

Patterns and determinants of eating healthy in Kenya

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Abstract

Background

The burden of non-communicable diseases (NCDs) is rising in low-and-middle-income countries (LMICs) with diet being a key risk factor. Policies to tackle diet-related NCDs require a broader understanding of patterns and drivers of healthy eating to inform interventions. This study assessed the patterns and determinants of eating healthy in Kenya.

Methods

This study used cross-sectional data from the 2015/16 Kenya Integrated Household Budget Survey (KIHBS). The outcome variable for this study was a continuous healthy diet index (HDI) developed using nine WHO/FAO healthy diet recommendations through principal component analysis (PCA), as a measure of eating healthy. The HDI score and the proportion of Kenyan households meeting WHO/FAO healthy diet recommendations for the nine dietary components were summarized by gender of the household head, residence, and socioeconomic status. Multivariable linear regression was used to assess determinants of eating healthy in Kenya. Crude and adjusted marginal effects and 95% CI were used to assess the strength of association.

Results

A total of 21,512 households in Kenya were included in the sample of which 60% were rural and about two thirds headed by males. The HDI index ranged from - 1.13 to 1.70, with a higher score indicating healthier eating. The mean HDI score in Kenya was 0.24, which was considered moderate, with urban residents having a higher score (0.25) than rural residents (0.23). No Kenyan household met all the nine healthy diet recommendations with majority (84%) meeting four or less. Healthy eating was associated with higher socioeconomic status (0.28, 95% CI 0.27–0.30), living in a rural area (0.16, 95% CI 0.14–0.19), having children under five years (0.02, 95% CI 0.01–0.03) in the household, and the household head being female, having education, being employed or in union.

Conclusion

In conclusion, the majority of Kenyan households do not meet all the healthy dietary recommendations. Furthermore, eating healthy is associated with higher socioeconomic status, living in a rural area, having children under 5 years in the household, and the household head having education, being in employment and in union. The findings from this study can be used to inform policies that promote healthy eating and the prevention of diet-related NCDs among the Kenyan population.

Background

The burden of non-communicable diseases (NCDs) continues to rise in low-and-middle-income countries (LMICs) [1–4]. Unhealthy lifestyle behaviours such as poor diet, sedentary behaviour, tobacco use, and harmful use of alcohol are reported to contribute to the rise in NCDs [5, 6]. A nutrition transition has also been observed in LMICs, characterized by shifts from traditional diets to more processed and refined foods high in saturated fats, trans-fats, sugar, and salt [6, 7]. This has been associated with an increase in diet-related NCDs such as obesity, diabetes and cardiovascular disease [8, 9].

Healthy diets are important in preventing diet-related chronic diseases. In 2013, a Global NCD Action Plan was endorsed by the World Health Organization (WHO) to address the rising burden of NCDs globally [10]. As a result, standards and guidelines for healthy diet consumption have been developed. These include the Eatwell guide, NOVA classification, and healthy diet recommendations by WHO and the Food and Agriculture Organization (FAO) [11–14]. Evidence-based

interventions that promote healthy diets include salt intake reduction, replacement of trans-fat with polyunsaturated fat, and public awareness on eating healthy. Despite the available standards and guidelines, increasing evidence shows poor dietary practices in LMICs [15]. Without proper policies, programs and interventions, the public health implications associated with NCDs in these countries may reach unmanageable levels [16].

The rising burden of NCDs in developing countries has led to generation of more evidence on dietary patterns and their drivers [1, 17]. Studies conducted in high-income countries (HICs) have used a composite healthy diet indicator from WHO healthy diet guidelines to assess dietary patterns in their population [18–20]. Others have used individual dietary components such as fruits and vegetables rather than generating a composite score [11]. In LMICs, majority of studies have assessed dietary behavior and drivers using individual dietary components as opposed to generating composite indicators. Socioeconomic status and food costs have been reported as important determinants of healthy eating [21–24]. Other studies have shown urban-rural and gender differences in dietary behaviour [25–28]. However, evidence of influencing factors varies by context. Previous studies conducted in Kenya have only assessed individual dietary components such as fruits and vegetables [29]. However, policies to tackle the diet-related NCDs require a broader understanding of patterns and drivers of healthy eating to inform interventions to promote healthy eating. Therefore, this study aimed to assess the patterns using a composite score. The study further assessed the determinants of healthy eating in Kenya.

Methods

Study design and participants

This study used cross-sectional data from the 2015/16 Kenya Integrated Household Budget Survey (KIHBS). The KIHBS is a nationally representative household survey that provides integrated household-level data on a wide range of indicators in order to assess the progress made in improving the living standards of the population [30]. Data from three main tools of the KIHBS survey were used for our analysis: (1) household members' information questionnaire, (2) household level information questionnaire, and (3) household consumption expenditure information questionnaire. The household members' questionnaire collected information on gender of the household head, education status of the household head, age of household head and household members, marital status of the household head, and religion of the household head. The household level questionnaire collected information on household size, residence of the household (urban/ rural), and household level expenditure on non-food items. The consumption expenditure questionnaire collected information on the types and quantities of foods consumed by Kenyan households from purchases, own production, own stock and gifts over a 7-day recall period. More details on participant recruitment and sampling are elaborated in the study report [30]. The final sample included 24,000 households comprising 14,120 rural and 9880 urban households. Our study was based on households that reported consuming foods whose dietary component quantities could be obtained from the Kenya Food Composition Tables 2018 (KFCT). From the KIHBS data set, 2488 households reported consumption of restaurant mixed foods, canteen foods, beer, wine, spirits, tobacco or stimulants, and narcotics, whose dietary component quantities could not be obtained. These households were dropped from the analysis giving a final analytical data set of 21, 512 households.

Measures

Outcome variable

The outcome variable for this study was a continuous healthy diet index (HDI) developed using the 2003 WHO/FAO expert recommendations on diet, nutrition and prevention of chronic diseases [14] and the 2018 updated WHO healthy diet fact sheet [31]. Nine dietary components and their WHO/ FAO cut-off values were used to construct the composite HDI index as shown in Table 1. Nutrient composition and energy information for foods consumed in the KIHBS survey were obtained from KFCT. The KFCT lists the energy quantities (Kcal) of the nutritional components per 100g edible portion on fresh weight for

commonly consumed foods in Kenya. Principal component analysis (PCA) was used to generate the composite HDI from the nine dietary components.

Table 1
WHO/ FAO healthy diet recommendations for HDI dietary components

Dietary factor	Recommendations
Total fat	15–30%
Saturated fatty acids (SFAs)	< 10%
Polyunsaturated fatty acids (PUFAs)	6–10%
Trans fatty acids	1–2%
Total carbohydrates	55–75%
Free sugars	< 10%
Protein	10–15%
Fruits and vegetables	≥ 400 g/day
Total dietary fibre	≥ 25 g/day
Salt intake	< 5 g/day

Explanatory variables

Predictor variables included in the study were the household head's gender, age, education, marital status, occupation, residence, socioeconomic status, household size, and the number of members in the household in different age groups. Age was categorized into four groups: below 30 years, 30–44 years, 45–59 years, and 60 years and above. Education level of the household head comprised of four categories: no education, completed primary, secondary and above, and other education. Marital status had two categories: in union (this included those married and cohabiting) and not in union (this included those separated/divorced, widowed and never married). Occupation of the household head was categorized into three categories, employed, self-employed, and unemployed. Religion was grouped into four categories: Christians, Muslims, other religions (including Hindu, traditionalists and others), and no religion. Residence comprised of rural or urban area.

Socioeconomic status was measured using the total aggregated consumption expenditure per adult equivalent in the household. This was an aggregate measure of food and non-food consumption expenditures of the households following the best-practice guidelines provided by Deaton and Zaidi [32]. Adult equivalents at household level were calculated using the steps described by Smith and Subandoro [33]. The food consumption component included expenditures of food consumed from purchases, own production, own stock and gifts over a 7-day recall period. The non-food expenditure components included household expenditure on house rent, water, electricity, gas, other cooking fuels and healthcare over the last one month; expenditure on clothing and footwear over the last three months; expenditure on education, household goods, furniture and fittings, communication, recreation and culture, insurance, financial, new/second hand motor vehicles and accessories, and miscellaneous over the last 12 months. The aggregate consumption expenditure per adult equivalent was categorized into five quintiles i.e. poorest, poor, middle, rich, and richest.

Data analysis

Sociodemographic characteristics of the study sample were described using frequencies and proportions. Counts and proportions were presented to show the distribution of categorical variables while means and standard deviations (SD) summarized the continuous variables. Means and 95% confidence intervals (CI) summarized the proportions of households meeting each of the healthy diet recommendations for each of the nine dietary components. Difference in proportion tests

were used to assess the differences in the proportions meeting recommendations by gender of the household head, residence, and socioeconomic status. Two sample t-tests were used to test differences in HDI scores by gender and residence. One-way ANOVA and Bonferroni tests were used to test differences in HDI by the different quintiles of socioeconomic status. Means, 95% CI, minimum, and maximum were used to summarize the HDI index overall, by gender and residence. Summary of HDI by county was mapped on the Kenyan map using ArcGIS. A multivariable linear regression model was fitted to assess factors associated with healthy diet consumption in Kenya. Crude and adjusted marginal effects and 95% CI were presented for each determinant. Variables were considered significant determinants of eating healthy if p-values were < 0.05. For all the analyses, survey weights were used to account for survey design and clustering. Data analysis was performed using STATA Statistical Software version 15.0 (StataCorp).

Results

Sociodemographic characteristics of the study sample

A total of 21,512 households in Kenya were included in the sample of which 60% were from rural areas and about two thirds were headed by males. The average household size was 4.0 (SD 2.4) members and the average age of household heads was 43 years (SD 15.7); male 42 years (SD 14.9) and female 46 years (SD 17.0), with about two thirds of the study sample falling between 30 and 59 years of age. The average monthly per adult equivalent consumption expenditure was USD 76.5 (SD 75.6) with 57% in the rich and richest category and 25% falling in the poor and poorest categories. Majority of household heads had up to primary level education (65%), were in union (71%) and practiced Christianity (83%). About half of the household heads were employed while 41% and 11% were self-employed and unemployed respectively (Table 2).

Supplementary table 1 presents a summary of continuous sociodemographic characteristics of the study sample.

Table 2
Sociodemographic characteristics of the study sample

	n	%
Age group		
Below 30 years	3,890	18.1
30–44 years	8,234	38.3
45–59 years	5,308	24.7
60 years and above	4,080	19.0
Residence		
Urban	8,556	39.8
Rural	12,956	60.2
Gender of household head		
Female	7,266	33.8
Male	14,246	66.2
Education of household head		
No education	4,446	20.7
Primary	9,540	44.4
Secondary and above	7,387	34.3
Other ^a	139	0.7
Employment status^b		
Unemployed	2,262	10.5
Employed	10,431	48.5
Self-employed	8,819	41.0
Marital status of household head		
Not in Union	6,229	29.0
In union	15,283	71.0
Religion		
Christian	17,778	82.6
Muslim	2,826	13.1
Other religion	278	1.3
No religion	630	2.9
Socioeconomic Status		

Notes: a = other education category comprised informal education i.e. madrassa/ duksi. b = employed comprised those on salaried employment at public and private sector, self-employed included those with private business, and the unemployed included those with no employment.

	n	%
Poorest	7,149	33.2
Poor	5,003	23.3
Middle	3,997	18.6
Rich	3,162	14.7
Richest	2,201	10.2
Total	21,512	100.0
Notes: a = other education category comprised informal education i.e. madrassa/ duksi. b = employed comprised those on salaried employment at public and private sector, self-employed included those with private business, and the unemployed included those with no employment.		

Patterns of healthy diet consumption in Kenya

Number of dietary recommendations met by Kenyan households

Figure 1 shows the number of healthy diet recommendations met by Kenyan households overall and by residence. Overall, no household in Kenya met seven or more of the healthy diet recommendations. Only 3% of Kenyan households met six of the nine healthy diet recommendations. Majority of Kenyan households (84%) met four or less of the healthy diet recommendations with no households meeting more than seven of the recommendations. The same was observed by residence with 82% and 86% of rural and urban households meeting four or less of the healthy diet recommendations.

Proportion of households meeting WHO/ FAO recommendations for HDI components

Table 3 shows the proportion of households in Kenya who met the WHO/ FAO healthy diet recommendations for each HDI component. Forty-five percent of households met the recommended fruit and vegetable intake with more female-headed households (50%) and urban households (52%) meeting the recommendations than their male-headed and rural counterparts, and this was statistically significant. In regards to the recommended total fat intake, majority of households (87%) met the recommendations with more female-headed (88%) and rural households (88%) meeting these recommendations than male-headed (86%) and urban households (86%). Overall, only 25% of households met the recommended total carbohydrate intake, with more female-headed (30%) and rural households (13%) meeting the recommendations. A similar pattern was observed for total protein and dietary fibre recommendations. Overall, about a third of the households met the recommended saturated fat intake with more urban households meeting the recommendations compared to their rural counterparts. Only 5% of households met the recommended polyunsaturated fats intake level with more urban households meeting the recommendations compared to their rural counterparts. Overall, only 3% of households met the recommended total trans-fats energy requirements with more male-headed households meeting the recommendations. For total carbohydrates and total proteins, more than 90% of the households were above the recommended daily intake while for polyunsaturated fats, about two thirds were above the healthy diet recommendations. Supplementary table 2 and supplementary table 3 show the proportions of households above and below the recommended healthy diet ranges respectively for selected dietary components.

Table 3
Proportion of households meeting WHO recommendations for various components of HDI

HDI Components	Gender		Residence		Socioeconomic Status					
	Overall (%)	Female	Male	Urban	Rural	Poorest	Poor	Middle	Rich	Richest
Fruits and vegetables, > 400g per day	45.3 (44.6–45.9)	49.9*** (48.7–51.0)	43.1 (42.2–43.9)	52.0*** (51.0–53.1)	40.0 (39.2–40.9)	15.0 (14.2–15.8)	37.3 (36.0–38.6)	51.9 (50.4–53.5)	63.3 (61.6–65.0)	79.7 (78.0–81.4)
Total fat, 15–30% of total energy	86.7 (86.3–87.2)	88.2*** (87.5–89.0)	86.0 (85.5–86.6)	85.6 (84.9–86.4)	87.6** (87.0–88.2)	85.0 (84.2–85.9)	89.2 (88.3–90.0)	87.9 (86.9–88.9)	86.9 (85.7–88.1)	84.6 (83.1–86.1)
Total carbohydrates, 55%–75% of total energy	25.3 (24.7–25.9)	30.1*** (29.0–31.1)	23.0 (22.3–23.7)	20.8 (20.0–21.7)	28.8*** (28.0–29.5)	30.9 (29.8–31.9)	32.0 (30.7–33.3)	28.0 (26.6–29.3)	18.7 (17.4–20.1)	10.7 (9.4–12.0)
Total Protein, 10%–15% of total energy	21.0 (20.4–21.5)	24.7*** (23.67–25.6)	19.2 (18.5–19.8)	14.3 (13.5–15.0)	26.1*** (25.3–26.8)	36.7 (35.6–37.8)	22.5 (21.4–23.7)	17.0 (15.9–18.2)	9.8 (8.8–10.9)	9.2 (8.0–10.4)
Saturated Fats, < 10% of total energy	32.9 (32.3–33.6)	33.7 (32.6–34.7)	32.6 (31.8–33.4)	39.8*** (38.7–40.8)	27.7 (26.9–28.4)	35.0 (33.9–36.1)	28.7 (27.5–30.0)	30.8 (29.3–32.2)	33.2 (31.5–34.8)	37.6 (35.6–39.6)
Polyunsaturated Fats, 6%–10% of total energy	5.0 (4.7–5.3)	4.4 (4.0–4.9)	5.3 (4.9–5.7)	6.5*** (6.0–7.0)	3.9 (3.5–4.2)	1.7 (1.4–2.0)	4.1 (3.6–4.7)	4.3 (3.6–4.9)	6.4 (5.5–7.3)	11.5 (10.1–12.8)
Trans-Fats, < 1% of total energy	3.0 (2.7–3.2)	2.3 (2.0–2.6)	3.3*** (3.0–3.5)	2.6 (2.3–3.0)	3.2 (2.9–3.5)	2.4 (2.0–2.7)	3.5 (3.0–4.0)	3.1 (2.5–3.6)	2.4 (1.9–3.0)	3.6 (2.8–4.4)
Dietary fibre, < 25g/day	71.0 (70.4–71.6)	76.8*** (75.8–77.8)	68.2 (67.5–69.0)	56.5 (55.5–57.6)	82.1*** (81.5–82.8)	7.1 (7.0–7.2)	7.7 (7.6–7.8)	7.0 (6.9–7.2)	6.8 (6.6–7.0)	6.7 (6.5–6.9)
Salt intake, <5g/day	45.6 (45.0–46.3)	38.8 (37.6–39.9)	48.9*** (48.1–49.7)	47.2 (46.1–48.2)	44.5 (43.6–45.3)	56.7 (55.6–57.9)	44.6 (43.2–45.9)	42.4 (40.9–43.9)	39.8 (38.1–41.5)	38.6 (36.6–40.6)

Notes: We are reporting the proportion of households who met the criteria for healthy eating based on WHO recommendations. Survey weights are used to account for the survey design and clustering. The 95% CI were computed using the Delta method. ** $p < 0.05$, *** $p < 0.01$

Distribution of HDI score by gender, residence, and socioeconomic status

Table 4 shows a summary of the HDI score by gender, residence and socioeconomic status. The HDI index ranges from – 1.13 to 1.70, with a higher score indicating healthier eating with regard to WHO/FAO dietary recommendations. The overall mean HDI score in Kenya was 0.24, with urban residents having a higher score (0.25) than rural residents (0.23). There was

no significant difference observed in the HDI score by gender of the household head. With regard to socioeconomic status, the findings indicate an increasing trend in the HDI score with increasing socioeconomic status, meaning that households with higher socioeconomic status were eating healthier.

Table 4
Summary of HDI score overall, by gender, residence and socioeconomic status

	Mean	95% CI	
Overall	0.24	0.24	0.25
Gender			
Female	0.25	0.24	0.26
Male	0.24	0.23	0.25
Residence			
Urban	0.25	0.24	0.26
Rural	0.23	0.22	0.24
Socioeconomic status			
Poorest	-0.02	-0.03	-0.01
Poor	0.17	0.16	0.18
Middle	0.25	0.24	0.27
Rich	0.34	0.33	0.35
Richest	0.46	0.45	0.48

Distribution of HDI score by county

The distribution of the HDI scores by the 47 counties in Kenya is presented in Fig. 2. The results showed that Western counties had higher HDI values as compared to counties in ASAL (arid and semi-arid lands) areas, which had the lowest HDI scores. It was also evident that counties that were neighbouring higher HDI counties had moderate HDI scores.

Determinants of healthy food consumption in Kenya

Table 5 shows the determinants of eating healthy in Kenya from the multivariable linear regression analysis. The findings indicated that eating healthy was positively and significantly associated with increased aggregate consumption expenditure per adult equivalent, suggesting that the richer the households, the more likely they were to consume healthy foods. In other words, if the aggregate consumption expenditure per adult equivalent increases by 10%, the probability of eating healthy increases by 2.8 percentage points.

The findings show that as the number of household members aged under five increases, the probability of eating healthy increased by 2 percentage points whereas as the number of household members aged 13–19 years and 40–64 years increases, the probability of eating healthy decreased by 1 and 3 percentage points, respectively. Furthermore, being from a male-headed household decreased the probability of eating healthy foods by 5 percentage points. The results also indicated that not having formal education decreased the probability of eating healthy foods by 11 percentage points while being employed increased the probability of eating healthy by 4 percentage points. Living in a rural household increased the probability of eating healthy by 2 percentage points. With regard to marital status, the household head being in union increased the likelihood of eating healthy foods by 4 percentage points.

Table 5
Determinants of eating healthy in Kenya

	Unadjusted Model			Adjusted Model		
	Marginal Effects	95% CI		Marginal Effects	95% CI	
Socioeconomic status	0.23 ^{***}	0.22	0.25	0.28 ^{***}	0.27	0.30
Number of household members of age category						
0–4 years	-0.03 ^{***}	-0.05	-0.02	0.02 ^{***}	0.01	0.03
5–12 years	-0.06 ^{***}	-0.07	-0.05	0.01	0.00	0.01
13–19 years	-0.06 ^{***}	-0.07	-0.05	-0.01 ^{**}	-0.02	0.00
20–24 years	-0.01	-0.03	0.01	0.01	-0.01	0.02
25–39 years	-0.01	-0.02	0.00	-0.01	-0.02	0.00
40–64 years	-0.04 ^{***}	-0.05	-0.02	-0.03 ^{***}	-0.04	-0.01
65+ years	-0.03 ^{***}	-0.05	-0.01	-0.02	-0.05	0.01
Gender of household head						
Female (Ref)						
Male	-0.01	-0.03	0.01	-0.05 ^{***}	-0.08	-0.03
Age of household head age (years)	0.00 ^{***}	0.00	0.00	0.00	0.00	0.00
Education status of household head						
Secondary and above (Ref)						
No education	-0.26 ^{***}	-0.29	-0.23	-0.11 ^{***}	0.15	-0.08
Primary	0.00	-0.02	0.02	0.01	-0.01	0.04
Other	-0.29 ^{***}	-0.41	-0.17	-0.12 ^{**}	-0.23	-0.02
Occupation of household head						
Unemployed (Ref)						
Self-employed	-0.01	-0.03	0.01	0.03	0.00	0.06
Employed	0.05 ^{***}	0.02	0.07	0.04 ^{**}	0.01	0.08
Residence						
Urban (Ref)						
Rural	-0.02	-0.05	0.01	0.16 ^{***}	0.14	0.19
Marital status of household head						
Not in Union (Ref)						
In union	-0.02 ^{**}	-0.04	0.00	0.04 ^{***}	0.02	0.06

Notes: Socioeconomic status = Log of monthly per adult equivalent total consumption expenditure. ** $p < 0.05$, *** $p < 0.01$.
Ref: Reference category. Survey weights were used to account for the survey design and clustering.

Discussion

This study assessed the patterns and determinants of eating healthy in Kenya. The findings indicate that a large proportion of Kenyan households were not meeting all the WHO/ FAO healthy diet recommendations. The HDI score for Kenya was moderate with urban households having higher scores compared to rural households. We also found that eating healthy was associated with socioeconomic status, residence, number of household members aged under five or between 40 and 64 years, and the gender, age, occupation, marital, and education status of the household head. The evidence from this study is useful in informing policies that would support Kenyan households to make healthy food choices.

This study is likely to be the first in Kenya to use a healthy diet indicator to assess patterns of eating healthy. Previous studies conducted in HICs have used a healthy diet indicator [18–20, 34]. The findings of the present study show that the majority of households were not meeting the healthy diet recommendations. This is in line with previous studies conducted in LMICs that show evidence of poor dietary behaviour [6, 35–37]. While Kenya's vegetable and fruit intake was low, it was much higher than what was found in South Africa (32%) [38], and what was found in an analysis that involved 52 LMICs (22%) [36]. A study in South Africa also reported that fruits were considered luxuries that were only bought if money was left over after purchase of staple food [39]. The low fruit and vegetable consumption observed in these countries may be linked to the low supply of fruits and vegetables that has been reported in SSA [40].

The findings show that substantial regional variations exist with regard to eating healthy in Kenya. The Western and Central counties had the highest HDI values indicating healthier eating compared to counties in arid- and semi-arid lands (ASAL). These variations are somewhat expected because of differences in climatic conditions, social and economic factors, among other factors in different regions of Kenya [41].

In the current study, socioeconomic status was a determinant of healthy eating. Our findings showed that eating healthy was positively and significantly associated with a higher socio-economic status. Similar results in a study conducted in Kenya showed that the foods the urban poor could afford were not sufficient for them to meet FAO dietary recommendations [21]. Other studies have also shown that people living in low-income populations have economic limitations that hinder them from eating healthy [22, 23]. The findings were further supported by a study looking at the urban food environment in Africa that found socioeconomic status as an important individual factor influencing dietary behaviours [24]. Other studies have also found that healthy diets cost significantly more which support the link between a higher socioeconomic status and eating healthy [22, 42].

Gender differences exist in choices made regarding the types of foods consumed in a household [25]. Our study found that households headed by a female were more likely to eat healthy. This is consistent with other studies that showed that women generally make healthier food choices by eating more fruits and fibre, avoiding foods high in fats, and limiting their salt intake [25, 27]. A study by Sedibe et al. [39] reported that female caregivers were the main promoters of healthy eating practices.

Our study found that households headed by an educated individual were more likely to eat healthy, which corroborates findings from studies conducted in rural and urban South Africa [43, 44]. Another study in the same setting demonstrated that low education was associated with inadequate fruit and vegetable intake [38].

Urban-rural differences have been reported in healthy diet consumption [36]. Our study found that rural households were more likely to eat healthy compared to their urban counterparts. A systematic review and meta-analysis of salt intake in SSA found a higher consumption of salt in urban areas compared to rural areas [28]. A study conducted in Soweto, South Africa

also demonstrated that urbanization has led to increased consumption of diets higher in energy and containing more salt, saturated fat and sugar [45].

Study Strengths And Limitations

This study has strengths and limitations. A major strength is the use of a nationally representative dataset, which makes our results generalizable to the Kenyan population. Second, this study provides novel information on patterns and determinants of eating healthy in Kenya. Third, the use of the HDI as a continuous score reduced the potential bias of information loss in the outcome variable, which increased the validity of the results. However, there are some limitations to note. Some data were excluded because their nutritional values were not found in the KFCT. The study was cross-sectional thus limiting causality. In addition, data from the study were from 2015–2016 and a lot with regard to eating healthy may have changed. Despite these limitations, this study provides important information on the patterns of eating healthy and associated factors in Kenya.

Conclusions

In conclusion, the majority of Kenyan households do not meet all the healthy dietary recommendations. Furthermore, eating healthy is associated with higher socioeconomic status, living in a rural area, having children under 5 years in the household, and the household head having education, being in employment and in union. The findings from this study can be used to inform policies that promote healthy eating and the prevention of diet-related NCDs among the Kenyan population.

Abbreviations

ASAL	Arid and semi-arid lands
CI	Confidence Interval
FAO	Food and Agriculture Organization
HDI	Healthy Diet Index
HICs	High-income Countries
KFCT	Kenya Food Composition Tables
KIHBS	Kenya Integrated Household Budget Survey
KNBS	Kenya National Bureau of Statistics
LMIC	Low- and middle-income country
NCD	Non-communicable disease
PCA	Principal component analysis
PCA	Principal Component Analysis
SD	Standard deviation
SSA	Sub-Saharan Africa
USD	United States Dollar
WHO	World Health Organization

Declarations

Ethical approval and consent to participate

This study utilized anonymized data from the KIHBS, which is publicly available from the KNBS, thus this study did not require institutional review board approval. The KNBS sought ethical approval and study participants provided informed consent before participating in the survey.

Consent for publication

Not applicable

Availability of data and materials

This study used publicly available data from the Kenya National Bureau of statistics.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

EW and SM conceptualized the study, reviewed literature, contributed to data analysis and prepared the initial draft of the manuscript. EW, SM, LK, JO, IK and PI made substantive contributions to the development and review of the manuscript. SK and HD supported data analysis for this study. All authors read and approved the final manuscript before submission for publication.

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Figures

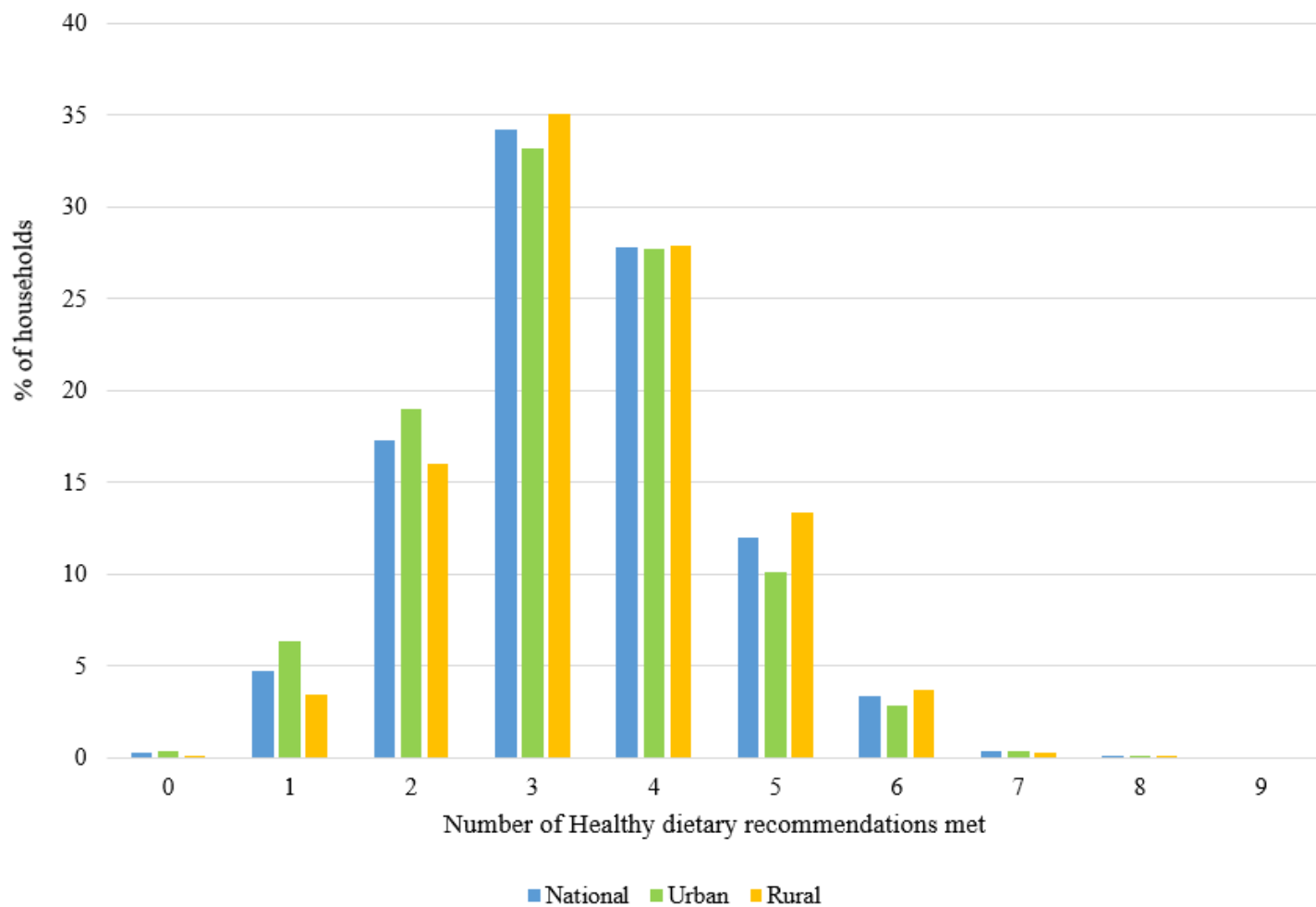


Figure 1

Proportion of Kenyan households meeting WHO/FAO healthy diet recommendations overall, and by residence

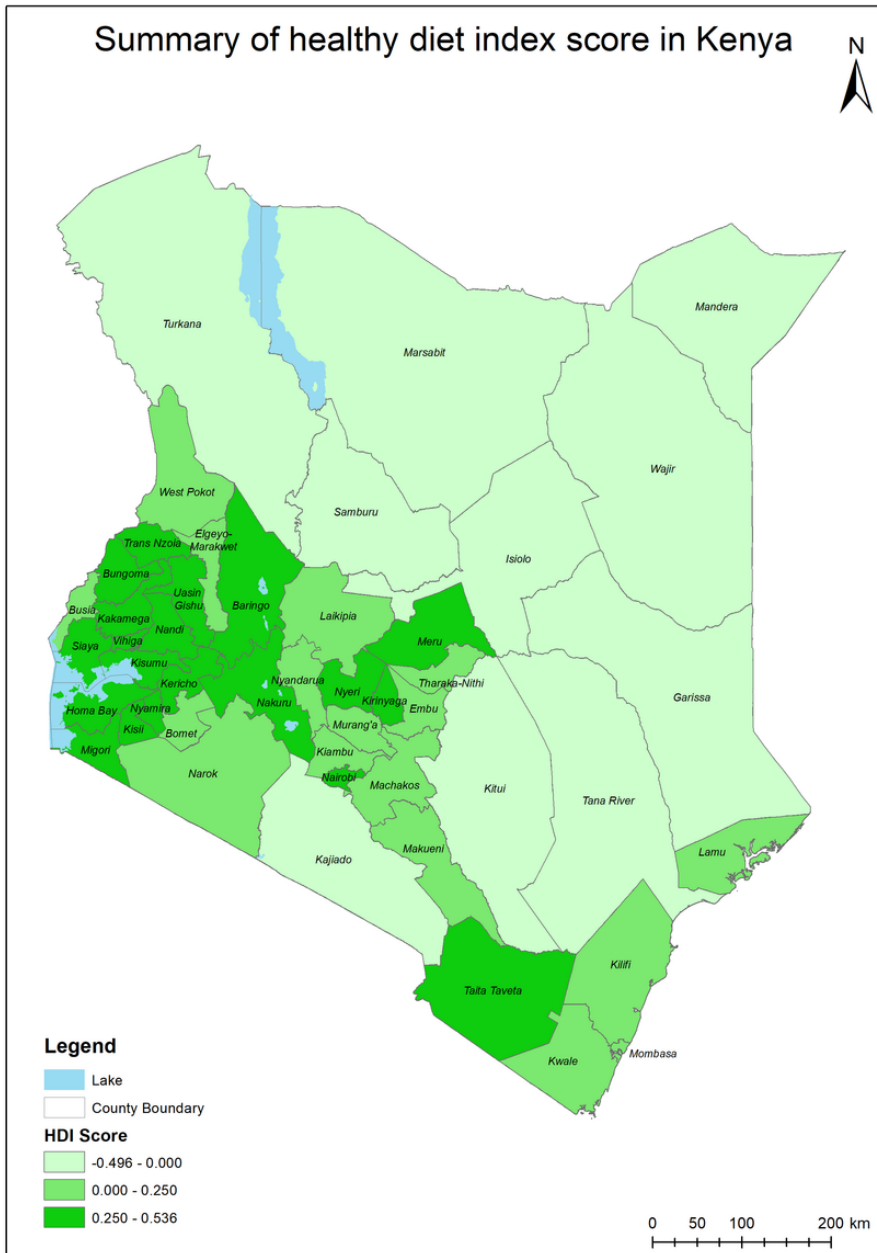


Figure 2

The distribution of HDI scores in Kenya by county

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