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DIETARY PATTERNS IN UGANDA AND THEIR INFLUENCING FACTORS: A CRITICAL REVIEW

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ABSTRACT

Improving the understanding of dietary patterns and underlying factors remains crucial in designing nutritional interventions and policy making. This review sought to provide a holistic picture of the studies covering dietary patterns in Uganda and the associated factors so as to identify gaps in existing literature and provide a basis for nutrition-sensitive interventions. A literature search for publications dating from March 2010 to 2021 was done using the terms dietary diversity, nutrient intake, food consumption and food choices in Uganda. Studies covering populations above 6 months of age, male and female, with exception of diseased populations, were screened. Because of the variability in the methodologies for assessment of dietary intake and dietary diversity, meta-analysis was not conducted. A total of 17,728 articles were found and 25 studies met the inclusion criteria. Nine of the 25 studies reported on dietary diversity indicators and their associated factors. The literature shows that diets in Uganda are mainly composed of starchy staples, especially cereals, roots, tubers and bananas, with legumes constituting the main protein source. The diets are characterized by low consumption of fruits and vegetables as well as animal protein sources. The share of food expenditure allocated to the different food groups corresponded to information on consumption for the different groups. Studies revealed that household food expenditure was higher among urban households, an observation attributable to their high reliance on food purchases to meet food requirements. The share of household expenditure on cereals and staples was reported to decrease with increasing wealth quantile and was lower among urban households. An opposite trend was reported for animal protein sources. Across the different studies, the mean dietary diversity score was above three (3). Nonetheless, intake of micronutrients and the mean dietary energy consumption (DEC) were reported to be lower than the daily recommended values. Given the lack of uniformity in the indicators across the different studies and differences in methodologies especially for dietary diversity scores, the existing research is inadequate for establishing quantitative evidence on the trends in dietary patterns and diversity, gender and age group differences in relation to dietary patterns. There is a need for high-quality, nation-wide research using validated tools and methodologies to measure dietary patterns and trends and explore the relation to gender and age groups.

Key words: Food consumption, Food choices, Dietary Patterns, Uganda, Dietary diversity

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INTRODUCTION

Malnutrition is a global burden responsible for more ill health than any other cause [1] especially among children under five years. Globally, about 150.8 million and 50.5 million children under five years of age are stunted and wasted, respectively [1], with Africa accounting for more than one third and a quarter of these figures, respectively [2]. In Uganda, the level of malnutrition is still high with 29% stunting and 4% wasting levels among children under five years [3]. This stems from the food and nutritional security situation [4]. A survey of Ugandan households indicated that 6.3% were food insecure while 21% were on the verge of food insecurity due to poverty, inequality and drought [5]. The food security situation in Uganda has been reported to influence the dietary behavior and consumption patterns [4]. These patterns differ by region and setting. While urban-based households rely largely on purchases for food availability, majority of rural households derive much of their livelihood and food availability from agriculture (own production) [3].

Literature search did not expose any existing review articles focusing on dietary and consumption patterns and trends in Uganda. Nonetheless, a few studies have been conducted to examine consumption and dietary patterns, as well as underlying factors. Therefore, the current study, sought to review existing literature on the food consumption and dietary patterns, choices, and the underlying factors in Uganda, in order to identify gaps in the existing studies and ultimately the need for nutrition-sensitive interventions.

METHODS

A critical review of quantitative data was conducted, covering the period 2010 to 2021. The databases used for the literature search included: Google Scholar, PubMed, Sciencedirect.com and additional material from grey literature (unpublished PhD Theses, data from FAOSTAT and the Uganda National Bureau of Statistics databases). The search words of focus included dietary diversity, nutrient intake, food consumption and food choices in Uganda.

Inclusion and exclusion criteria

The inclusion criteria were: (i) data and articles published or written in the last decade (between 2010 and 2021), (ii) articles published in scientific journals and PhD level theses, (iii) articles whose study population was regional or national in Uganda.

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The exclusion criteria included: (i) review articles to minimize inclusion bias, (ii) non peer-reviewed articles, (iii) non-published material (such as non-PhD theses, posters and reports), (iv) articles or PhD theses published before the last decade (before March 2010). Duplicate studies, studies that examined diseased populations and populations below 6 months of age were excluded.

Following the search, 2,948 articles were initially selected from a total of 17,728 found. Screening using article titles led to reduction of the articles to 62. The number reduced further to 31 upon abstracts screening and to 25 after screening based of the full article text (Figure 1).

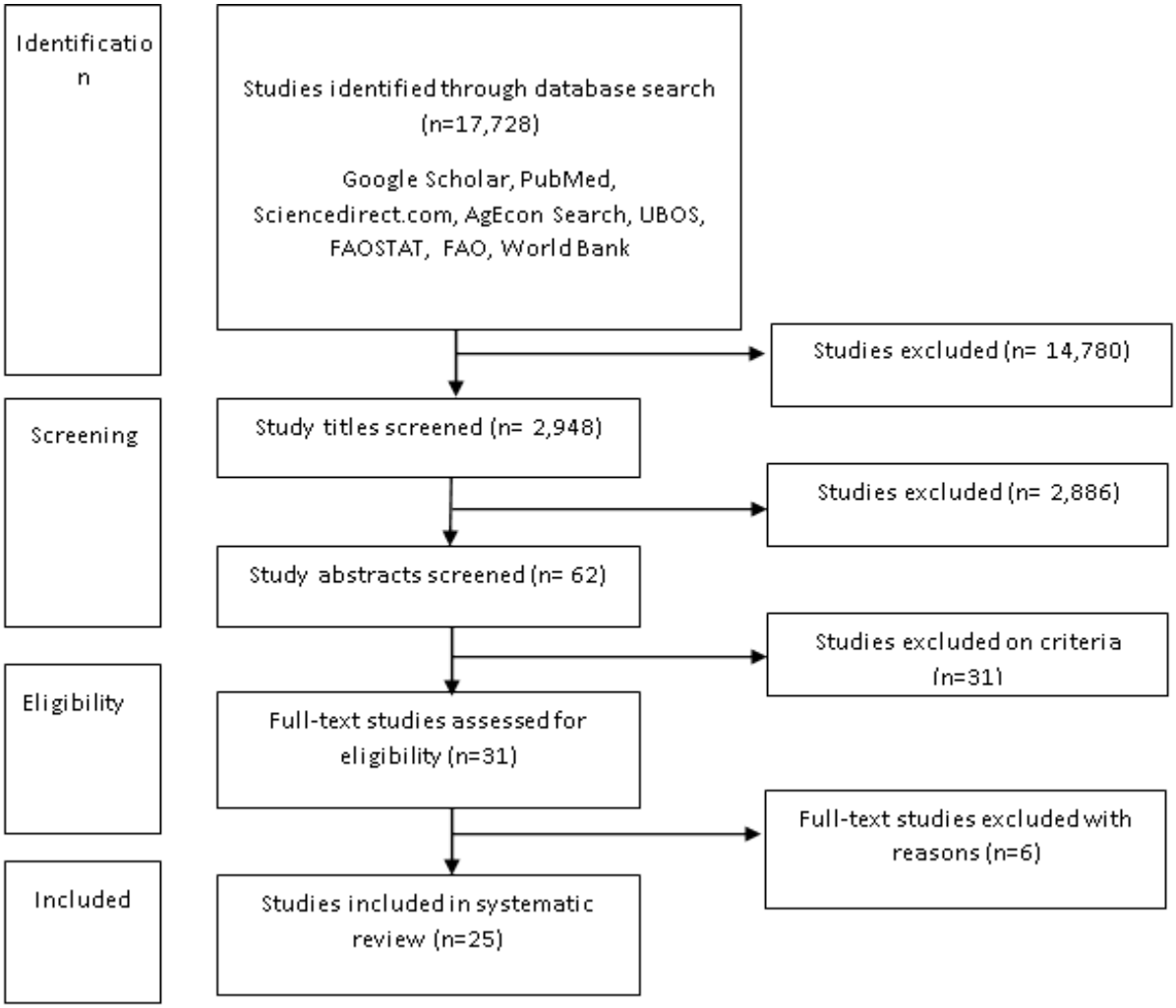

Figure 1: Flow diagram for selection and inclusion of studies in the critical review

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RESULTS AND DISCUSSION

Food consumption and dietary patterns in Uganda

Studies and research on food consumption and dietary patterns in Uganda have been limited and largely region-specific. Among the 25 articles selected for critical review, after screening, 13 covered food consumption and dietary patterns in Uganda. These differed with respect to population segment studied, geographical scope and indicators assessed. From the review, it can be observed that Uganda is experiencing a transitioning diet, manifesting elements of the 'Westernized' diet and traditional dietary attributes. The traditional diet is a high-carbohydrate meal, with a protein source (mostly plant based), often deficient in micronutrients [3, 6]. The 'Western diet' is associated with increased risk of obesity and nutrition-related non-communicable diseases [7]. Even with the transition, the diet remains predominantly plant-based [3, 7].

Caloric intake

Three data sources reporting on caloric intake were found [8, 9, 10]. Mean dietary energy consumption (DEC) has slightly increased over the past five years and is reported to be lower than 2,400 kcal per person daily [8, 9, 10] (Figure 2). The largest contributors to DEC by category are, cereals and their products (29.3%), roots and tubers (16%), plantains and bananas (12.4%), pulses and nuts (11.7%) and oils and fats (9.5%) [10] (Figure 3). Among the commodities, maize and its products, plantains and bananas, cassava and its products, fats and oils are the major contributors to DEC [10]. The contribution to DEC from cereals, pulses and nuts has been declining while that of roots, tubers, plantains and bananas has been increasing (Figure 3). The contribution of the starchy staples, nuts and pulses to daily caloric intake does not significantly vary across rural and urban areas, contrary to animal protein sources, oils and sugar, that are higher in urban areas [9].

Dietary energy consumption has been reported to be generally higher in urban households as opposed to their rural counterparts (Figure 2). The largest share of the DEC in urban households comes from food purchases (77%), while rural households have been reported to have a larger share of the DEC from own-produced food (42%) [9]. Uganda Bureau of Statistics (UBOS) [9] reported regional differences with respect to contribution of purchased food to DEC, showing that households in Kampala (88%) had the highest share of their DEC from food purchases, those in Kigezi (53%) had the highest share of their DEC from own production while those in Karamoja (11%) had a significant share of their DEC from food received in-kind. The latter is attributable to the large proportion of food relief

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distributed in this region. Additionally, households in the highest wealth quintile had a higher DEC (2,452 kcal/person/day) compared with those in the lowest quintile (1,809 kcal/person/day), an indication of disparities in food access [9].

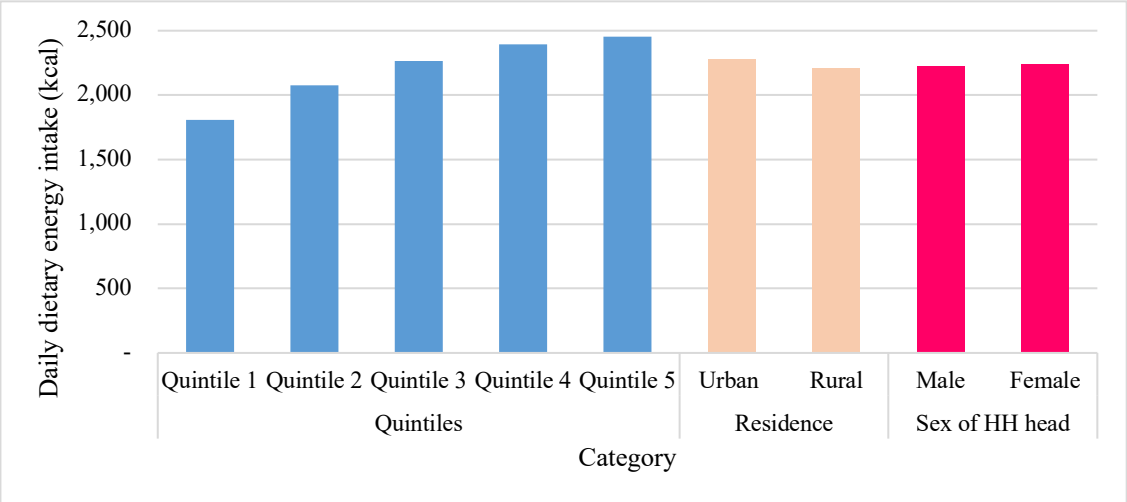

Figure 2: Mean dietary energy consumption (kcal per person per day) of different population segments in Uganda
Source: [9]

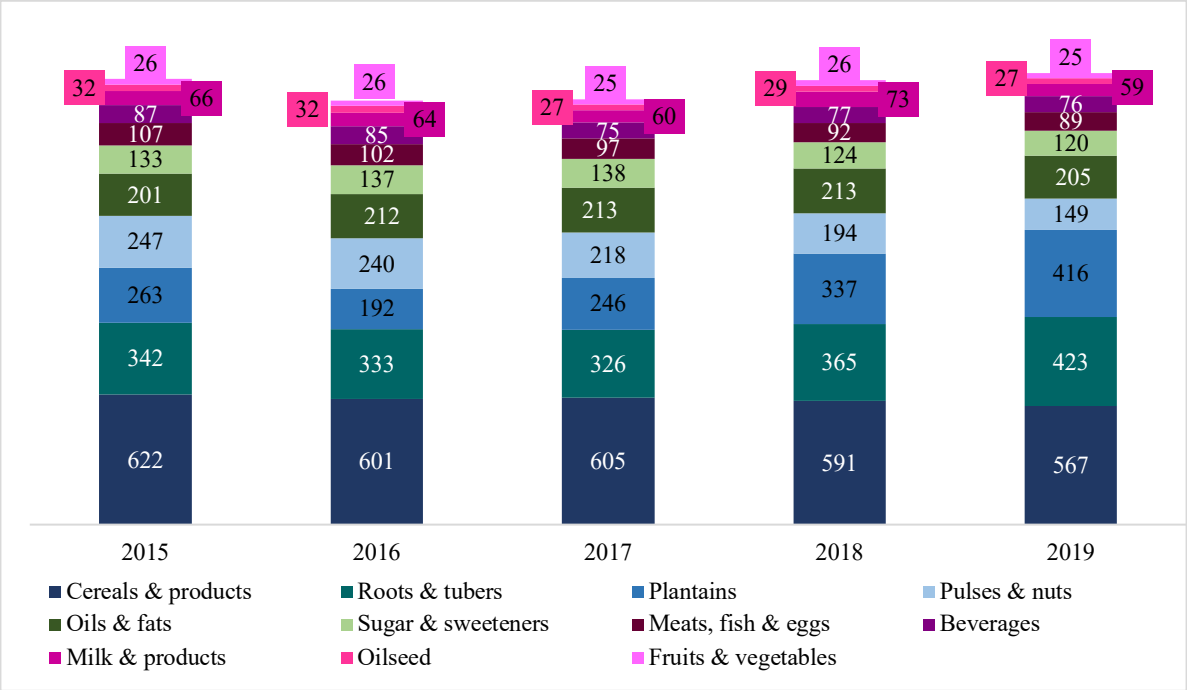

Figure 3: Contribution of different food categories to daily energy consumption
Source: [10]

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Micronutrient intake

There are scanty studies examining micronutrient intake, with only four meeting the inclusion criteria for this review [3, 8, 11, 12]. Micronutrient intake was largely through supplements, despite there being interventions to promote consumption of biofortified foods such as vitamin A fortified cooking oil, maize flour and wheat flour, table salt, fortified baby food, iron-rich beans and Vitamin A biofortified sweet potatoes. A nation wide study by UBOS and ICF reported that 8% of children (6-23 months) had received the vitamin and mineral powder supplements [3]. Additionally, among children aged 6-59 months, 7% and 62% had received iron and vitamin A supplements, respectively in the 6 months before the survey. While 86% of women took iron supplements at least once during their most recent pregnancy, only 23% took them for 90 days or more. Approximately, 1 in 10 women (12%) took no iron supplements [3]. With exception of iron, the mean intake of micronutrients (vitamin A and zinc) has been reported to be lower than the recommended values [8]. In a nationwide survey, rural children were less likely (38%) to have eaten iron-rich foods than urban children (47%), a difference attributed largely to disparities in access [3]. Of all households included in the study, 8% had no salt, 1% had salt that was not tested, and among households in which salt was tested, 99% had iodized salt. Karamoja region had the highest proportion of households without salt (32%) [3]. A proportion of micronutrients are derived from fortified foods by consumption of the vehicle foods. In Uganda, up to 85% of the oil in the market is fortified with vitamin A [11] and the levels of fortification of both sugar and oil result in the delivery of 95% and 91% of the daily EAR (Estimated Average Requirement) of vitamin A, respectively to the average consumer [12]. Fiedler and Afidra [12] reported that 58% and 61% of individuals purchase some amount of oil and sugar, respectively, with the average per capita consumption at 15.7 g/day and 32.6 g/day for fortified vegetable oil and sugar, respectively. Of the 61% of individuals reported to purchase sugar, 72% (which translates to 44% of the study population) also were also found to purchase fortified vegetable oil.

Dietary diversity

Nine (9) studies of those reviewed, assessed dietary diversity or its indicators and fitted the inclusion criteria. One of the studies sub-categorized the dietary patterns, based on data from the 2008 Uganda Food Consumption Survey (cross-sectional) [7]. In this study [7], the patterns were categorized into: (i) the “traditional, high-fat, medium environmental impact,” (ii) “transitioning, processed, low environmental impact” (high intake of bread and buns, rice and pasta, sugar and sweeteners and tea), (iii) animal-based, high environmental impact (animal sources), and (iv) plant-based, low environmental impact (a diverse mix of plant-based food groups, that is,

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fruits, vegetables, legumes, roots and tubers and cereals). The study reported that while the traditional, high-fat dietary patterns with medium environmental impact was common among both rural and urban women of reproductive age, urban residency was positively associated with both the "transitioning, processed, low environmental impact" and the "animal-based, high environmental impact." Urban residency was negatively associated with the "plant-based, low environmental impact" dietary pattern.

From the review, it is established that generally, Ugandan diets are mainly composed of starchy staples especially cereals, roots, tubers and bananas, with legumes constituting the main protein source while consumption of fruits and vegetables and animal source proteins is low, as presented in Figure 4. A study in Acholi and Teso sub-regions revealed that the most common food groups that were consumed by women of reproductive age (15-49 years) were cereals, roots and tubers (89%) [13]. This is similar to the findings in south-western and northern regions that revealed that over 80% of households consumed roots, tubers and plantain [14]. In terms of consumption, these starchy staples are followed by cereals and pulses [13, 14]. In all the regions and studies, the least consumption has been reported for animal source proteins, specifically, meats, fish, dairy and eggs, across all population groups. The urban population has been reported to consume a more varied diet, incorporating more animal products than the rural counterparts [3, 7].

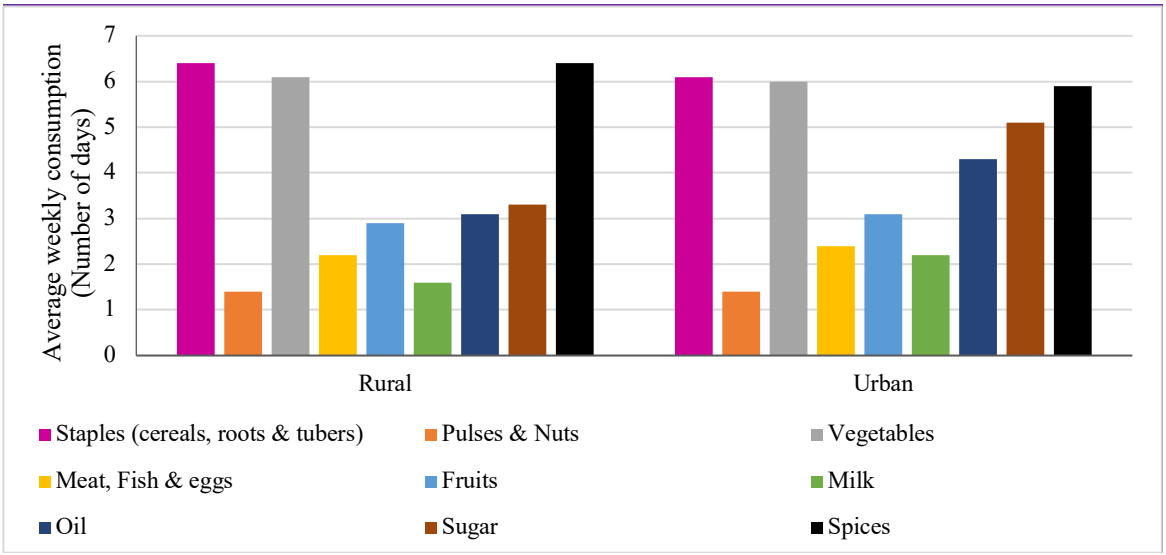

Figure 4: Average food consumption patterns over a 7-day period by food groups - 2016/17
Source: [9]

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Literature shows low consumption of fruits and vegetables in Uganda. Among households, less than 15% were reported to be meeting their daily requirement for fruits and vegetables of five or more servings [15, 16]. In a study among school going children and adolescents, more children (46%) consumed the daily vegetable recommendation than the young adolescents (26%) and older adolescents (18%) [17]. Among children aged 6 to 23 months, consumption of vitamin A rich foods increased with age, ranging from 47.8% to 75.8% [17].

Table 2 presents the summary of findings of the different food consumption indicators in Uganda. The dietary diversity score (DDS) indicators were reported on by nine of the reviewed studies. The different studies presented varying methodologies especially regarding the number of food group categories considered in the computation of the DDS (Table 1). Across the studies, the mean value was above three food groups across the different regions [8, 18, 19, 20, 21]. The scores have been reported higher in northern (4.41) and south-western (4.06) regions.

With the exception of children aged 6-23 months, the proportion of persons meeting the recommended minimum dietary diversity decreased with age, with the lowest registered among adult females and the highest among children aged below 5 years (Table 2). The proportion of children below 2 years (24 months) meeting the minimum dietary diversity was reported to be lowest at 30% [9], which corroborates with the fact that less than 20% of them get the minimum acceptable diet and only 42% get the minimum meal frequency. Women exhibited the lowest individual dietary diversity, lower than the household dietary diversity score (HDDS), with average scores of less than 3.5 in both northern and south-western regions, only higher than the scores for children below 24 months of age. Dietary diversity among children aged 6 to 24 months was found to be higher among non-breastfed children in comparison to the breastfed children, with the proportions of the two groups consuming different foods reported as follows: fortified baby food (2% versus 0.2%), grains (84% versus 71%), vitamin A-rich fruits and vegetables (55% versus 50%), other fruits and vegetables (29% versus 19%), food from roots and tubers (63% versus 56%), food from legumes and nuts (58% versus 50%), meat, fish, and poultry (43% versus 33%), eggs (17% versus 13%), and milk products (7% versus 3%) [3].

Women dietary diversity score (WDDS) has been reported to be low in rural areas with a few women meeting the minimum threshold of five or more food groups out of 10 (Figure 5). Child dietary diversity score (CDDS) has been reported to increase with age, with the mean falling below 3.3. Meal frequency has also been

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reported by some of the studies [3, 4, 14, 22]. Majority of the households and individuals across the age categories were found to have at least 2 meals a day. On the other hand, food consumption score (FCS) was examined in two of the reviewed articles [18, 19]. In a national study, an increment in FCS among households from 56.84 in 2009/10 to 59.34 in 2011/12 was reported [19] whereas in a cross-sectional survey in northern Uganda, the reported mean FCS was 36.1 (±12.2) among households [18].

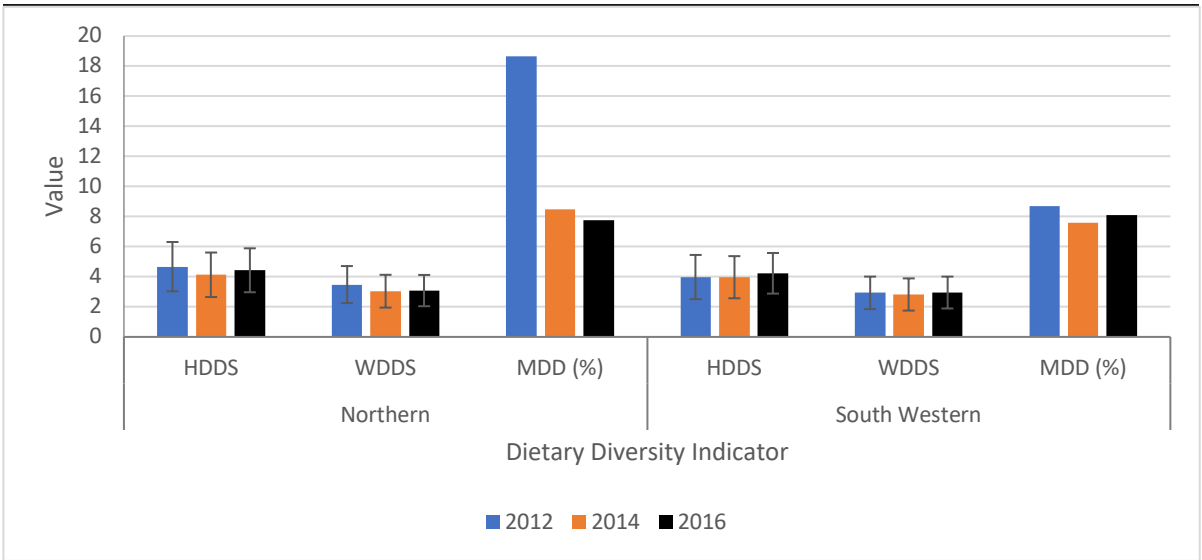

Figure 5: Household dietary diversity and women's dietary diversity in Northern and South Western regions – Panel data

HDDS – Household dietary diversity score, WDDS - Women dietary diversity score, MDD - Minimum dietary diversity

Source: [14]

External food environment

One study examining the external food environment in rural (Mayuge) and urban (Kampala) areas of Uganda [22] was found. This cross-sectional study reported the multiplicity of food retail outlets in Uganda and their importance towards food access within the urban and rural communities. While a few formal outlets existed, majority of the outlets were informal and included mobile vendors. Outlets in rural settings had significantly lower diversity in food categories than the urban settings. The study revealed that with the exception of open-air markets, sugar-sweetened beverages were more available in retail outlets than other food items, both in rural and urban setting. The most common formal outlets included groceries and supermarkets. These were most prominent in urban settings and offered more food categories and diversity than the other retail outlet types. These mostly served the middle and high income class consumers. For fresh fruits and vegetables, open air

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markets offered the highest volumes and greatest variety of this category and served virtually all consumer segments.

Household food expenditure

Studies on food expenditure were few, with three published works reviewed [8, 9, 24]. Despite the variation in absolute values across the studies, there was agreement between findings of the different studies on the fact that food takes the largest proportion of the household expenditure budget in both rural and urban areas, with the percentage higher in the former. There has not been a significant change over time in the proportion of household expenditure allocated to food across the rural and urban households (Figure 6). Starchy staples consisting of cereals, roots, tubers and bananas form a key component of the diets in both urban and rural settings, across gender and age categories, contributing the largest proportion to household food expenditure [9, 24]. The major sources of foods include purchases and own production [8, 9]. During peak harvest months such as October to November, consumption from own production drastically increases while the reverse is true for consumption from purchases and vice-versa, especially among rural households [9]. Food expenditure was reported to be higher among urban households and this was attributed to the large reliance on food purchases to meet food requirements. Food purchased was about twice as much as food from own production [8]. Share of household expenditure on cereals and staples has been reported to decrease with increase in wealth quintile and was lower among urban households, while the reverse was true for animal protein sources. The poorest households in rural areas devoted 70% of their total expenditures to food while the wealthiest spent 57%. Urban households at the bottom of the wealth distribution allocated 63% of their budget to food while those in the fifth quintile devoted 42% [24]. Individuals with higher incomes consumed more fruits and vegetables, animal source foods and non-alcoholic beverages than their low-income counterparts.

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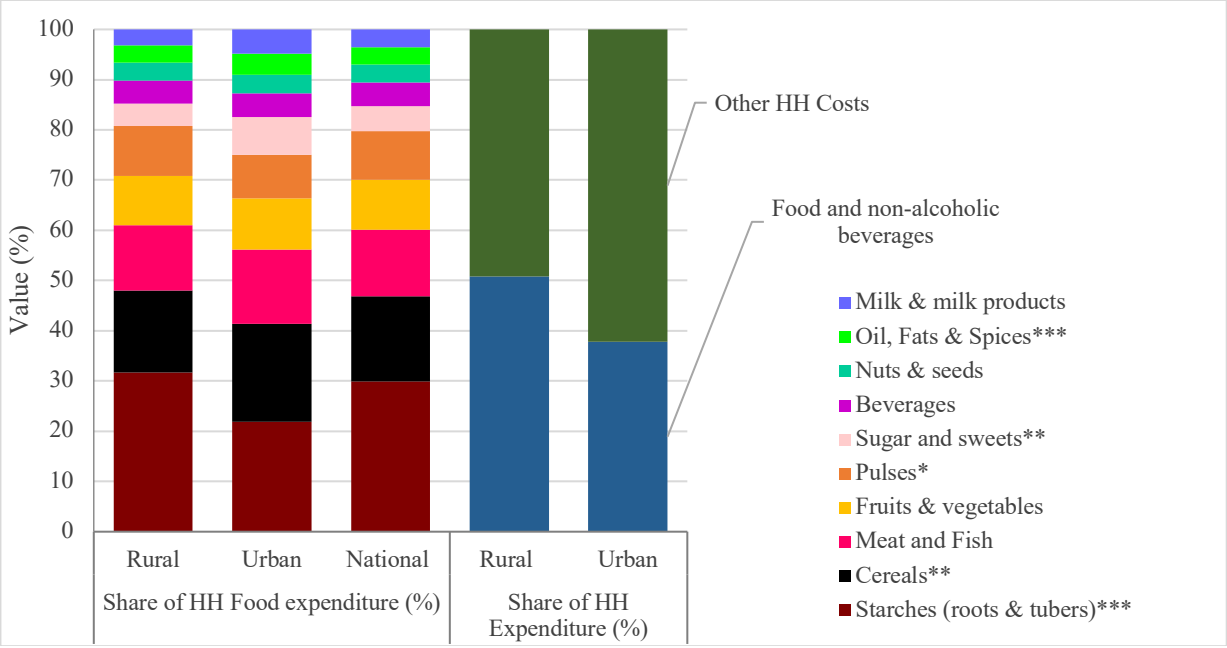

Figure 6: Share of household expenditure and food expenditure by food group in rural and urban levels

*, **, *** means that the average food expenditure shares are statistically different between rural and urban households at the 10, 5, and 1 percent level respectively
Source: [9, 24]

Factors driving consumer food behavior and choices in Uganda

Food consumption and dietary patterns in Uganda are largely influenced by factors such as incomes, prices, household demographics, availability by production and production diversity, presence of outlets and other socio demographic factors [8, 13, 14, 15, 19, 21, 25, 26].

Farm production and diversity: Own farm production is a key part of the food environment in Uganda, especially in rural areas [9]. An increase in farm production diversity has been associated with better household dietary diversity score (HDDS) [8, 13, 14, 19]. Farm production diversity (FPD) was also positively and significantly associated with household daily intake of energy, iron, zinc and vitamin A. Specifically, a one species increase in the number of crops and livestock produced on farm was associated with 0.3, 0.5, 0.4, and 1.4 percentage point increment in energy, iron, zinc and vitamin A household daily intake, respectively [8]. A positive correlation between crop diversity score and household diversity and minimum dietary diversity was also reported among women [14]. This is in agreement with a study covering northern Uganda that reported that a unit increase in the number of species accessed for food was likely to increase dietary diversity of women of reproductive age by 18%, other factors notwithstanding [13].

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Household socio-demographic factors: Several household socio-demographic factors, such as education level, household size, personal characteristics of the household head and income have been found to influence food consumption patterns and dietary diversity [19, 25, 26, 27, 28, 29]. A positive, significant correlation between the level of education of the household head and household food consumption and diversity has been reported [3, 8, 25, 28].

Increasing age of the household head has been associated with improved household food and nutrition security and diversity [8, 26]. Relatedly, children with care givers between the age of 30 – 39 years had a 11% higher dietary diversity than those with care givers aged below 20 years ($p<0.05$) [29]. However, very old age was reported to negatively impact household food nutrition [8].

Gender influence on household food and nutrition security has been reported [8], with male household headship being associated with significantly poorer food security and nutrition security [8, 26].

A statistically significant relationship was also reported between occupation and individual diversity score of women of reproductive age of $P \leq 0.05$ (0.030) [28]. Household income has been reported to have a positive significant correlation with household food consumption and diversity [27]. Among adolescents, those living in households of the lowest socio-economic class were more likely to have a low dietary diversity score compared to those in higher social-economic classes [27]. Variations in the household dietary diversity score arising from income differentials were observed with households in a higher income tercile having a higher score (4.69) than those in the lowest tercile (3.94) [8].

Being married has also been positively associated with increased individual food consumption and dietary patterns. While focusing on fruits and vegetable consumption, it was established that marital status was statistically significantly associated with eating the recommended 5 or more servings of fruits and/ or vegetables per day in a week [16]. On the other hand, marital status had no significant influence on child dietary diversity [29].

Household size has been found to be positively associated with increasing household dietary diversity [8, 19, 29]. However, a negative and significant effect of number of children on the child dietary diversity scores, with an increase in the number of children in the household reducing the child dietary diversity by 3% has been reported [29].

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Access to information and nutrition education: Access to information and related factors such as education and technology access and use have been positively associated with improved household food and nutrition security [8]. The study is in agreement with Sekabira and Qaim [26], which further associated possession of a mobile phone by the household head to improved household food and nutrition diversity.

Food price: Price is a key determinant of food choices, consumption and dietary patterns. A study covering northern Uganda revealed that higher prices of foods disincentivized household consumption; an example of milk and milk products, vitamin A-rich vegetables and fruits, and eggs, whose consumption was low owing to high prices [8].

Socio-cultural factors: Socio-cultural factors have been reported to play a key part in shaping food consumption and dietary patterns in both rural and urban settings [7]. These include cultural, social and religious restrictions on consumption of some food types. Several cultural beliefs have been reported as barriers to proper diets, an example being the restriction of consumption of chicken, eggs and gizzards, which are considered first class protein sources in some groups to children and women [30].

Consumer persuasion: Persuasion through promotion and advertisement has played a role in shaping consumption patterns especially among the young population. Advertisement and promotions have had a significant influence on consumption of sweetened beverages such as energy drinks and sodas; with an increasing consumption among the populace, especially the urban [23].

Geographic location: Location plays a key role especially in determining access to food. Shorter distances not only improve access to buy food but also to sell food thus increasing income [21]. A positive relationship between proximity to markets and household food consumption and dietary diversity has been reported [8, 26]. A study conducted in Kiboga and Bukoba districts, revealed that the latter being adjacent to a water body (Lake Victoria) registered higher consumption of fish compared to Kiboga [21]. In the same study, it was established that rural markets were more limited in the variety of fruits and vegetables available compared to urban markets, limiting access to variety by the non-producing consumers in the area [21].

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CONCLUSION

Several studies have been conducted to examine dietary patterns in Uganda. However, the lack of uniformity in the indicators across the studies and differences in methodologies especially for dietary diversity indicators makes the existing research inadequate for establishing quantitative evidence on the trends in dietary patterns and diversity, gender and age group differences in relation to dietary patterns. There is a need for high-quality, nation-wide research using validated tools and methodologies to measure dietary patterns and trends and explore the relation to gender and age groups.

Conflicting Interest

The authors would like to declare that there is no any conflicting interest in preparation of this work.

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Table 1: Summary of the literature review

Study	Period of data collection	Design	Primary data source	Sample size	Population	Region/Geographical scope in Uganda	Indicators analyzed	Methods used	Summary of original findings	Comment
[18]	2010	Cross-sectional	Survey	1,956	HHs	Northern Uganda (Lira, Gulu, Pader, Kitgum, Apac, Oyam, Amuria, Katakwi)	HDDS FCS	HDDS methodology (11 groups) FCS methodology (8 groups)	• HDDS – 3.3 (±1.4) • FCS – 36.1 (±12.2) • HHs with HDDS≤ 3 – 66.6% • HHs with FCS ≤ 35 – 51%	Compared findings from two indicators of dietary patterns Focused on rural population
[31]	2015	Cross-sectional	Survey	100	HHs with children below five years	Central Uganda (Wakiso)	HDDS Meal frequency	HDDS methodology (6 groups)	• 84% had HDDS of 3, 22% had HDDS of 4, 20% had HDDS of 2 and below • 54% of HHs had 3 meals a day, 30% had two meals a day, and 14% had more than three meals a day while the other 2% had one meal a day	Largely urban and peri-urban Only considered six food groups
[31]	2011	Controlled intervention trial	Recall	Treatment (nutrition education) - 46 Control - 43	Rural female caregivers and the children in their care (6-48 months)	Western Uganda (Kabarole)	FVS Selection frequency score	24-hour recall FVS methodology	• Improved child snacking patterns, food-selection practices, meal adequacy, and food variety in intervention group	
[17]	2011/12	Survey	LSMS-ISA Uganda National	1,722	Rural smallholder households	National	Food Consumption Score	FCS methodology	<table><tr><td>Indicator</td><td>2009/10</td><td>2010/11</td><td>2011/12</td></tr><tr><td>HDDS</td><td>7.35</td><td>7.33</td><td>7.48 (±2.05)</td></tr></table>	Conducted trend and panel analysis

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Study	Period of data collection	Design	Primary data source	Sample size	Population	Region/Geographical scope in Uganda	Indicators analyzed	Methods used	Summary of original findings	Comment
			Panel Survey				HDDS Caloric intake	HDDS methodology	FCS: 56.84 (2015), 55.50 (2016), 59.34(±21.34) (2017) Per capita Caloric intake per week: 10,600 (2015), 9,000 (2016), 8,700 (2017)	Some data left out due to incomplete data
[8]	2009-2011	Panel	Panel survey	8,617	Farming households	National	HDDS	HDDS methodology (12 groups)	HDDS - 7.46 (±2.52) FPD had a positive and significant associated impact with HDDS A one species increase on farm led to a 0.4%, 0.3%, 0.5%, 0.4%, and 1.4% associated increase in the daily per capita expenditure, energy, iron, zinc and vitamin A household daily intake respectively	Used panel regression
[27]	Not disclosed	Cross-sectional	Survey	598	Adolescents aged 10–19	Eastern Uganda (Iganga, Mayuge)	WDDS	WDDS Methodology (9 groups)	45.32% of the adolescents had <4 DDS Majority had consumed cereals/roots/tubers (99.7%), fats & oils (87%), spices & beverages (84.1%), and sweets (77.1%) Least consumed - dark green leafy vegetables (42.3%), meat/poultry/fish (33.1%), dairy (32.9%), eggs (11.2%), vitamin A-rich fruits and vegetables (33.4%) and other fruits (8.2%)	Applied modified Poisson regression
[21]	Not disclosed	Cross-sectional	Survey	206	HHs with children	Central Uganda (Kiboga)	HDDS	HDDS Methodology	High consumption by household and child (>50%) for white roots, tubers and bananas, legumes, and other fruits	

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Study	Period of data collection	Design	Primary data source	Sample size	Population	Region/Geographical scope in Uganda	Indicators analyzed	Methods used	Summary of original findings	Comment
					aged 6 to 59 months				No significant difference between food group consumption at household level and of the youngest 6-59 month old child within the households	
[33]	Not disclosed	Cross sectional	Survey	300	Urban residents	Central Uganda (Kampala)		Probit model Heckman model	Chips (19.1%), deep fried chicken (14.5%), sausages (14.1%), deep fried meat (10.2%) and "chaps" (10.0%) were main fast-food consumed Positive effect of time spent away from home and disposable monthly income on fast-food consumption Income had a non- linear relationship with fast-food expenditure	Only study on fast food consumption
[18]	2014	Cross sectional	Survey	3,962	Individuals 18–69 years	National	Consumption or not of the recommended fruits and vegetables servings	Recall method	484 (12.2%) consumed 5 or more servings of fruits and/ or vegetables daily 90.7% of the urban participants consumed <5 servings of fruits and vegetables compared to 86.2% in rural areas Consumption of fruits and vegetables was higher among females	
[29]	Not disclosed	Cross sectional	Survey	162	Mothers/caregivers for children under 5 years	Northern Uganda (Kole)	HFIAS CDDS	HFIAS methodology CDDS Methodology (7 groups)	HFIAS level - 11.5 45.7% were food insecure Majority of the children were fed on grains, roots and tubers (80.7%) and liquids other than milk (74.7%) Least consumption - animal proteins (eggs – 13.6%, meat, fish, poultry & organ meats – 15.4%) and fruits & vegetables (Vitamin A rich fruits & vegetables – 24.1%, other fruits & vegetables – 34.6%)	

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Study	Period of data collection	Design	Primary data source	Sample size	Population	Region/Geographical scope in Uganda	Indicators analyzed	Methods used	Summary of original findings	Comment
									Considering at least 4 four groups, 72.8% of the children had a lower CDDS	
[24]	2009-10, 2010-11, and 2011-12	Panel	Living Standards Measurement Study-Integrated Surveys on Agriculture data	2,700	Farming households	National	Food expenditure		Starches and cereals represented the largest food expenditure share in both rural (32%, 16.3% of food budget) and urban (22%, 19.4%) areas, respectively.	Only peer reviewed study on food expenditure Largely descriptive analysis
[8]	2017/18	Cross sectional	Survey	1280	WRA	Northern and Eastern Uganda	WDDS Minimum dietary diversity (MDD)	WDDS Methodology (10 groups) MDD methodology (at least 5 groups)	Most consumed - cereals, roots, and tubers (89%), leafy vegetables (80%), meat/fish (55%), pulses/legumes (55%), and nuts and seeds (43%) 47% of the WRA were not meeting their MDD score	
[34]	2016	Cross sectional	Survey	182	Households	Central Uganda (Kiboga)	HFIAS FCS CDDS	HFIAS methodology FCS methodology (11groups)	Majority (82%) consumed >6 food groups weekly Food groups consumed at least once per week by >80% of households - legumes (100%), roots, tubers, and bananas (97%), cereals and grains (88%) and other fruits (83%) HFIAS - 10.7 ±5.9	

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Study	Period of data collection	Design	Primary data source	Sample size	Population	Region/Geographical scope in Uganda	Indicators analyzed	Methods used	Summary of original findings	Comment
								CDDS Methodology (9 groups)	Only 34% were food secure; 6% had mild food insecurity; 31% had moderate food insecurity; and 29% faced severe food insecurity CDDS for children aged 6–23 months - 2.8 ±1.2 CDDS for children aged 24–36 months - 3.0 ±0.8 CDDS for children aged >36 months - 3.2 ±0.9	

*FCS – Food Consumption Score, HDDS – Household Dietary Diversity Score, HHs – Households, FVS - Food Variety Score, FPD - Farm Production Diversity, WDDS - Women Dietary Diversity Score, CDDS - Children Dietary Diversity Score, HFIAS - Household Food Insecurity Access Scale, WRA - Women of Reproductive Age; FPD – Farm Production Diversity

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Table 2: Summary of the findings on food consumption indicators in Uganda

Variable/indicator	Category	Value	Region	Source
Minimum Acceptable Diet	12-23mo	19%	Amuria	[35]
	6-23mo	15%	National	[3]
Minimum Meal Frequency	6-23mo	42%	National	[3]
Mean Meal frequency	Adult females	2.82	Arua	[23]
Have 2 meals a day	Households	77.3%	Karamoja	[4]
	Children below 5y	92.85%	South Western & Northern	[9]
Have ≥ 3 meals a day	Households	13%	Pallisa, Isingiro	[5]
		21.2%	Karamoja	[4]
Household Dietary Diversity Score	Households	3.2	South Western region	[36]
		4.06 (1.42)	South Western region	[9]
		4.41 (1.55)	Northern region	[9]
		7.62(2.34)	National	[20]
		3.3 (±1.4)	Northern region	[18]
		7.48 (±2.05)	National	[17]
Women Dietary Diversity Score	Women	3.21 (1.14)	Northern region	[9]
		2.9 (1.07)	South Western region	[9]
Meet Minimum Dietary Diversity	Children 6-23mo	30%	National	[3]
	Children below 5 y	70.15%	South Western & Northern	[9]
	Adolescents	54.7%	Eastern region	[27]
	Women	11.84%	Northern region	[9]
		8.15%	South Western region	[9]
	Women of reproductive age	53%	Teso & Acholi	[8]
Child Dietary Diversity Score	6-59mo	2.3	South Western Uganda	[36]
	6–23 mo	2.8	Central Uganda	[34]
	24–36 mo	3.0		
	>36 mo	3.2		
Consume Vit A rich foods	6-8mo	47.8%	National	[3]
	9-11mo	64.1%	National	[3]
	12-17mo	70.4%	National	[3]
	18-23	75.8%	National	[3]
Consume RDA for fresh fruits & vegetables	Urban households	10%	National	[17]
	Children and adolescent students	50%	Kampala	[17]
Mean Dietary Energy Consumption	Households	2,226 kcal/person/day	National	[9]

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		2,000 kcal/person/day	National	[37]
		2,769kcal/person /day	National	[8]
	Female headed households	2,241 kcal/person/day	National	[9]
	Male headed households	2,220 kcal/person/day	National	[9]

RDA – Recommended Dietary Allowance

Table 3: Food group expenditure shares by wealth quintile, rural and urban Uganda, 2012

Food group	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Average
Rural						
Cereals	16	16	17	17	13	16
Starches	38	33	32	28	20	30.2
Beans	11	11	10	7	5	8.8
Peas, nuts & seeds	4	4	4	5	4	4.2
Fruits & vegetables	11	10	9	9	9	9.6
Meat, Fish & milk	9	14	15	18	21	15.4
Oil, fat, spices & sugar	7	6	7	8	8	7.2
Beverages & FAFH	5	5	7	9	19	9
Urban						
Cereals	22	19	15	15	12	16.6
Starches	26	23	19	20	14	20.4
Beans	10	7	6	7	4	6.8
Peas, nuts & seeds	10	3	4	3	4	4.8
Fruits & vegetables	9	9	10	8	9	9
Meat, Fish & milk	11	16	17	21	27	18.4
Oil, fat, spices & sugar	6	13	10	9	9	9.4
Beverages & FAFH	6	11	20	17	21	15

FAFH – Food Away from Home
Source: [24]

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