

Research Article

Household Utilization of Soybeans in East Gonja Municipality: Consumption Patterns, Perceptions, and Constraints

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Abstract

Soybeans are widely cultivated in East Gonja, yet their household use remains uneven despite clear nutritional and livelihood benefits. This study assessed household consumption patterns, awareness and perceptions, and constraints shaping soybean utilization to inform targeted nutrition and livelihood interventions in the municipality. A cross-sectional mixed-methods design was applied to a sample of 384 households selected through multi-stage cluster sampling. Quantitative data were collected via structured questionnaires and analysed in the Statistical package for the social sciences (SPSS) (descriptive statistics, χ^2 tests, and binary logistic regression). Qualitative data from focus group discussions and key informant interviews were thematically analysed in NVivo to contextualize quantitative findings. Household utilization was high overall (289/384, 75.26%). Most users reported 1–2 uses in the prior 7 days (48.96%), with the majority indicating year-round use (58.85%). Typical monthly use clustered at 1–2kg (39.32%). Mothers were most often responsible for soybean meal preparation (94.46%), and local markets were the primary source (61.25%). Awareness of processing methods was high (87.50%); just over half had received preparation information (52.86%); nearly all believed recipe access would increase use (97.92%); and two-thirds reported household-level processing (67.71%). Bivariate analyses showed significant associations between utilization and sex, education, household size, and income (all $p \leq .019$), and between utilization and cultural acceptance, attitudes, awareness of processing, reported challenges, and belief that recipes would increase use (all $p \leq .013$). In the multivariable model (LR $\chi^2 = 182.688$, $p < .001$; pseudo- $R^2 = 0.737$; $n = 380$), neutral attitude predicted markedly lower odds of utilization (adjusted odds ratio [AOR] = 0.018, $p < .001$), while awareness of processing methods predicted higher odds (AOR = 3.338, $p = .016$). Sex, education, household size, and reported challenges were not significant after adjustment. Soybean consumption is common in East Gonja but is shaped by attitudes and know-how. Neutral dispositions toward soybean meals constrain use, whereas awareness of processing methods enables adoption. Routine preparation roles held by mothers and reliance on local markets frame day-to-day use. These findings point to practical levers for improving household nutrition through soy.

Keywords

Soya Bean, Utilization, Consumption Pattern, Perception and Constrain

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1. Introduction

Soybeans (*Glycine max*) are a strategic crop for nutrition and food security due to their high protein, vitamins, and soil fertility benefits.

In Ghana, despite government promotion under initiatives like Planting for Food and Jobs, household-level consumption remains low.

In East Gonja Municipality, where malnutrition is prevalent, soybeans present a cost-effective alternative to animal protein.

However, utilization is constrained by cultural attitudes, limited recipe knowledge, and socio-economic challenges.

This study aims to evaluate soybean consumption patterns, household perceptions, awareness, and constraints to inform targeted interventions.

1.1. Statement of the Problem

Soybeans, a highly nutritious and affordable source of protein, are widely cultivated in East Gonja Municipality of the Savannah Region but remain underutilized in household diets despite their potential to reduce malnutrition and food insecurity [1, 2]. Households in northern Ghana largely depend on subsistence farming with limited access to animal protein, which is mostly consumed during festive periods due to high costs [3]. Soybeans offer a viable alternative, yet there is little data on consumption patterns, perceptions, and integration of soybean-based meals in East Gonja. This study therefore seeks to examine household consumption patterns, perceptions of soybean use, awareness levels, and the constraints affecting their utilization [4].

1.2. Aim and Objectives

1.2.1. Aim of the Study

The aim of the study is to: To evaluate the consumption patterns, household perceptions, and utilization of soybeans in meal preparation among households in the East Gonja Municipality.

1.2.2. Study Objectives

The aim of the study will be realised by specifically achieving the following specific:

To assess the consumption patterns of soybeans among households in the East Gonja Municipality.

To explore household perceptions regarding the use of soybeans in meal preparation.

To explore the attitudes of households towards soybean utilization among households in the East Gonja Municipality.

To assess households perceived constraints associated with the utilization of soybeans in the East Gonja Municipality?

1.3. Significance of the Study

This study is important because it directly addresses malnutrition and dietary deficiencies in rural Ghana by promoting soybeans a locally available, affordable, and protein-rich crop as a dietary alternative [1, 2]. Increased soybean utilization can improve nutritional outcomes, particularly for vulnerable groups such as women and children. Economically, greater demand for soybeans can create market opportunities for local farmers, boosting household incomes and supporting sustainable agricultural development [4]. Additionally, the study generates essential data that can guide policymakers, extension services, and development organizations in designing targeted interventions that reduce food insecurity and enhance agricultural sustainability [3].

2. Literature Review

Soybeans are globally recognized for nutritional richness and economic importance. They provide complete protein, essential minerals, and health-promoting isoflavones.

Globally, soy utilization is high in Asia and Western markets, but remains low in Africa due to cultural barriers, processing challenges, and misconceptions.

In Ghana, soybeans are primarily grown for animal feed and oil processing rather than home consumption.

Barriers include limited awareness, lack of culturally adapted recipes, storage issues, and socio-economic constraints.

Nevertheless, programs by Ministry of Food and Agriculture (MoFA) and Non-governmental organizations (NGOs) have promoted soybeans through school feeding, fortified foods, and training.

The Theory of Planned Behaviour and the Food Security Framework guided this study, linking attitudes, norms, and control factors to food choices.

2.1. The Nutritional and Economic Importance of Soybeans

Soybeans are a highly nutritious and affordable crop, providing complete protein, essential vitamins, minerals, and health-promoting compounds such as isoflavones [5-7]. They serve as a cost-effective alternative to animal protein, especially in regions where meat is inaccessible or expensive [8, 9]. Beyond nutrition, soybean farming supports rural livelihoods by generating income, creating employment, and contributing to agricultural development [10-12]. Their integration into diets, school feeding, and nutrition programs has been shown to reduce malnutrition and improve dietary quality, particularly for vulnerable groups [5, 13, 14]. Overall, soybeans play a dual role in improving food security and fostering economic sustainability in farming communities.

2.2. Global and Regional Trends in Soybean Utilization

Soybeans are among the most widely cultivated legumes globally, serving as a major source of protein, oil, and bioactive compounds. While production is dominated by the United States, Brazil, and Argentina, consumption patterns vary across regions. In Asia, soy-based foods such as tofu, miso, and soy milk are traditional staples, while in Western countries, soy products have grown popular as plant-based alternatives [9, 15]. In sub-Saharan Africa, including Ghana, soybean utilization remains relatively low despite local production, largely due to cultural food preferences, limited processing knowledge, and low consumer awareness [10, 16]. Most Ghanaian soybeans are used for animal feed and oil production, with only modest integration into traditional meals [17]. Government and NGO initiatives, such as MoFA's soybean promotion programs and Global Alliance for Improved Nutrition (GAIN) -supported school feeding interventions, have improved awareness and utilization but challenges persist [18, 19]. Greater investment in education, processing technologies, and policy support is needed to enhance soybean consumption and maximize its nutritional benefits in African diets.

2.3. Perceptions and Attitudes Towards Soybean Consumption

Household consumption of soybeans is influenced by cultural, social, and economic factors that shape dietary choices. In many African communities, including Ghana, soybeans face resistance due to cultural conservatism, their association with livestock feed, and limited knowledge of preparation methods [20, 21]. Taste preferences also play a major role, as soybeans are often perceived to have an undesirable beany flavor. Although processing techniques such as roasting and fermentation improve sensory qualities, access to such products remains limited in rural areas [22-24].

Misconceptions further restrict soybean adoption. Myths that soy is nutritionally inferior to animal protein or that it causes hormonal imbalances persist, despite evidence showing soy protein provides all essential amino acids and has no harmful hormonal effects [15, 25, 26]. Gender dynamics also influence soybean consumption, as women—who are typically responsible for meal preparation—may be constrained by the preferences of male household members who undervalue soy-based foods [23, 27].

Overall, soybean acceptance is limited by cultural traditions, taste-related barriers, misconceptions, and household decision-making dynamics. Effective interventions should address these challenges through nutrition education, community engagement, and the promotion of locally acceptable soy-based recipes to ensure sustainable dietary integration.

2.4. Factors Influencing Soybean Consumption in Farming Households

Soybean consumption in farming households is shaped by market accessibility, socioeconomic conditions, extension services, and social influences. Despite its widespread cultivation in Ghana and sub-Saharan Africa, soybeans remain underutilized in household diets due to structural and cultural barriers.

A key determinant is market availability. Poor infrastructure and weak supply chains limit household access to processed soybean products, while most soybeans are directed toward commercial sales or livestock feed. Seasonal fluctuations in production also affect affordability and accessibility [28-30].

Socioeconomic factors including income, education, and employment—shape household food decisions. Low-income households prioritize staple crops for energy needs, and processing costs further discourage soybean use. Limited literacy and lack of knowledge about preparation also contribute to low adoption [31, 32].

Extension services and nutrition education play an important role but often focus more on production than on household-level utilization. Where training includes soybean cooking and processing methods, households are more likely to adopt soy-based meals [33-35].

The media and community leaders also influence consumption patterns. Radio and community-based campaigns have successfully raised awareness, while the involvement of traditional leaders, religious figures, and women's cooperatives has improved soybean acceptance and utilization [10, 36, 37].

In conclusion, soybean integration into household diets depends on addressing barriers such as poor market distribution, economic challenges, and limited household knowledge. Strengthening nutrition education, improving market access, and leveraging trusted community leaders are essential strategies for increasing soybean utilization in farming households.

2.5. Theoretical Framework

This study applies two complementary frameworks to explain soybean consumption in farming households. At the micro level, the Theory of Planned Behaviour (TPB) [38, 39] explains household decision-making regarding soybean preparation and consumption. According to TPB, behaviour is shaped by intentions, which are influenced by attitudes (e.g., taste, perceived benefits), subjective norms (e.g., cultural acceptance), and perceived behavioural control (PBC) (e.g., processing skills, fuel, and time). Behavioural outcomes are reflected in utilization frequency and consumption volumes, with PBC also exerting a direct influence when external constraints exist.

At the systems level, the Food Security Framework [40, 41]

outlines four dimensions availability, access, utilization, and stability that shape household opportunities and constraints. Availability is assessed through farm and market supply; access through affordability and income; utilization through processing knowledge, cooking practices, and nutrition perceptions; and stability through seasonal or year-round use. This framework situates household behaviours within wider production, market, and seasonal contexts.

The framework also overlaps with UNICEF's conceptual model of nutrition [42], which emphasizes diet quality, care practices, and enabling environments as determinants of nutrition outcomes. By linking household-level drivers (attitudes, norms, skills, and constraints) with broader food system dynamics, the combined TPB–Food Security approach provides a comprehensive basis for variable selection, instrument design, and analysis of soybean utilization.

2.6. Conceptual Framework

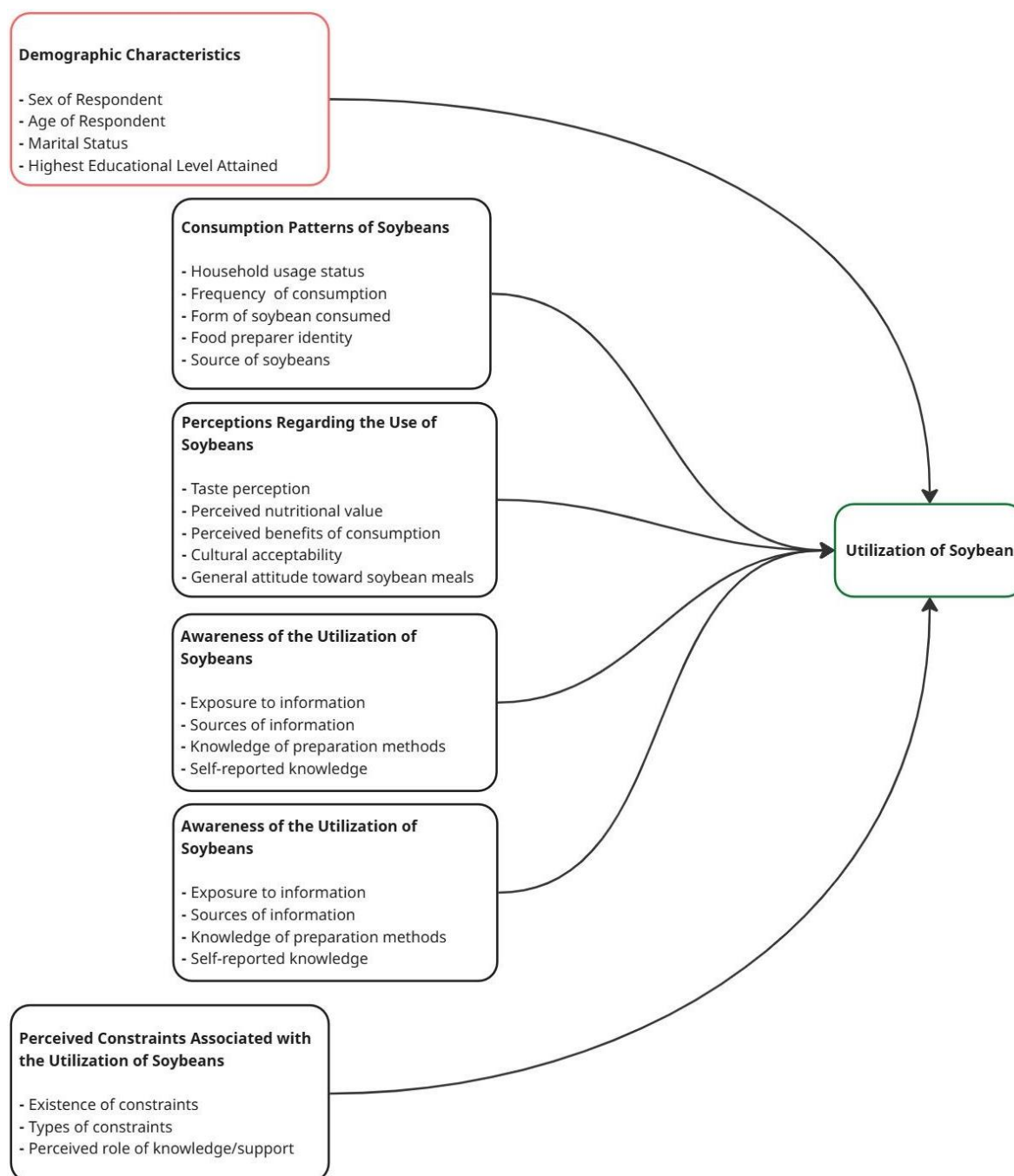


Figure 1. Conceptual framework of household soybeans utilization.

3. Methodology

The study used a cross-sectional mixed-methods design.

Quantitative data were collected from 384 households using structured questionnaires, and analyzed with SPSS (descriptive statistics, chi-square tests, and logistic regression).

Qualitative data from focus group discussions and key informant interviews were thematically analyzed in NVivo.

Respondents were household members responsible for food preparation. Sampling used multi-stage cluster selection across 10 communities.

The study area was East Gonja Municipality, Savannah Region, a predominantly rural agrarian setting with high poverty and malnutrition rates.

3.1. Study Area

The study was conducted in the East Gonja Municipality of the Savannah Region, Ghana, a predominantly rural jurisdiction covering approximately 10,787 square kilometers with a population of 135,450 [43]. The municipality experiences a tropical savannah climate with an average annual rainfall of about 1,100 mm, conditions that support the cultivation of maize, yam, cassava, groundnuts, and soybeans [18]. Agriculture is the principal economic activity, and the local context is characterized by high poverty prevalence, limited healthcare access, and inadequate infrastructure. Conducting the study in this setting provided an opportunity to document household soybean consumption within a typical agrarian economy and to describe how socio-economic and cultural conditions intersect with food choices relevant to nutrition and food security.

3.2. Study Design

The study adopted a cross-sectional mixed-methods design to document household soybean consumption patterns in the East Gonja Municipality and to identify associated factors. Data were collected at a single point in time, which provided a snapshot of current behaviours and contexts while minimizing recall and temporal confounding. The quantitative component consisted of a structured household survey, and the qualitative component comprised focus group discussions and key informant interviews. This convergent approach enabled triangulation of findings and complemented numeric estimates with contextual explanations of practices, perceptions, and constraints, consistent with mixed-methods guidance on integrating quantitative and qualitative strands within a single phase of inquiry [44].

3.3. Study Population

The study population comprised all private households in the East Gonja Municipality. The unit of analysis was the

household, represented by one eligible adult respondent (≥ 18 years) who was primarily responsible for meal planning and preparation or was otherwise knowledgeable about household food consumption. Institutional households (e.g., schools, prisons), visitors, and temporary residents with <6 months' residence were excluded.

3.4. Sample Size and Sampling Technique

3.4.1. Sample Size

The minimum sample size for the household survey was determined using Cochran's formula for proportions:

$$n = \frac{Z^2 \times p(1-p)}{e^2}, n = \frac{1.96^2 \times 0.5(1-0.5)}{0.05^2} \approx 384$$

Where:

n is the sample size.

Z is the Z -value (the number of standard deviations from the mean). For a 95% confidence level, is 1.96.

p is the estimated proportion of level of consumption of soya from previous studies, assumed to be 0.5. Because there is no prior estimate.

e is the desired level of precision (the margin of error), typically set at 0.05 for 5% precision.

3.4.2. Sampling Technique

The study employed a multi-stage cluster sampling design to select 384 households from East Gonja Municipality. At the first stage, three of the thirty electoral areas were chosen using simple random sampling. From these, ten communities were randomly selected to ensure both geographical and social diversity. The sample was distributed evenly, with approximately 38–39 households per community.

Within each community, households were selected using a community-based random approach. Field teams began at a central point, determined a random starting household by spinning a bottle, and applied the right-hand rule to identify subsequent households. All eligible households in a compound were interviewed, and if a household was unavailable, at least two revisits were attempted before replacement. This method was appropriate for dispersed rural settings, balancing randomness with field efficiency [45].

3.5. Data Collection Methods

3.5.1. Questionnaire

A structured household questionnaire was used to collect quantitative data in East Gonja Municipality. The tool captured soybean consumption patterns, household perceptions regarding soybean use in meal preparation, and the variety of soybean-based dishes prepared. Question formats included both single and multiple responses, with skip logic applied where necessary. Data were collected through face-to-face interviews in local languages and English by trained enu-

merators, following informed consent procedures. To ensure data quality, questionnaires were reviewed daily for completeness and consistency, and clarifications were obtained through same-day call-backs when needed.

3.5.2. Focus Group Discussions (FGDs)

Focus Group Discussions were conducted to generate qualitative insights on cultural and social factors shaping the perception and utilisation of soybeans. Participants were purposively drawn to reflect diversity in gender, age, occupation, and soybean use experience within the study communities. Each FGD comprised 12 participants and was facilitated by a trained moderator using a semi-structured guide that allowed probing while ensuring coverage of key themes such as meal routines, recipe knowledge, household decision-making, and perceived barriers and enablers. Sessions were conducted in familiar community venues, audio-recorded with permission, and supported by detailed field notes. Recordings were transcribed and translated where necessary to ensure accuracy prior to analysis.

3.5.3. Key Informant Interviews (KIIs)

Key Informant Interviews (KIIs) were conducted with individuals holding expert knowledge or influential community positions, including agricultural extension officers, health workers, local leaders, and soybean market actors such as traders. These interviews provided valuable insights into systemic and institutional factors shaping soybean production, market access, availability, and nutrition-related public health messaging. A semi-structured interview guide enabled flexible yet focused discussions, allowing informants to elaborate within their expertise while guiding the researcher to probe household soybean utilization themes. All interviews were conducted in person, recorded with informed consent, and subsequently transcribed for thematic analysis.

3.6. Data Analysis

3.6.1. Quantitative Analysis

Quantitative data from the household survey were entered and cleaned in Microsoft Excel and subsequently analysed using SPSS Version 30. Descriptive statistics including frequencies, percentages, means, and standard deviations were computed to summarize soybean consumption patterns, per-

ception indicators, and household characteristics. Bivariate analyses were conducted using Pearson's chi-square (χ^2) tests to assess associations between soybean utilization and explanatory variables. Binary logistic regression was used to identify predictors of soybean utilization while adjusting for potential confounders. Model fit was assessed using likelihood ratio chi-square, pseudo R^2 and standard information criteria (AIC and BIC). Statistical significance was set at $\alpha = 0.05$.

3.6.2. Qualitative Analysis

Qualitative data from FGDs and KIIs were thematically analyzed in NVivo 14. Transcripts were coded both inductively and deductively, with codes grouped into themes and refined for consistency. Two researchers coded a subset of transcripts to strengthen credibility, and data saturation was confirmed when no new insights emerged. Trustworthiness was ensured through triangulation, reflexive memos, and validation with field notes. Anonymized quotes were used to illustrate findings, which were then integrated with quantitative results for a comprehensive understanding of household soybean utilization.

4. Results and Discussion

Of the 384 households, 75% reported soybean use.

Consumption was modest (mostly 1–2kg/month), and primarily year-round. Women (94%) were the main food preparers, with markets as the main source.

Common uses included main dishes, porridge, and snacks. Utilization correlated with education, income, household size, and positive attitudes.

Regression analysis showed that neutral attitudes reduced odds of utilization, while awareness of processing increased odds.

Qualitative data highlighted barriers including taste, lack of recipes, time demands for processing, misconceptions (e.g., soy as animal feed), and male household resistance.

The discussion emphasizes that while awareness is relatively high, perceptions and constraints shape household adoption.

Strengthening education, recipe dissemination, and small-scale processing can enhance acceptance.

Table 1. Demographic Characteristics.

Variable / Category	Frequency	Percent
Sex		
Male	98	25.52
Female	286	74.48

Variable / Category	Frequency	Percent
Total	384	100.00
Age Group		
18–24 (Youth)	8	2.08
25–54 (Prime working-age)	305	79.43
55–64 (Older working-age)	50	13.02
65–76 (Elderly)	21	5.47
Total	384	100.00
Marital Status		
Single	19	4.95
Married	320	83.33
Divorced	14	3.65
Widowed	31	8.07
Total	384	100.00
Education Level		
No formal education	233	60.68
Primary	25	6.51
Junior High School	43	11.20
Senior High School	32	8.33
Tertiary	51	13.28
Total	384	100.00
Household Size		
≤ 3	35	9.11
4–6	172	44.79
7–9	118	30.73
10+	59	15.36
Total	384	100.00
Occupation		
Farmer	218	56.77
Trader	63	16.41
Civil servant	70	18.23
Unemployed	15	3.91
Other	18	4.69
Total	384	100.00
Income Category		
< GH¢ 500	17	4.43
GH¢ 500 – GH¢ 999	48	12.50
GH¢ 1,000 – GH¢ 1,499	58	15.10
GH¢ 1,500 and above	65	16.93

Variable / Category	Frequency	Percent
Prefer not to say	196	51.04
Total	384	100.00

Soybean Consumption Patterns Among Households

Table 2. Frequency of Soybean Use in the Past 7 Days.

Frequency of Use	Frequency	Percent
0 times	159	41.41
1–2 times	188	48.96
3–4 times	27	7.03
5 or more times	10	2.60
Total	384	100.00

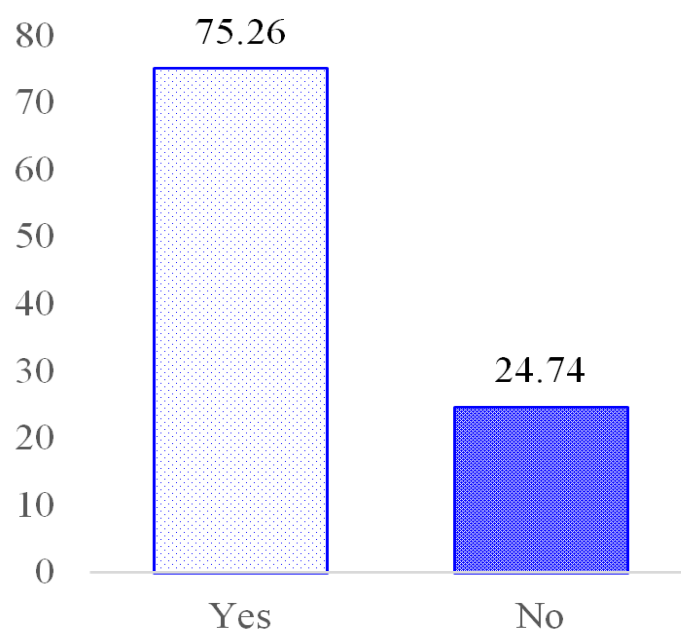


Figure 2. Soybean Consumption Patterns among Households.

Table 3. Seasonality of Soybean Use / Consumption.

Usage Pattern	Frequency	Percent
Seasonally only	82	21.35
All year round	226	58.85
Not sure	76	19.79
Total	384	100.00

Table 4. Average Monthly Household Use of Soybeans (kg).

Quantity Used	Frequency	Percent
Less than 1kg	85	22.14
1–2kg	151	39.32
3–5kg	44	11.46
More than 5kg	10	2.60
Don't know	94	24.48
Total	384	100.00

Table 5. Person Responsible for Preparing Soybean-Based Meals in the Household.

Household Member	Frequency (n)	Percent (%)
Mother	273	94.46
Father	2	0.69
Grandparent	4	1.38
Other	10	3.46
Total	289	100.00

Table 6. Main Source of Soybeans for Household Use.

Source	Frequency (n)	Percent (%)
Own farm	107	37.02
Local market	177	61.25
Neighbours/friends	5	1.73
Total	289	100.00

Table 7. Types of Meals Using Soybeans in the Past Month.

Meal Type	Frequency (n)	Percent of Responses (%)	Percent of Cases (%)
Breakfast meals (porridge, soy milk)	118	24.08	29.87
Main dishes (stew, soup)	186	37.96	47.09
Snacks (soy kebab, roasted)	57	11.63	14.43
Baby/child-specific meals	0	0.00	0.00
Other	129	26.33	32.66
Total Responses	490	100.00	124.05

Table 8. Household Members Who Typically Consume Soybean-Based Meals.

Household Member	Frequency (n)	Percent of Responses (%)	Percent of Cases (%)
Children under 5	70	11.33	18.23
School-age children	158	25.57	41.15
Adults	90	14.56	23.44
Elderly	50	8.09	13.02
Everyone in the household	250	40.45	65.10
Total Responses	618	100.00	160.94

Table 9. Bivariate associations between socio-demographic characteristics and household soybean utilization.

Variable / Category	Utilization of soybeans		χ^2 (df)	p-value
	Yes (n, %)	No (n, %)		
Sex of Respondent			$\chi^2(1) = 9.30$	0.002*
Male	85 (29.41)	13 (13.68)		
Female	204 (70.59)	82 (86.32)		
Total	289	95		
Age Group			$\chi^2(3) = 0.98$	0.806
18–24 (Youth)	6 (2.08)	2 (2.11)		
25–54 (Prime-age)	232 (80.28)	73 (76.84)		
55–64 (Older workers)	37 (12.80)	13 (13.68)		
65–76 (Elderly)	14 (4.84)	7 (7.37)		
Total	289	95		
Marital Status			$\chi^2(3) = 0.53$	0.913
Single	15 (5.19)	4 (4.21)		
Married	241 (83.39)	79 (83.16)		
Divorced	11 (3.81)	3 (3.16)		
Widowed	22 (7.61)	9 (9.47)		
Total	289	95		
Education Level			$\chi^2(4) = 11.78$	0.019*
No formal education	185 (64.01)	48 (50.53)		
Primary	20 (6.92)	5 (5.26)		
Junior High School	24 (8.30)	19 (20.00)		
Senior High School	24 (8.30)	8 (8.42)		
Tertiary	36 (12.46)	15 (15.79)		
Total	289	95		
Household Size			$\chi^2(3) = 13.81$	0.003*
≤ 3	20 (6.92)	15 (15.79)		
4–6	122 (42.21)	50 (52.63)		

Variable / Category	Utilization of soybeans		χ^2 (df)	p-value
	Yes (n, %)	No (n, %)		
7–9	99 (34.26)	19 (20.00)		
10+	48 (16.61)	11 (11.58)		
Total	289	95		
<i>Occupation</i>			$\chi^2(4) = 9.38$	0.052
Farmer	176 (60.90)	42 (44.21)		
Trader	42 (14.53)	21 (22.11)		
Civil servant	47 (16.26)	23 (24.21)		
Unemployed	12 (4.15)	3 (3.16)		
Other	12 (4.15)	6 (6.32)		
Total	289	95		
<i>Income Category</i>			$\chi^2(4) = 13.28$	0.010*
< GH¢ 500	10 (3.46)	7 (7.37)		
GH¢ 500–GH¢ 999	41 (14.19)	7 (7.37)		
GH¢ 1,000–GH¢ 1,499	43 (14.88)	15 (15.79)		
GH¢ 1,500+	40 (13.84)	25 (26.32)		
Prefer not to say	155 (53.63)	41 (43.16)		
Total	289	95		

FGDs

Focus Group Discussions

KIIs

Key Informant Interviews

5. Conclusion and Recommendations

Soybean consumption is moderately common in East Gonja, but constrained by socio-cultural and practical barriers.

Neutral attitudes, recipe gaps, and limited processing knowledge hinder wider use, despite high availability and awareness.

Policy should focus on behaviour change strategies, nutrition education, and practical training for household food decision-makers, especially women.

Strengthening market access, promoting processed soy products, and integrating soy into school feeding can improve household nutrition and food security.

Abbreviations

SPSS	Statistical Package for the Social Sciences
MoFA	Ministry of Food and Agriculture
NGOs	Non-governmental Organizations
GAIN	Global Alliance for Improved Nutrition
TPB	Theory of Planned Behaviour
PBC	Perceived Behavioural Control

Author Contributions

Saaka Laila is the sole author. The author read and approved the final manuscript.

Conflicts of Interest

The author declares no conflicts of interest.

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