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Determinants of Vegetable Consumption among Rural Households in Northern Ghana

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ABSTRACT

Traditional African Vegetables (TAV) are widely grown and consumed in northern Ghana, providing essential micronutrients for a healthy diet. This study sought to identify factors that influence the frequency with which rural households consume vegetables. Cross-sectional data from 187 rural households were collected and analysed using the Poisson count regression model. A 6-item dietary assessment tool from the 2017 Behavioural Risk Factor Surveillance System (BRFSS) was used to measure the frequency of vegetable consumption. The results of the study revealed that socioeconomic factors such as the caregiver's age, household wealth status, household dietary diversity, occupation of the household head, and household food security status influenced the frequency of vegetable consumption. Therefore, future campaigns to improve vegetable consumption should prioritise economic characteristics associated with the household head and household. Moreover, cost, availability, and access are important factors to consider when promoting household vegetable intake in rural areas.

Keywords: *traditional African vegetable, vegetable intake, vegetable consumption, Rural, Ghana*

INTRODUCTION

The importance of vegetable consumption to human health has been widely acknowledged. Vegetables have been noted to provide an important source of dietary fibre and nutrients for humans and have significant health benefits, including protection against chronic diseases and a reduction in obesity (Haller et al., 2012; Holley et al., 2017); a decrease in risk of type 2 diabetes (Carter et al., 2010); improved mental functioning, anti-depression conditions, self-efficiency and reduced cancer fatalism (Głabska, 2020). Vegetable consumption also helps in reducing the incidence of communicable diseases among children (Holley et al., 2017). The World Health Organisation (WHO) recommends a minimum intake of 400g/day of fruits and vegetables to optimise their health benefit (World Health Organisation, 2005). However, this recommendation is mainly unmet in developing countries (Micha et al., 2015). Frank et al. (2019) report that only 18% of

individuals from low and middle-income countries meet the WHO recommendation. Green leafy vegetables have been shown to contribute to improved nutrition and health in Sub-Saharan Africa (Smith and Eyzaguirre, 2007; Kamga et al., 2013) as these have been the mainstay of the diets of local indigenous populations in Africa for centuries and have become shaped by culture (Mirghani & Mohammed, 1997). A recent meta-analysis of a large number of epidemiology studies by Aune et al. (2017) associates a higher intake of leafy vegetables with a reduced risk of coronary heart disease, stroke and mortality for every 100g/day increment in intake. A similar study by Cooper et al. (2012) associates the intake of leafy vegetables with a significant reduction in the risk of type 2 diabetes.

The cultivation of traditional African vegetables (TAVs) is common among rural households in northern Ghana and constitutes an important source of food in rural areas. TAVs are indigenous or introduced vegetables that have become part of the culture of a people due to prolonged use (Abukutsa-Onyango, 2010). The term TAV is often used interchangeably with indigenous vegetables. Issaka et al. (2016) report that every rural household in northern Ghana cultivates at least three types of TAVs. However, despite their long-acknowledged health benefits, vegetable intake among households in Ghana generally leaves much to be desired (Chagomoka et al., 2015; Amo-Adjei & Kumi-Kyereme, 2014), raising concerns that households may not be deriving the required nutritional and health benefits from their consumption. Efforts to improve vegetable consumption have mainly been through behavioural change, educational programmes and campaigns. However, according to Siegel (2019), such interventions have resulted in less impact than expected in low and middle-income countries. Thus, it is imperative to ensure that interventions aimed at effecting behavioural change in vegetable consumption are informed by specific factors that mediate a household's behaviour and are most likely to trigger the desired response meaningfully.

From 2013 to 2016, the World Vegetable Centre (WorldVeg) and its partners in Ghana, the University for Development Studies (UDS) and the Savannah Agricultural Research Institute (SARI) implemented a project titled 'Traditional African Vegetables for Improved Income and Nutrition (TAV Project)'. The project aimed to increase the production and consumption of traditional African vegetables for improved nutrition among rural households in northern Ghana. An intensive and sustained sensitisation campaign was carried out to promote the health benefits of TAV and to increase their consumption among targeted households in northern Ghana. Improved okra, amaranth, jute mallow and roselle varieties were introduced to farmers in the study area through community managed demonstrations fields, educational campaigns and field days. The cultivation of these vegetables is integrated into the farming system and offer an affordable source of food for households with limited access to food and income. This study aims to identify the socio-economic factors influencing TAV consumption among rural households in northern Ghana and to contribute to a more informed and targeted campaign on improved vegetable consumption by identifying specific drivers of TAV consumption in the context of rural households in northern Ghana.

METHODOLOGY

The Study Area

Northern Ghana is situated between latitudes 8°-11° N and longitudes 0°- 3° W. Administratively, it comprises the Upper West Region, Upper East Region, and Northern Region, now sub-divided to include the North-East and Savannah Regions. The area falls within the dry

savannah zone, which occupies an estimated 40% of Ghana. The rainy season permits a growing season of 150–160 days in the Upper East Region and 180–200 days in the other regions. The mean annual rainfall varies from 1,000 mm in the Upper East Region to 1,200 mm in the Savannah Region. The rainfall pattern shows wide variations from year to year regarding the amount and distribution. Consequently, the area is vulnerable to drought. According to the 2021 population and housing census, the five northern regions together account for 18.9% of the total population of Ghana. Northern Ghana is characterised by high poverty rates, with an estimated 55% of the total population below the poverty line compared to a national average of 24.2%. The Upper West Region has the highest poverty rate, with 70.7% of its population considered poor followed by the Northern and Upper East regions with poverty rates of 50.4% and 44.4% respectively (Ghana Statistical Service, 2017). Smallholder agriculture is the mainstay of the local economy in northern Ghana. Vegetable cultivation is common among farmers in northern Ghana, cultivated for both income and consumption.

Sampling

There were three regions at the time of this study, which have subsequently been split into five. These are Libga (Savelugu District) in the Northern Region, Kani (Lambusie Distict) in the Upper West Region and Vea (Bongo District) in the Upper East Region. The targeted respondents were household heads and women responsible for preparing the household's meals (caregivers). Ten (10) respondents were selected randomly from seven (7) communities in one district each in the three (3) regions, making a total of 210 respondents. The communities were purposively selected based on year-round vegetable production. The sample size was constrained by limited financial resources.

Data collection

Data were collected using structured questionnaires and focused group discussions. Quantitative data were collected using questionnaires administered to household heads. One team of trained enumerators was used to administer the questionnaire to all respondents to ensure consistency. A total of 187 questionnaires out of 210 administered were analysed due to the exclusion of some questionnaires because of poor data quality. One focused group discussion was conducted in each community consisting of groups of 8-12 caregivers. The focused group discussions aimed to validate and seek further clarification on the quantitative data and are used to discuss the results. Data on vegetable intake was recorded through the participant's 7-day recall of the number of times a particular vegetable was consumed in the household in the previous week using a 6-item dietary assessment tool from the 2017 Behavioural Risk Factor Surveillance System (BRFSS). The questionnaire also included the household dietary diversity score (HDDS) (Kennedy et al., 2010) and the household hunger scale (HHS) (Ballard et al., 2011) for food insecurity. The HHS is a measure of food security categorised into low, moderate, and high levels of insecurity. Finally, an index of household ownership of durable assets was used to assess the wealth index of the households (HAI). The HAI, designated as low, average and high, corresponds to household wealth status: poor, middle-income and high-income households according to the household's ownership of durable assets. The household asset index is a proxy for a household's ability to access food (Huluka et al., 2019).

Theoretical model

The study employed Poisson count regression model to analyse the data. The Poisson count model assumes that the dependent variable Y has a Poisson distribution. For a univariate Poisson distribution, the average number of

occurrences of an event is denoted by a single variable μ, which is a non-negative real number (i.e., μ>0) (Salkind, 201). A variable y, which follows a Poisson distribution and takes values equal to or greater than zero with parameter μ, denotes the mean frequency of vegetable consumption by a household and is represented by a probability mass function as follows:

$$\Pr(\mathrm{Yi} = \mathrm{y}) = \frac{\mathrm{e}^{-\mu}\mu^{\mathrm{y}}}{\mathrm{y!}}, \mathrm{y} = 0,1,2,\ldots,\mathrm{k} \quad (1)$$

Where Yi denotes the dependent variable for the i^{th} observation, y is an occurrence of an event or count, and μ is the intensity of occurrence or rate of an event. A key requirement of the Poisson probability distribution is the equi-dispersion property, which says that the mean and variance of the dependent variable must be equal.

$$i.e., E(Y_i) = Var(Y_i) = \mu$$

To ensure that the mean is non-negative and non-zero ($\mathrm{i.e.}, \mu > 0$), μ is expressed as:

$$\mu = \exp(\mathrm{X}'\beta) \quad (2)$$

Where X represents a vector of explanatory variables, and β is the parameter to be estimated.

Given a set of explanatory variables, equation (2) can be expressed as:

$$E(Y_i) = exp^{(B_1X_{1i})}\exp^{(B_2X_{2i})}\exp^{(B_3X_{3i})}\ldots\ldots\ldots\exp^{(B_kX_{ki})} \quad (3)$$

$$= = exp^{\beta_jX_{ji}}C_j \qquad (\mathrm{i} = 1,\ldots\ldots,\mathrm{n})$$

Where j can take any value from 1 to k and is associated with a specific explanatory variable, and Cj represents the product of the remaining exponential terms in (3) and is a constant. Since the Poisson model is non-linear, maximum likelihood estimation (MLE) is employed to obtain parameters and is expressed as follows:

$$\mathrm{lnL}(\beta) = \ln\left[\frac{\mathrm{e}^{-\mu}\mu^{\mathrm{y}}}{\mathrm{y!}}\right] = -\mu + \mathrm{y_i}\ln(\mu) - \ln(\mathrm{y_i!})$$

$$= -\exp(\mathrm{x'_i}\beta) + \mathrm{y_i}(\mathrm{x'_i}\beta) - \ln(\mathrm{y_i!}) \quad 4$$

The marginal effect of a variable on the average number of events is stated as follows:

$$\frac{\mathrm{dE}\left({}^{\mathrm{y_i}}/_{\mathrm{x_i}}\right)}{\mathrm{dx_j}} = \beta_\mathrm{j}\exp(\mathrm{X'_i}\beta) \quad 5$$

Thus, a unit increase in X_i will result in an increase or decrease in the average number of the dependent variable, in this case, the mean frequency of consumption of traditional African vegetables, by the marginal effect.

Empirical model

Empirically, the frequency of vegetable consumption by a household/per week (I_i) is assumed to be a function of a vector of explanatory variables, namely; characteristics of household head (HHH): (sex of household head (SexHHH), educational status of household head (EduHHH) and occupation of household head (OcuHHH); characteristics of Caregiver (CG): Age of caregiver (AgeCG), (educational status of a caregiver; and economic characteristics of the household (HHC) (household dietary diversity scores (HHDD), household size (SizeHH), household asset index (IndexHH) and household hunger score (HHS).

$$\mathrm{I_i} = \mathrm{f}\begin{pmatrix}\mathrm{EduHHH, SexHHH, AgeC\ , EduC\ , DepHH,}\\ \mathrm{SizeHH, DDSHH,}\\ \mathrm{AssetIndexHH, HHS, OccuHHH}\end{pmatrix} \quad 7$$

Thus, the frequency of vegetable intake (VI) is expressed as the combined effect of characteristics of the household head (HHH), characteristics of the caregiver

(CG) and the economic characteristics of the household (EC) and is expressed as:

$$VI_i = \sum_{J=1}^{J} \alpha_J \, HHH_i + \sum_{j=1}^{J} \beta_j C_{\ i} + \sum_{j=1}^{J} \gamma_i \, EC_i + \varepsilon_i \qquad 8$$

Description of the variables included in the model

Frequency of vegetable intake

The outcome variable, the frequency of vegetable intake, was measured using the 2017 Behavioural Risk Factor Surveillance System's (BRFSS) Fruit and Vegetable (FV) Module by Seung & Latetia (2017). BRFSS assesses the frequency of consumption utilising a 6-item dietary assessment tool.

Table 1: Variables and a priori expectation

Indicator	Definition	Measurement	A priori expectation
		Dependent Variable	
FrequencyIntake	Frequency of Vegetables intake	Weekly recall of vegetable consumption	
		Independent Variables	
SexHHH	Sex of household head	1=male, 2=female	+ve
EduHHH	Educational status of household head	1= literate, 0=non-literate	+ve
OccuHHH	Occupation of household head	1= Farmer, 0=non-farmer	+ve
SizeHH	Size of household	Total number of household members	+ve
DDHH	Household Dietary Diversity	Different types of vegetables consumed in a household during the past week	-ve
AssetIndexHH	Household asset index	Household ownership of durables assets	-ve
HHS	Household hunger score	Number of times a household did not meet its full requirement of food requirement over the past 30 days	+ve
AgeCG	Age of the woman responsible for preparing food in the household	Age in years	+ve
EduCG	Educational status of the woman responsible for preparing food in the household	1= literate, 0=non-literate	+ve

RESULTS

Socioeconomic characteristics of household and vegetable consumption

Table 2 illustrates the descriptive statistics of the respondents. On average, households consume vegetables 6 times per week, with a range of 1 to 13 times. The head of the household was about 52 years old, with an age range of 29 to 59 years. In this area, it is common for older members to make household decisions, even if younger members have their own families. Ninety-five percent of household heads were male. The average household size is 14, ranging from 2 to 40 due to the communal living

style and several nucleus families within each household.

Table 2: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Mean frequency of vegetable intake/week	6.2	1.94	1	13
Mean Age of Household Head	52	13.2	29	89
Household size	14.0	9.5	2	40
Age of caregiver	38	11.1	16	70
Household Dependency Ratio	0.74	0.02	0.1	0.80
Sex of household head	Male = 95%		Female =5%	
Occupation of household head	Farmer = 95%		Other=5%	
Educational status of the caregiver	Literate = 13%,		Non-literate = 87%	
Educational status of household head	Literate = 14%		Non-literate = 86%	
Household Asset Index	Low = 20%	Average = 39%	High = 41%	
Household hunger score	High = 77%	Moderate = 17%	Low= 6%	

In the study area, it is common for mothers to pass on the responsibility of caregiving to younger women once they come of age. This is reflected in the average age of caregivers being 38 years old. The average household dependency ratio in the study area was 74%, which is higher than the national average of 69%, according to the Ghana Statistical Service (2021). This ratio ranged from 1% to 80%. The majority of household heads (95%) are farmers, as agriculture is the primary source of livelihood in rural areas of northern Ghana. The study area has a high illiteracy rate, as reflected by the fact that 87% of caregivers and 86% of household heads did not have formal education. Most households had an average to high HAI, meaning that their wealth status, as measured by ownership of household durables, is above average. However, households rarely sell their assets to finance household expenses, resulting in an HHS of 77%. This means that most households struggle to meet their full dietary needs.

Common traditional African vegetables consumed in northern Ghana

Leafy vegetables are the most consumed vegetables by households in the study area, accounting for 70.1% of the vegetables identified. Seven of the 17 traditional vegetables consumed by rural households featured in at least 60% of all household diets. These included pepper, okra, tomato, amaranthus sp., corchorus sp., roselle sp., and cowpea leaf. Eggplant, onion, baobab leaf, kenaf, bitter leaf, cassava leaf, and pumpkin leaf featured in the diets of between 20% and 48% of all households. Cocoyam leaf, blackberry leaf and moringa leaf feature in the diets of less than 20% of all households.

Table 3: Types of vegetables consumed by households

NO	Vegetable	% respondents
1	Pepper (*Capsicum sp*)	100.0
2	Okra (Abelmoschus *esculentus*)	95.8
3	Tomato (*Lycorpecicum esculentus*)	90.8
4	Amaranthus (*Amaranthus hybridus*)	84.2
5	Corchorus (*Corchorus olitorius*)	72.5
6	Roselle (*Hibiscus sabdariffa*)	65.0
7	Cowpea leaves (*Vigna unguiculata*)	62.5
8	Garden Eggs (African eggplant, *Solanum aethiopicum*)	47.5
9	Onion (*Allium cepa*)	44.2
10	Baobab leaves (*Adansonia digitata*)	36.7
11	Kenaf (*Hibiscus cannabinus*)	31.7
12	Bitter Leaves (*Vernonia amygdalina*)	23.3
13	Cassava leaves (Manihot *esculenta*)	21.7
14	Pumpkin Leaves (*Cucurbita sp*)	20.0
15	Cocoyam leaves (*Xanthosoma sagitifolium*)	19.2
16	Blackberry leaves (*Rubus rosaceae*)	9.2
17	Moringa leaves (*Moringa oleifera*)	8.3

Seventy-five per cent (75%) of the households cultivated and bought vegetables. On the other hand, 23.3% of the households meet their household vegetable requirements solely from their production. Only 2% of respondents did not cultivate any vegetables but obtained vegetables solely from the market.

The output of the Poisson regression

The results of the Poisson regression analysis reveal several influential factors on vegetable consumption within rural households in northern Ghana. These factors include the caregiver's age, household asset index, household dietary diversity, the occupation of the household head, and the household hunger score. The incidence rate ratio measures the effect of an explanatory variable on the rate of occurrence of an event (frequency of TAV consumption per week). Firstly, the caregiver's age significantly affects vegetable intake (P= 0.005), but the effect was surprisingly negative and relatively modest, with an incidence rate ratio (IRR) of 0.99. Secondly, a high HAI, when compared to a low one, was associated with a 28% significant increase in the frequency of vegetable consumption (P=0.003). Additionally, an increase of one unit in the HDDS significantly increased the frequency of vegetable consumption by 5% (P=0.03). Furthermore, compared to non-farmer heads, households with a farmer as the head had a 43% lower frequency of vegetable intake (P=0.000). The findings also showed that households with a high HHS have a significant increase in the frequency of vegetable intake compared to those with low HHS. However, household size and the education and literacy of the household head did not influence the frequency of vegetable consumption in our study.

Table 4: Results of the Poisson regression analysis

Frequency Intake	IRR	Std. Err.
Age of caregiver	0.9929189***	0.0025
Sex of household head		
Male	0.9218964	0.1257306
Household size	0.9980151	0.0030402
Household asset index (HAI)		
Average	1.100402	0.0674066
High	1.280458***	0.1066163
Dietary diversity	1.047594**	0.0225706
Occupation of household head		
Farmer	.5708497***	0.068398
Educational status of the caregiver		
Literate	0.8816089	0.0704888
Educational status of household head		
Literate	1.090217	0.0821145
Household Hunger Score		
Moderate	1.066391	0.0741314
High	1.806226	0.2379731
_cons	0.1475526	0.0347758
ln(ID) 1 (exposure)		
Number of obs = 187		
LR chi2(12) = 114.61		
Prob > chi2 = 0.0000		
Pseudo R^2 = 0.0607		
Log likelihood = -886.3047		

DISCUSSION

Socio-economic factors influencing traditional vegetable consumption

Age of a caregiver

Our initial assumption that the age of a caregiver would positively affect the frequency of household vegetable consumption was not supported by the results. However, it is worth noting that other studies conducted by Sinyolo et al. (2020) in South Africa and Terin et al. (2019) in Turkish households found that age positively influences vegetable consumption. We assumed that older caregivers would be more likely to support vegetable consumption due to their age and knowledge of traditional dishes utilising vegetables. However, in households where younger women have taken over caregiving roles, older women are no longer able to influence dietary decisions. Caregiver vegetable consumption behaviour is also influenced by cost. According to Nicklett et al. (2021) food insecurity among older adults is associated with lower vegetable intake as these could be more expensive than nutrient-poor and energy-dense alternatives (Drewnowski, 2010). Savela et al. (2023) have noted that older caregivers experiencing subjective poverty have been noted to be less likely to consume two or more portions of fruit and vegetables daily. Furthermore, younger women are less knowledgeable in traditional dishes utilising leafy vegetables and find the preparation of these dishes tedious as in the case of bitter leaf.

Household wealth status

In this study, a higher household wealth status was expected to be associated negatively with vegetable consumption. This is because TAV constitute a significant part of the staple diet in northern Ghana, often accompanying cereal-based foods like maise, millet and sorghum. Our

expectation, therefore, was that as households become wealthier, they will tend to increase the consumption of other foods that will substitute traditional dishes and, hence, TAV. However, contrary to our expectations, household wealth status demonstrated a substantial but positive relationship with the frequency of vegetable intake among high-income generating homes. This agrees with Nyaruwata (2019), who found a positive association between income and household consumption of indigenous vegetables in Zimbabwe. Ruel et al. (2005) also observed that a 10% increase in income is associated with a 6-10% increase in fruit and vegetable consumption in some countries in sub-Saharan Africa, including Ghana. Msambichaka et al. (2018) associated less risk of inadequate vegetable intake with higher income earners. Lower-income households are more likely to consume fewer vegetables and have overall low-quality diet than higher-income households (French et al., 2019). Indeed, the focus group discussion revealed that contrary to our initial assumption, poorer households in the study area are resorting to less expensive alternatives to vegetables, especially during the dry season.

Occupation of household head

According to our presumption, a household head's occupation as a farmer will positively affect the frequency of household vegetable intake. However, the results revealed a significant but negative association between farmer-headed households and the frequency of vegetable consumption. In their study on the effects of agricultural commercialisation in Uganda, Ntakyo and van den Berg (2019) discovered that growing commercialisation among rice farmers was related to an inability to achieve minimal calorie needs and a higher dietary diversity among rice farmers. Based on this finding, we argue that increasing commercial opportunities for farmers in northern Ghana has decreased the cultivation of traditional crops, which hitherto have contributed to household dietary requirements, including indigenous vegetables. This gives credence to the fact that 75% of farmers in the study area did not depend solely on their production of vegetables but purchased some. This means that economic factors, such as income and access, are important in access to vegetables in the study area, contrary to expectations. Indeed, Msambichaka et al. (2018) found that people other than farmers were less at risk of not meeting the daily recommended fruit intake in Tanzania. Again, Ntakyo and van den Berg's (2019) findings support the current finding to the extent that, traditionally, diets in northern Ghana are primarily based on vegetable soups and sauces that accompany the cereal-based staples. Therefore, increased dietary diversity signifies a shift from less consumption of traditional vegetables to more affordable alternatives. Indeed, the focus group discussion indicated that rural households often substitute vegetable soups with legume-based soups (groundnut), which are more affordable during the dry season.

Household dietary diversity score

It was believed that a diverse diet would lead to a lower frequency of vegetable consumption, as a diverse diet was thought to move away from traditional vegetables typically consumed with cereal-based staples in rural areas of northern Ghana. The findings of this research suggest that higher HDDS is associated with a greater frequency of vegetable consumption. This indicates that households in the study area consume more vegetables than anticipated, contrary to findings by Marie (2003) and Afari-Sefa et al. (2012) that in the developing world, low dietary diversity has been linked to poor populations who rely on starchy staples. Ochieng et al. (2016) determined that households participating in traditional vegetable promotion programs in Tanzania had significantly higher dietary diversity among children under five and

women of reproductive age. As a result, extensive promotion of indigenous African vegetables as healthy alternatives in the study area may have boosted household dietary diversity by increasing vegetable consumption. Indeed, Tanimonure et al. (2021) discovered that underutilised indigenous vegetables significantly contribute to high household diversity scores in Nigeria. In northern Ghana, wild and under-utilized vegetables contribute to rural household diets especially during periods of hunger.

Household hunger score

Our study revealed that households with higher food insecurity (high hunger score) tend to consume vegetables more frequently, which aligns with our initial expectations. Turnbull et al. (2021) found that food insecurity is a significant predictor of fruit and vegetable consumption among households in the United Kingdom. Similarly, Sealey-Potts and Labyak (2020) indicate that even though households in the United States of America experienced food insecurity, they still consumed vegetables at least once a week. In the study area, it is common for households to grow at least three types of vegetables, especially leafy vegetables (Issaka et al., 2016). These vegetables are integrated into the farming system and offer an affordable source of food for households with limited access to food and income. This supports the assertion by Galli et al. (2020), who indicate that the cultivation of fruits and vegetables is essential for ensuring that households have easy access to affordable food. This appears contrary to our finding on effect of wealth status on vegetable consumption which is negative as higher-income households tend to consume more vegetables. However, this is understandable in the sense that rural households in northern Ghana rely on wild vegetables during periods of hunger.

CONCLUSION

The study sought to identify factors influencing the frequency of TAV intake among rural households in northern Ghana. The study used qualitative and quantitative data analysed through the Poisson count regression model and simple percentages. Pepper, okra, tomato, amaranthus sp., corchorus sp., roselle sp., and cowpea leaf were the commonest vegetables consumed in the study area, which are included in at least 60% of diets in the by households. Other vegetables included eggplant, onion, baobab leaf, kenaf, bitter leaf, cassava leaf, pumpkin leaf, cocoyam leaf, blackberry leaf, and moringa leaf. The caregiver's age, the household's asset index, the occupation of the household head, the diversity of the household's diet, and the household's hunger score influenced vegetable consumption by rural households. The study recommends that campaigns to increase vegetable consumption in rural areas should focus on socioeconomic factors related to the household head and the household itself. Additionally, rural farmers are increasingly buying vegetables to supplement their produce. Therefore, when promoting vegetable consumption in rural areas, it is important to consider the availability and accessibility to vegetables informed by contextually specific factors.

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