, thereby contributing to their household's food security [64]. Another study showed that one-third of sampled households participated in urban agriculture, but no significant association with food security was found, which was likely influenced by barriers such as the lack of property rights and insufficient plots, among others [91]. While findings are mixed on the impacts of urban agriculture in this context, other studies document urban farming can improve food security and dietary diversity especially in times of crisis [92].


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Prices and affordability

Larger food outlets, such as supermarkets, in medium-sized Kenyan towns were associated with greater dietary diversity and child height, likely because they provide variety at affordable prices [93]. Lower-income consumers frequent informal markets that offer even lower prices [94] [95] [96] [71]. Prices and affordability also influence demand for ASF [94] [97]. High ASF prices are a barrier to consumption [98], with poor consumers purchasing less expensive unpasteurized milk from informal markets, which carry higher risks for food safety [82] [99] [100] [76].[i] Although consumers are motivated by the nutritional attributes of foods (such as fortified porridge flour [89]) and lower perceived food safety risks (such as African leafy vegetables [101] or kale [102] [103]), lower-income earners express a low willingness to pay higher prices for these foods [104] [105]. Affordability determines household food availability in informal settlements [65], and competitive pricing motivates consumers to frequent open markets and vendors [106]. Even if poor households are open to new nutritious foods, such as micronutrient-fortified porridge, they are not willing to pay more for them, emphasizing that fortified foods must be more affordable [104]. Crises disrupt urban households' purchasing power for food [107] [108], dampening consumer preferences for dietary quality and spurring negative coping strategies (e.g., eating street foods or drinking less milk) in informal settlements [107] [109]. Cash and food vouchers can improve food affordability [110].

Marketing and regulation

Few studies examined marketing and regulation. In Nairobi's informal markets, ads mostly promoted SSBs (48 percent) and alcohol (29 percent) [111]. While a lack of regulation limited milk supply chain traceability, new rules restricted small-scale milk traders and raised prices [112]. Urban consumers favored regulating "junk" foods and additives due to health concerns [78]. Informal food vendors faced challenges from government efforts to formalize markets, which intensified during the pandemic when officials removed street stalls [113]. The limited number of studies on marketing and advertising regulation is a significant gap, given the increasing impact of unhealthy diets.

Sustainability

Participatory foodscape mapping improved food safety and environmental health by involving vendors and communities [81], but sustainability in urban food environments remains underexplored, especially amid climate change challenges.

Desirability

Research on food desirability highlights that urban consumers' food choices and consumption patterns are significantly influenced by various factors, including nutrition knowledge [114], social environments (such as family culture or vendor sociability) [78] [15], and taste preferences [98, 78] [95] [104] [115]. For example, households with access to nutrition information are more likely to consume a greater diversity of foods. [114]. Yet urban consumers prefer minimal changes to food products when new ingredients are introduced, favoring modifications that do not significantly alter the food's taste, texture, or other noticeable properties [104].

Accessibility

Supermarket proximity improves urban access to food [116] [117] [118], yet many households in urban areas are still food insecure [119] [120], particularly female-headed households [121]. Distance to markets and availability influence access to a wider variety of foods, even within food groups. For example, both rural and urban consumers consume dairy, but urban consumers tended to live closer to shops and consume a greater variety of dairy products including pasteurized milk. However, approximately 40 percent of urban consumers face income constraints to purchasing dairy [99]. Gender is also a key aspect in food access, as men often hold the decision-making power [122]. Local terminal markets have stabilized meat supply for urban residents [123]. In urban and rural Kenya, market-based cash and food vouchers improved food security, and a response analysis of recipients and nonrecipients in the program found that households preferred cash or vouchers to food aid, especially in urban areas due to greater market accessibility. However, in rural areas, women and households with limited market access preferred food aid [110]. Sack gardening supported livelihoods, social capital, food security, and within-group dietary diversity (vegetables) in an informal settlement [124]. Likewise, urban households that farmed in urban or rural settings were more food secure compared to nonfarming households [64].

Convenience

Urban consumers' preferences for convenience affect food outlet choices as well as purchasing patterns for certain foods. Urban residents prioritize proximity over health-related attributes of food and food products, favoring accessible food sources such as street vendors, supermarkets, and milk ATMs [91] [96] [125] [126] [82] [127]. In one study, greater distance to markets reduced preferences for fresh, healthy foods such as indigenous leafy vegetables [96]. Other studies documented that in addition to distance, operating hours and time spent waiting to obtain food influence consumer food choices [125] [126, 96, 128]. Although supermarkets are convenient for urban residents, these outlets may drive increased consumption of UPFs instead of healthier, unprocessed foods [127] [93] [118]. Street foods are also an important food source for low-income households. A study examining the relationship between street food consumption and employment showed that the unemployed and self-employed were more likely to consume street foods than the formally employed [125]. Ready-made foods, such as those offered by street vendors, are also important nutrient sources for poor households [126].

Food environment interventions: regulations and programs

We identified five evaluations of urban food environment interventions (Table 2) related to regulations (n=2, in pink) and programs (n=3, in yellow). Regulatory studies evaluated national COVID–19 market and mobility restrictions and laws affecting small-scale milk vendors. Programs addressed food safety (vendors), affordability (vouchers), and availability (urban gardening).

Table 2: Food environment interventions in urban Kenya, 2000–2023

Randomized controlled trial	Population	Intervention	Results
No [92] (Qualitative)	Consumers	**Regulation:** Government COVID–19 restrictions such as social distancing, curfew, and lockdowns.	**Key Findings:** Regulations disrupted livelihoods and supply chains, limiting affordability, availability, and access to safe, adequate, and nutritious food.
No [112] (Qualitative)	Vendors	**Regulation:** Government law banning the sale of raw milk to consumers.	**Key findings:** Vendors were resistant to measures to change milk transport containers due to increased supply chain traceability and higher costs.
No [110] (Quantitative)	Consumers in informal urban settlements, consumers in rural areas	**Voucher program:** Mathare (urban) monthly food voucher-for-work transfers worth 1,000 Kenyan Shillings; Makueni (rural), a three-month-long food-voucher-for-work valued at 150 shillings per day for up to 10 days of work per month.	**Key findings:** Overall, most households preferred cash or vouchers over direct food aid. Households in urban areas preferred the flexibility of cash or vouchers to food. Markets in urban settlements responded better to a large injection of cash or vouchers than rural areas. Specific groups in the rural setting (women and those with limited market access) preferred food aid.
No [129] (Mixed methods)	Consumers in informal urban settlements	**Urban gardening program:** Training and inputs on urban sack gardens.	**Key findings:** post-intervention, participants reported reduced household food insecurity and increased variety of vegetables consumed. The program enhanced social capital through group gardening. Key barriers included insufficient inputs.
Yes [130] (Quantitative)	Smallholder dairy farmers in urban and peri-urban areas	**Food safety intervention:** IG: training on usage of aflatoxin binder. CG: no training. All farmers visited bi-weekly (3 months).	**Significant impact:** Training smallholder farmers with an aflatoxin binder reduced AFM1 levels in milk and improved milk yield and perceived cow health and appetite. The CG was more likely to have milk with AFM1 levels above regulatory limits than the IG.

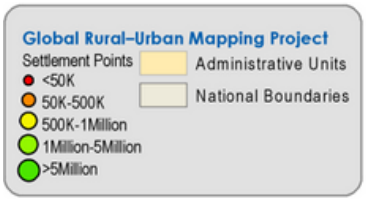
Note: IG = intervention group; AFM1 = aflatoxin m1 chemical compound; CG = control group

Pandemic-related disruptions and market restrictions reduced food access and affordability, leading to urban farming as a coping strategy [92]. Vendor resistance arose from regulatory changes, such as a raw milk sales ban, due to higher costs and traceability issues [112]. A study of preferences for cash, food, or vouchers showed urban consumers preferred flexible vouchers, with urban markets better adapted to market-based transfers [110]. Programs like urban gardening and dairy farmer training reduced food insecurity and improved agricultural outcomes [129] [130]. While research on urban food environments is growing, most studies focus on Nairobi, with a need for more research in secondary cities and urban-rural linkages.

Endnotes

[i] Double-duty actions are interventions, programs, or policies that simultaneously prevent or reduce the risk of both nutritional deficiencies leading to underweight, wasting, stunting, and micronutrient deficiencies and problems of overweight, obesity, and diet-related NCDs.
[ii] The East and Southern African region is defined by UNICEF as Angola, Botswana, Burundi, Comoros, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Rwanda, Somalia, South Africa, South Sudan, Tanzania, Uganda, Zambia, and Zimbabwe.
[iii] Minimum dietary diversity is receiving foods from 5 or more of the following 8 food groups: a. breast milk; b. grains, white/pale starchy roots, tubers, and plantains; c.beans, peas, lentils, nuts and seeds; d. dairy products (tinned, powdered, or fresh animal milk, infant formula, yogurt, cheese); e. flesh foods (meat, fish, poultry, organ meats); f. eggs; g. vitamin A-rich fruits and vegetables; h. other fruits and vegetables.
[iv] Minimum meal frequency is receiving the minimum recommended number of feeds per day according to age and breastfeeding status.
[v] As defined in the 2022 Kenya DHS, “Sweet beverages include sweet/flavored milk, and yogurt drinks, sweet/flavored soy milks or nut milks, fruit juice and fruit-flavored drinks, chocolate-flavored drinks, sodas, malt drinks, sports drinks, and energy
drinks, sweetened tea, coffee, herbal drinks, and other sweetened liquids.” [6]
[vi]As defined in the 2022 Kenya DHS, “Unhealthy foods are a group of sentinel food types which include sweet foods such as cakes, sweet biscuits, candies, chocolates, ice cream, ice lollies; and fried and salty foods such as crisps, chips, ngumu, mandaazi, samosa, bhajias, or indomie.” [6]
[vii] Populations living with HIV require increased nutrient requirements, as HIV impedes the intake and uptake of nutrients as well as increasing vulnerability to other infections.
[viii] A few studies documented impacts during the COVID-19 pandemic, which are not included in the main text as they are now outdated and do not provide evidence on longer term trends or current state of urban food environments. However, they are listed briefly here: short-term food price increases that occurred during the COVID-19 pandemic, which fluctuated based on the type of food [109][131]. However, our review did not capture data on whether these trends remained after the pandemic. COVID-19 disruptions to the supply chain hindered access to formal markets and safe, nutritious foods [107] [131].

Map (page 1): Urban Settlement Points: Kenya. Center for International Earth Science Information Network (CIESIN), Columbia University, CUNY Institute for Demographic Research (CIDR), International Food Policy Research Institute (IFPRI), The World Bank, and Centro Internacional de Agricultura Tropical (CIAT). 2017. Global Rural-Urban Mapping Project, Version 1 (GRUMPv1): Settlement Points, Revision 01. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC). Accessed 2023.



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