

Research Article

# The Effect of Cultural Factors on the Consumption of Consumable Insects: Evidence from Rural Southwestern Uganda

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## Abstract

Consumable insects are an important part of human food systems and their consumption across diverse cultures dates back into the pre-historical period. This study assessed the effect of cultural factors on the consumption of consumable insects in the Kiruhura district of southwestern Uganda. The study employed a post-positivism research paradigm (mixed methodology) in a cross-sectional survey. The survey was conducted across 134 households in the Kiruhura district of South-western Uganda between January and June 2021 using a self-administered questionnaire and interview guide. Results show that member attitude and perceptions, cultural beliefs, and values were significant drivers of eating insects, particularly grasshoppers in the Kiruhura district. The findings of the study imply that the eating of insects in the area could be enhanced by educating and raising awareness about the importance of utilizing insects as a source of food. More program support that integrates rearing of insects within the household farming system could increase availability and sustainable use of seasonal consumable insects as nutritious food presents great implications for policies targeting dietary interventions.

## Keywords

Consumable Insects, Cultural Determinants, Entomophagy, Uganda

## 1. Introduction

About two billion people worldwide consume insects which are commonly known as entomophagy and this practice forms part of socio-cultural values across diverse groups of people from ancient times [18]. The practice is common in developing countries particularly in the global south [19]. Scientifically, advances in science and technology view this as one of the interventions that will be modified to cater to

the increasing need for food security considering the population explosion being experienced in developing countries [8]. The consumption of insects is slowly by slowly gaining prominence even among the societies that had a negative perception of it. Close to two thousand species of insects are believed to be consumable by the human population to date. The most prominent consumable insects known in the world

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include beetles, caterpillars, bees, wasps, ants, grasshoppers, locusts, crickets, cicadas, leaf and plants hoppers, scale insects and true bugs, termites, dragonflies, and flies. At the regional level, about six hundred seventy-nine species of insects are eaten by the population in the Americas, four hundred and seventy-two are consumed in Africa in Africa, three hundred and forty-nine are consumed in Asia, one hundred and fifty-two are consumed in Australia and around forty-one consumed by the population in Europe [10, 19].

Due to limited sources of animal proteins in Sub-Saharan Africa, most people have resorted to consuming insects as an alternative source of proteins [15]. It has been documented that the most commonly eaten types of insects in Africa include caterpillars (Lepidoptera) (31%), followed by grasshoppers, crickets, and locusts (Orthoptera) (23%) [10]. Additionally, the Coleoptera, especially the larvae follow (19%), and then termites (Isoptera) (7%), bees, wasps, and ants (Hymenoptera) (7%), true bugs (Heteroptera) (6%), aphids, scale insects, cicadas, and leafhoppers (Homoptera) (4%), and flies (Diptera) (1%). Other consumed insect species (3%) consist of cockroaches (Dictyoptera), mayflies (Ephemeroptera), and arthropod species such as hard ticks (Ixodidae) and spiders (Araneae) [20].

In Uganda, grasshoppers (*Ruspolia nitidula*) and flying termites (*Macrotermes bellicosus*) locally known as *senene* and *enswa* are the most commonly eaten consumable insects [5]. Grasshoppers in Uganda are marketed at prices that are forty percent higher than beef [1]. Available evidence further confirms that consumable insects have a high protein and remain an important natural resource available to vulnerable people and provide earning opportunities for the unemployed people and traders in most parts of southwestern Uganda [2]. While studies on the eating of consumable insects exist, most of these have focused on nutritional composition and environmental benefits [5], leaving a knowledge gap on the underlying cultural factors surrounding the eating of these insects in different communities. In Uganda, fewer studies conducted on the drivers for eating consumable insects and related foods have focused on the Northern and Central regions of Uganda [11]. This calls for more research especially in rural southwestern Uganda where the eating of consumable insects particularly grasshoppers has had a lot of cultural underlying connotations. The findings generated here will help scientists involved in food security and community livelihoods interventions to find a way of addressing these cultural underlying issues underscoring the role of consumable insects in addressing food security gaps.

Currently, the population of Uganda stands at forty-two million and is projected to go beyond a hundred million by 2050 [13]. With this population, demand for food is expected to increase, especially protein-based food whose major source is livestock [21]. The ever-increasing population continues to exert a lot of pressure on the land, making it less and less every day to sustainably keep large herds of cattle for protein supply [13]. Entomophagy provides the alterna-

tive route for the source of fats and proteins away from environmentally friendly meat [16]. However, the potential of utilizing insects as food remains untapped in many food-stressed communities of Uganda [5] such as the Kiruhura district. Most categories of households are still afraid to consume insects due to traditional beliefs and customs hold against this practice especially in rural southwestern Uganda. Therefore, it remains unclear as to whether the communities in Kiruhura district eat consumable insects especially grasshoppers for food. While studies on drivers on utilization of consumable insects as food exist, most of these have focused on the Northern and Central regions of Uganda [11, 17]. As such, there is insufficient evidence on the cultural factors influencing the consumption of consumable insects, particularly in the Kiruhura district where traditional skepticism against the practice is high [1]. From a policy perspective, this study is relevant in steering the debate on the most feasible policy options to enhance the consumption of consumable insects in the Kiruhura district as an alternative source of protein. Therefore, the need for a scientific study with a special focus on Kiruhura district, in rural southwestern Uganda.

## 2. Methodology

### 2.1. Research Design

The researcher employed a mixed-method approach to study the influence of social, cultural, and economic determinants of consumption of consumable insects for food in Uganda's Kiruhura district. This study design was chosen because it involves both aspects of qualitative and quantitative approaches of data collection and analysis.

### 2.2. Study Setting

The study was conducted in the Kiruhura district of southwestern Uganda. The area is situated in the cattle corridor of Uganda, at a distance of about 220km by road from Uganda's capital. Banyankore pastoralists sometimes referred to as Bahima, reside mainly in the Kiruhura district and neighboring areas of Mbarara, Sembabule, Kyegegwa, Lyantonde, and Isingiro. Culturally, consumption of consumable insects among this group is considered taboo. This study was conducted here to ascertain the cultural dimensions underlying this taboo among these people and how it can be addressed to cater to the growing need for consumable insects as an alternative source of food.

### 2.3. Target Population and Sample Size

This study targeted the entire population of households from which the sample population was selected. Target population implied those units (households) for which the research findings are meant to make inferences. Specifically, this research study targeted all households in Kazo and

Nyabushozi counties. The households were sampled using cross-sectional non-probability convenience sampling. The study randomly sampled 147 household heads to participate in this study.

### 2.4. Instrumentation and Data Collection Procedure

This research study used a questionnaire with both close and open-ended questions to collect data. The whole exercise of data collection and administering questionnaires was coordinated and supervised by the researcher to reduce to researcher's bias and copies of the questionnaire were administered to participating households for face-to-face interviews by trained enumerators. In each local area, a resident was deployed to help the enumerators with language translation and logistics. The enumerator went through induction before data collection to familiarize themselves with the questions and the purpose of the study in ensuring that relevant and quality data could be collected.

### 2.5. Data Analysis

The data collected were analyzed through the use of the logistic regression technique. This technique was appropriate

because the dependent variable was dichotomous (binary). Logistic regression was employed in this study since the dependent variable was dichotomous and required the comparison of more than one variable at a time. Qualitative data was analyzed using content analysis and presented in narrative quotations to back the quantitative findings.

## 3. Findings of the Study

The pseudo-adjusted coefficient of determination shows that the model explained 70.66 percent of the variations in the probability. The significant result of the log-likelihood ratio test (LR) value for the logistic regression model suggests that the selected model fits well the data. Results of a logistic regression model with estimates ( $\beta$ ), their standard errors (S. E.), significance levels ( $p$ ), and marginal effects (Mfx). Among the cultural determinants: member attitude and perceptions, cultural beliefs, and values were significant drivers of consumption of consumable insects. While the coefficient values of the cultural factors explain the influence of each on the consumption of consumable insects, the marginal effects measure the actual effect of instantaneous changes in each variable on households' consumption of consumable insects.

**Table 1.** Logistic regression models for factors influencing consumption of consumable insects in Kiruhura district.

Cultural factors	Variable				
	Obs	Mean	Std. dev	Min	Max
Marital status	134	.881	.325	0	1
Members' attitude and perception	134	2.713	1.183	1	4
Cultural beliefs and values	134	3.306	.606	1	4

**Table 2.** Results on cultural determinants and consumption of consumable insects.

Variable	Coefficient	Standard error	P> z	Marginal effects (Mfx)
Household marital status	-.627	1.114	0.574	.080
member attitude and perceptions	2.742	.918	0.003	.351***
LnCultural beliefs and values	10.686	2.988	0.000	1.369***
Number of observations		134		
LR chi2(3)		111.59 (0.0000)		
Pseudo R <sup>2</sup>		0.7066		
Log pseudo-likelihood		-23.16351		

Note: \*\*\*1, \*\*5 and \*10% respectively

Member attitude and perceptions were found to have a positive and significant influence on the consumption of consumable insects. This confirms that member's attitudes and perceptions were supportive in the eating of consumable insects as reflected in terms of member's easy access of foods from consumable insects, easy preparation of food from consumable insects, consumable insects fitting member's cultural status, the easy judgment of the quality of foods from consumable insects, ability to make many different meals from processed consumable insects and minimal choices of making bad food from consumable insects. Results showed that a positive change in members' attitudes and perceptions would instantaneously increase the probability of consuming consumable insects by 35.1 percent holding other factors constant. This finding suggests that efforts to encourage the households to consider eating insects would likely be successful since their attitudes and/or phobias towards eating consumable insects are positive. In support of the statement, one key informant had this to say:

*I couldn't imagine a grasshopper (senene) in my mouth until a member of the Rushere women group prepared some for us. Hey, they were sweet and tasty. (perse.com)*

Previous studies have shown that consumer attitudes and perceptions towards organic foods including consumable insects affect purchase intention and consequently consumption patterns. Similar studies in Zambia, Kenya, and Zimbabwe, in the Victoria basin (Uganda and Burundi), confirm that consumable insects perceptions were more positive in urban than rural areas [14]. Their study attributed the increased perception to marketing campaigns. A study by Chang, Ma, and Chen among Taiwanese consumers found that attitudes and perceptions to consumable insects, food neophobia, and disgust for consumable insect types were key drivers for not purchasing and eating insects [3]. A similar study by [8] in China further found out that the perceived positive attributes associated with consumable insects and the preferences of children in the household have positive impacts on consumption frequency. This suggests the need to provide education knowledge of consumable insects to consumers in the study area would improve on the perception of attributes associated with insects and this consequently increases their purchase probability.

In food cultures, behavioral and customary beliefs when making food choices like those from consumable insects, rituals and taboos play a big role. The results show that cultural beliefs and values score positively influenced the consumption of consumable insects and this was statistically significant at 1 percent. This implies that members whose cultural beliefs and values are supportive were 10.7 times more likely to consume consumable insects than those whose cultures were prohibitive. The corresponding marginal effects revealed that cultural beliefs and values increased the probability of consuming consumable insects for food by 136.9 percent.

During the key informant interviews, other participants expressed those peers and the general environment influence, as one participant expressed that;

*If foods from consumable insects are readily available and I see my family members eat regularly with passion, I would also try it. (perse.com)*

Specific cultural beliefs and values towards consumable insects play a significant role in determining the acceptance and preference of consumable insects. People with strong cultural beliefs and touch will find it difficult to accept the consumption of insects as opposed to the liberal contemporary globalists who find it easy to adjust to new ways of life. People involved in food security-related interventions involving the use of consumable insects as an alternative source.

For example, *senene* is consumed as food in Cameroon, Nigeria, South Africa, and Uganda, but the same species is considered poisonous in other [4]. More importantly, religious and gender-based taboos govern the consumption of consumable insects in some regions. For example, in central parts of Uganda, religious practices prohibit women from consuming *senene* that they are inappropriate, however, proponents of this school of thought do not provide substantive grounds to explain their belief [4, 5, 12]. A study by [9] expressed that a significant number of people living in urban communities are forbidden from consuming insects owing to religious inclination. Most contemporary churches have different teachings regarding the consumption of insects. Contemporary churches have divergent views regarding the consumption of insects and have in most cases preached against the practice [9]. Due to the ever-growing religious following of contemporary churches in Zimbabwe, most people including those that originally used to consume insects, have since abandoned the practice. This plays a negative card towards scientists and researchers working hard to close the gap of food security and creating an alternative source of proteins from the animals.

## 4. Conclusion

It was established that cultural factors have no significant effect on the consumption of consumable insects in the Kiruhura district of southwestern Uganda was also verified using the logistic regression model. Based on the model results, cultural factors including member attitude and perceptions, cultural beliefs and values are some of the drivers that have a positive and significant influence on the consumption of consumable insects in the district. In general, the observed high consumption of consumable insects shows that entomophagy is widely practiced in the district.

## 5. Policy Implications

One of the issues surrounding the consumption of con-

sumable insects is how to supply consumable insects on regular basis to meet the increasing consumption trends. Analysis of cultural factors provided information on the key drivers that must be optimally utilized to enhance the consumption of consumable insects in the region.

Based on the findings and discussions, this study suggests the need to educate and raise awareness about the importance of consumable insects through media to promote and encourage people to consume consumable insects as foods since they are a sustainable nutritious food that has less impact on the environment.

The findings further recommend more program support to increase availability and sustainable use of seasonal consumable insects as a nutritious food since consumable insects have social and cultural support reflected in their cultural beliefs and values, members' attitudes and perceptions, and hence their production could deserve more attention from government programs including wealth creation.

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## Conflicts of Interest

The authors declare that there is no conflict of interest.

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