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Key Words

Food security; Access to market; Diversity of foods; Highly consumed foods

Short Communication

Availability, Accessibility, and Diversity of The Highly Consumed Foods in A Rural Setting in Western Kenya

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Abstract

Drift in the consumption of particular foods in a setting affects the pillars of food security. To avert the drift that results in adverse nutritional outcomes, there is a need to assess the consumption of highly consumed foods in a particular area for an evidence-based approach to policy formulation. This study was undertaken to determine access to food, own food production, market access, and consumption patterns of foods, as well as the diversity of highly consumed foods in rural areas of Western Kenya. The study employed a cross-sectional design incorporating purposive and multi-stage simple random sampling and was analyzed using Python software. The data was presented in tables and charts. From the results, 53.6% often have no food, 44.8% sometimes consume smaller meals, 43.8% sometimes were worried about food, 40% complained about the limited variety of food, and 39.3% sometimes consume fewer meals. Further, 81.2% of the respondents rely on farming for food, and 59.4% of the respondents access the market on foot, 26.6% by motorcycle, and 14.1% by bicycle. In addition, vegetables and grains were consumed an average of more than five times a week. The study shows the drift of food pillars with the diversity of vegetables, but not on grains. To address the drift, there is a need to improve the access and diversity of foods. The improved diversity of grains will compliment already existing diversified vegetables resulting into a good health outcome.

Introduction

Food security is defined as a situation that exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for a healthy and active life [1,2]. However, a drift in the pillars of food security (Food availability, accessibility, utilization, and stability) results in food insecurity that poses severe negative health outcomes [3,4]. According to the United States Department of Agriculture (USDA), food insecurity is defined as a state that exists when there is a limited social and economic household-level condition or uncertain access to sufficient food [6,7] Within a household, food insecurity occurs when, at certain times or seasons in a year, a household is unable to acquire enough food for the household members due to insufficient food, inadequate money to buy food, or inability to access food [5-7].

Studies show that more than 300 million people suffer from acute food insecurity in 74 countries internationally. Globally, one in four people (about 2 billion people) suffered from moderate to severe food insecurity in 2017 and 9.2 percent in 2018, within Sub-Saharan Africa (SSA) and South Asia, contributing the greatest number. In SSA countries, almost one-third of the population is severely food insecure, and about 51 percent of Kenyans have limited access to sufficient food. As a result of prolonged food insecurity, individuals usually die from starvation, diseases, and malnutrition [1,8,9].

Agricultural production is the primary source of livelihood and food among the majority of households and is the leading contributor to gross domestic production (GDP) [20]. In Kenya, food and cash crop production and rearing of animals account for 70 percent of informal employment in the rural areas and 65 percent of the national exports [10]. Despite the over-dependence, the agriculture sector faces several challenges in Western Kenya including climate change, rapid population growth, overreliance on rain-fed agriculture, inadequate land, high rate of youth unemployment, and rural-to-urban migration. This leads to fluctuating food prices, agricultural policies, and inadequate production of foods, posing a direct effect on the demand for food [11,12]. These challenges are a potential risk to household nutritional adequacy and thus pose a compelling reason for behavioral changes in food utilization and consumption, agricultural production, and policy implementation towards dietary diversification to eradicate malnutrition [10,13]. This study therefore, was undertaken to assess the access to food, own production of foods, access to market, and consumption patterns of foods, and diversity of highly consumed foods in rural western Kenya.

Materials and Methods

Study Design and Variables

A cross-sectional study was conducted among 64 smallholder farming households in Gem and Rarieda sub-counties of Siaya County, Kenya. To ensure a representative sample, a multistage sampling approach was used, involving stratification followed by simple random sampling. Data were collected using semi-structured questionnaires administered through household interviews, and information on the availability, accessibility, and diversity of commonly consumed foods in rural settings. The variables were food access, household food production, food consumption patterns, and dietary diversity. Siaya county is situated in the Lake Victoria Basin in Western Kenya. The county borders Homabay county to the South, Busia county to the North West, Vihiga and Kakamega counties to the North East and Kisumu County to the South East.

It has six (6) sub-counties namely: Bondo, Alego Usonga, Gem, Rarieda, Ugenya, and Ugunja. It has a population of 993,183 people and covers an area of approximately 2,496.1 km². The main farming systems comprise cereal crops intercropped with food legumes and integrated with livestock.

Target Population

The target population in this study consisted of smallholder farmers (SHFs) residing in Rarieda and Gem sub-counties of Siaya County, Western Kenya. Eligibility criteria included residency in either of the two sub-counties for at least five years prior to the survey, active engagement in sorghum farming for a period of at least 2 years or willingness to initiate sorghum cultivation, ownership of at least one-eighth of an acre of land or readiness to allocate such a portion for sorghum farming, non-participation in similar projects implemented by other organizations, and willingness to engage in sorghum value addition activities. Exclusion criteria included individuals who were ill or mentally unstable and thus unable to provide informed consent, those who were outside the study area at the time of data collection, and minors whose parents or guardians were unable to provide consent on their behalf.

Sample size and sampling

A multi-stage sampling technique was employed to obtain a representative sample for the survey. A sampling frame, comprising a list of all farmers in the two Sub-Counties—Rarieda and Gem—was compiled with the assistance of Sub-County and Ward Crop Officers. The list included a total of 184 farmers, with 92 farmers from each Sub-County. The ward served as the smallest sampling unit, and participants were selected proportionally based on the number of farmers in each ward relative to the total number in their respective Sub-Counties.

Farmers from Gem and Rarieda sub-counties were stratified by place of residence, age, education level, and disability status. Within each stratum, simple random sampling was used to select participants. This was done by writing "Yes" and "No" on folded pieces of paper, shuffling them, and allowing farmers to pick one. This process was repeated until the target sample size for each ward and subsequently for each sub-county was achieved.

In Rarieda Sub-County, which had 92 farmers, the distribution was as follows: 59 farmers in West Asembo (64.13%), 5 in North Uyoma (5.43%), and 29 in West Uyoma (31.52%). Based on this distribution, a total of 33 participants were selected proportionally: approximately 21 from West Asembo, 2 from North Uyoma, and 10 from West Uyoma. Of these, 16 were males and 17 were female. In Gem Sub-County, which also had 92 farmers, the distribution was: 15 farmers in North Gem (16.30%), 37 in South Gem (40.22%), 22 in West Gem (23.91%), and 18 in East Gem (19.57%). Accordingly, 31 participants were selected from Gem: approximately 5 from North Gem, 13 from South Gem, 7 from West Gem, and 6 from East Gem. Among them, 7 were male and 24 were female. This proportional allocation ensured fair representation of farmers across wards within each Sub-County based on their relative population sizes.

Data collection procedure

Quantitative data collected included demographic information (e.g., age, gender, education level, occupation, religion, physical condition, and household size), socio-economic indicators (e.g., food expenditure, sources of household income, food and water sources, lighting and cooking methods, and type of housing), and household food security information (e.g., food access and the Household Food Insecurity Access Scale). Data on agricultural practices, value addition, consumption, and training history were also collected. Structured questionnaires, administered under supervision by trained enumerators, were used to collect quantitative data.

Data analyses

Quantitative data were first entered into Microsoft Excel, then exported to the to Python using Pandas within a Jupyter Notebook for analysis. Statistical Package for the Social Sciences (SPSS, Version 21) for analysis. The data were coded, and frequency checks were performed to identify and correct any missing values before conducting the final analysis. Descriptive statistics including demographic information, socio-economic indicators, and household food security information were presented using tables and charts.

Ethical consideration

The study protocol for Ndaloh Heritage Orgaization was authorized by the County Health Management Ethics Committee of Siaya, Kenya.

Results

Demographic characteristics of respondents

The study involved 64 study participants, females constituted 64% (41) of the respondents. It was also evident that 60.9% (39) of the respondents were above 50 years, 28.1% (18) were between 30-49 years, and 10.9% (7) were 18-29 years. On marital status, 75% (48) of the respondents were married, 20.3% (13) were widowed, 3.1% (2) were divorced, and 1.6% (1) were single. In terms of education level, 63.5% (41) had attained primary education, 27.0% (17) had attained secondary education, and only 9.5% (6) had completed college or university education. Furthermore, 76.6% (49) reported to be Christians, 20.3% (13) believed in traditional religion, while 1.6% (1) accounted for Muslims and others (Table 1).

Table 1: Demographic characteristics of respondents.

PARAMETER	FREQUENCY(n)
SEX	
Females	41 (64.1%)
Males	23 (35.9%)
AGE BRACKET	
50+	39 (60.9%)
30-49	18 (28.1%)
18-29	7 (10.9%)
MARITAL STATUS	
Single	1 (1.6%)
Married	48 (75.0%)
Divorced	2 (3.1%)
Widowed	13 (20.3%)
EDUCATION LEVEL	
Primary	41 (63.5%)
Secondary	17 (27.0%)
College/University	6 (9.5%)
RELIGION	
Christian	49 (76.6%)
Traditional	13 (20.3%)
Muslim	1 (1.6%)
Others	1 (1.6%)

Household Food Insecurity status

The findings from the assessment of household food insecurity status show that more than 40% of the respondents sometimes worried about food, complained about limited variety of food, and consumed smaller meals and fewer meals. Further, 44.1% rarely could not consume their preferred food, 37.5% rarely missed what they wanted, and 53.6% often had no food (Figure 1).

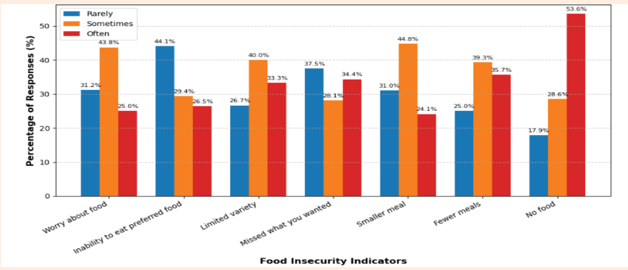

Figure 1: Food insecurity access in households.

Types of foods available and accessibility

Figure 2 shows that more than 60% of the respondents' diets consisted of fruits, vegetables, roots, tubers, pulses, and legumes. However, only 7.7% consisted of meat and fish, indicating a limited reliance on animal-based food sources (Fig. 2A). In terms of methods of food access, 81.2% of the respondents rely on farming for food, 51.6% on buying and 1.6% on food aid (Figure 2B).

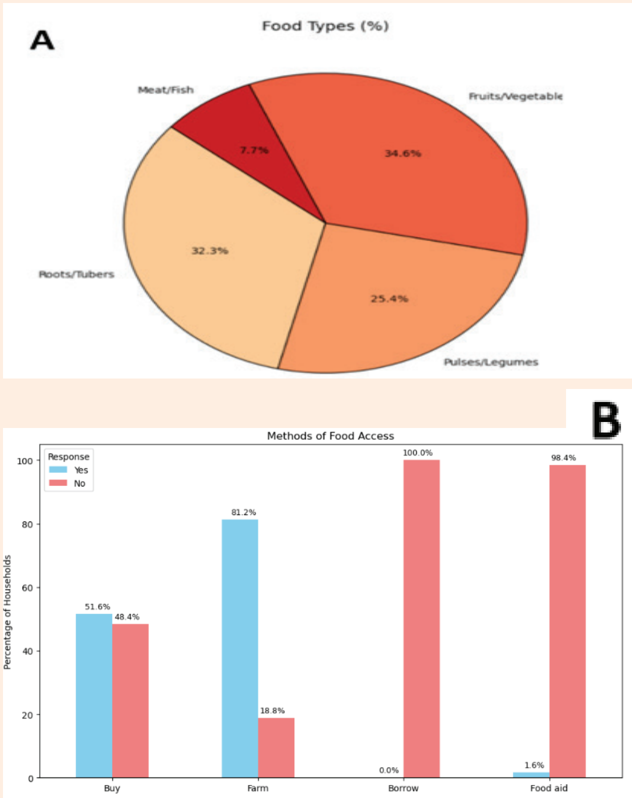

Figure 2: Types of foods obtained (A) and methods of food access (B) by the respondents.

Accessing the market

The study shows that 59.4% of the respondents access the market on foot, 26.6% by motorcycle, and 14.1% by bicycle (Figure 3A). Besides the means of transport, the study also showed that 59.4% of the respondents stay between 5 to 10 kilometers whereas 26.6% stay less than 5 kilometers to the market (Figure 3B). Comparatively, the market is easily accessible thus a high dependence on non-motorized and affordable forms of transport.

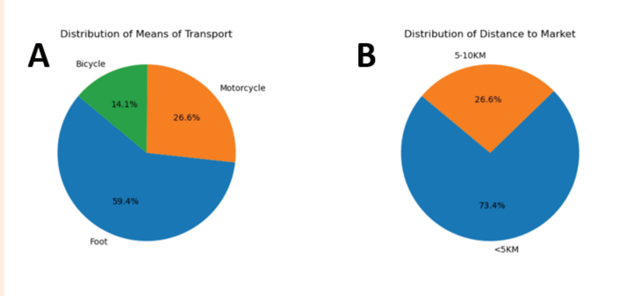

Figure 3: Means of transport (2A) and distance to the market (2B).

Consumption patterns of food groups

Vegetables and grains were consumed an average of more than five times in a week, while fats, sweets, and dairy were consumed four times as shown in Figure 4. Fruits, meat and alternatives, and eggs were consumed 2.5, 1.8, and 1.2 times in a week. The findings show evidence of food diversity; however, plant-based foods are widely consumed as opposed to animal-based foods (Figure 4).

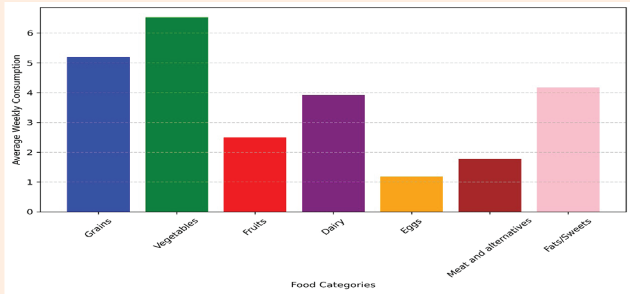

Figure 4: Consumption patterns of food groups.

Production of African Leafy Vegetables (ALVs)

Figure 5 shows that the commonly planted ALVs included 'osuga' (black night shade) at 28.2%, 'boo' (cow peas) at 21.8%, 'dek' (spider weed) at 20.2%, and 'mito' (clotalaria) at 15.3%. Other notable varieties included 'ododo'(amaranth) at 8.1%, 'kadhira' (Ethiopian kale) at 3.2%, 'apoth' (jute mallow) at 2.4% and 'atipa' (asystasia) at 0.8%. The data indicates a preference for a few dominant varieties, with 'osuga' and 'boo' making up nearly half of all ALVs planted.

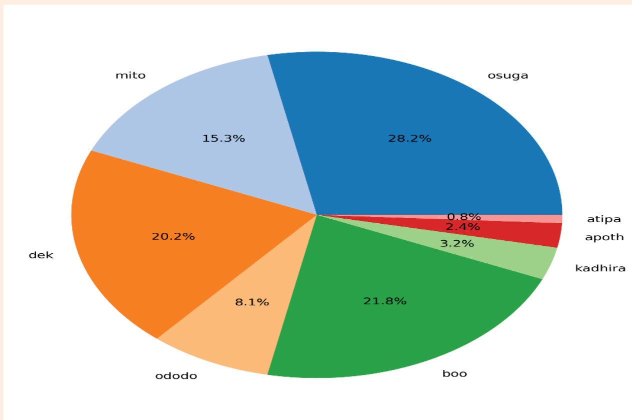

Figure 5: Production of ALV Varieties planted.

Discussion

The study shows that people in the rural western Kenya rely on own farming to access food and there is limited access to the market. In addition, it shows that people consume diversity of vegetables but for the grains, there is limited diversity – people depend on maize as a source of grain. In rural settings, most households depend on their own food production as the main source of food and surplus sold to generate income. The income is used to purchase other foods that are not produced by the household. Other studies show that a combination of own production and market purchase of food contributes greatly to household diet diversity and quality [14]. In this study, we have observed that households produce vegetables, certain grains, cereals and crop species. In other words, households depend on both their production and purchase from the market as a way of improving access to food. The study shows that the diets of people from rural settings are largely plant-based consisting of vegetables, roots, tubers, pulses, and legumes, and are easily grown within the household. However, animal-based products such as meat and fish are mainly obtained from the market.

In SSA, farm sizes are relatively small despite the rapid population growth and climate change that has reduced agricultural productivity that seems to be growing though at a slower pace compared to other regions globally [15]. The situation becomes more complicated in the rural setting that has limited access to modern technologies for food production and preservation. Individuals tend to resort to purchasing food that is produced from other regions from the markets, that are not far away as a means to achieve nutritional adequacy [15,16]. In this study, markets are less than 5 kilometers away thus residents are able to reach them by foot or use affordable forms of transport such as bicycles or motorbikes.

Agricultural especially small-scale farming is the main driver of income in the rural setting in the developing countries. A study by Bjornlund et al. (2019) reported that small scale farming in the rural areas of Mozambique, Zimbabwe and Tanzania account for 27%, 49% and 73% of household income respectively [17]. Within a household, fluctuating food prices, increased health expenses, loss of employment, poverty, crop pests and diseases, and increased debt pose risks to livelihood. Further, poor infrastructure, poor road networks, and impoverished distribution systems pose negative risks negatively in food accessibility and availability. These challenges lead to over-reliance on food that is produced on the own farm [18]. In this study, people from Western Kenya in rural settings consume vegetables and grains more than five times a week that are locally produced.

Despite efforts to purchase food from the markets, most of the individuals in the rural setting have inadequate marketing and purchasing skills, limited knowledge on nutrition and insufficient support from other organizations [19]. In this study, there is a high dependence on fats, sweets, dairy products, meat and alternatives from the market despite their high costs and perceived health effects. This negatively impairs household food security.

The study confirmed that a lack of marketing skills, institutional support services, and limited access to arable land, have directly negative effects on achieving livelihood outcomes. This study recommends a sustainable crop production method which reduces the costs of farming resources, such as pesticide and fertilizer, through organic methods to ensure food safety and enhanced nutrient quality. This study further encourages inclusive rural development, where small-scale producers are treated as stakeholders in agricultural policy formulation to enable access to financial resources and increase in production through the formation of cooperatives. In Kenya, agricultural production is mainly dominated by females and is the main driver in transforming existing agri-food systems [20]. This is confirmed in this present study where more than 50 percent of the respondents were females Worth noting, the majority of the respondents were aged 50 years above and the least are the youths aged 18-29 years. Most youths are not involved in farming activities and are mainly domiciled in urban areas leaving the elderly with no option [21]. This contributes negatively to food production [10,13].

It is also evident that household food insecurity is still a menace in Western Kenya. For instance, despite participating in agricultural production, more than 40 percent of the respondents often have no food and could rarely consume their preferred foods. Further, 40 percent of the respondents reported sometimes worrying about food, complaining about a limited variety of food, and consuming smaller meals and fewer meals as a means to mitigate the problem.

Although there is evidence of household food insecurity, foods such as fruits, vegetables, roots, tubers, pulses, and legumes are easily available and accessible. Foods are mainly obtained through their own production or purchase. It is worth noting that plant-based foods are obtained through their production (farm) while animal foods are obtained through purchasing from the nearby markets. Regardless of Rarieda and Gem sub-counties bordering Lake Victoria, respondents reported to depend mostly on plant-based foods such as vegetables and grains as opposed to animal-based foods such as meat, fish, milk, sardines, and eggs.

Moreover, respondents reported to be planting African leafy vegetables such African nightshade (*Solanum scabrum*), cow peas (*Vigna unguiculata*), spider plant (*Cleome gynandra*), amaranth (Amaranthus spp.), Ethiopian kale (*Brassica carinata*), jute mallow (*Corchorus olitorius*), and asystasia (*Asystasia gangetica*). ALVs consists of most African diets since they are culturally accepted and easily grow in tropical environments such as western Kenya. Despite having certain anti-nutrients, ALVs contain micronutrients such as iron, magnesium, phosphorus, B-complex and ascorbic acids that are vital in reducing malnutrition.

The limitation of the study

This study utilized a cross-sectional design, where variables were assessed at a single point in time, in particular, food security data at one point in time makes it difficult to assess seasonal or temporal variations. Also, the recall bias presented a potential limitation, as participants might not have accurately remembered past events or might have provided socially desirable responses. Selection bias especially on the sub-counties as the survey may not fully represent the county, where policy formulation takes place. To address these limitations, a comprehensive and up-to-date sampling frame was utilized, and efforts were made to ensure representativeness of the selected participants. The recall period was kept short to improve accuracy, and the survey questions were designed to be as objective as possible in order to minimize both recall and social desirability biases. These steps were taken to enhance the validity and generalizability of the findings.

Conclusion and Recommendations

The study shows drift of food security in the rural western Kenya, specifically, people rely on own farming to access food and there is limited access to the market. In addition, there is diversity of vegetables but limited for grains. To improve food security, the diversity of grains should be improved. The improved diversity of grains will compliment already existing diversified vegetable to reduce high prevalent adverse health outcomes.

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Declaration of Interest Statement

There was no conflict of interest among authors and project partners.

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