

**|ATTITUDE AND WILLINGNESS TO CONSUME LOCALLY MADE SOYMILK BY
REFUGEES AND HOST COMMUNITY MEMBERS IN NORTHERN UGANDA**

By

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DECLARATION

I, Okello Emmanuel (22/U/1208/MFN/PS), declare that the work presented in this dissertation is my work and has not been submitted for academic award in any University.

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DEDICATION

To my parents and siblings, I dedicate this effort.

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LIST OF ACRONYMS

FGD	Focus Group Discussion
GAM	Global Acute Malnutrition
GH	Greenhouse gases
GIZ	The Deutsche Gesellschaft für Internationale Zusammenarbeit
PBM	Plant Based Milk substitutes
SAM	Severe Acute Malnutrition
KMO	Kaiser-Meyer-Olkin

ABSTRACT

The well-being of refugees and host community members is threatened by reliance on diminishing food aid, limited financial capacity and market access, insufficient land for farming, and overpopulation, among other challenges. This situation is exacerbated by food rations that primarily consist of starchy staples with limited or no animal protein, increasing the risk of nutritional deficiencies. The consumption of locally produced plant-based milk substitutes such as soymilk could provide a cost-effective solution to address these risks. However, the acceptance and consumption of such foods depend on consumer attitude and preferences. This study investigated the willingness to consume and the factors influencing attitude towards the consumption of locally made soymilk among refugee and host community members. A cross-sectional mixed-methods study was conducted with 365 participants in Palabek Refugee Settlement, Lamwo District. Data were collected using a semi-structured questionnaire and focus group discussions guide, and analysed using SPSS version 25 and thematic inductive analysis, respectively. The findings reveal that most respondents (75%) had not consumed soymilk prior to the study, with a higher proportion of the host community (29%) reporting prior consumption compared to the refugee group (22%). The majority of respondents (99%) exhibited a positive attitude towards locally made soymilk, with no significant differences between the two study groups. Participants expressed a high likelihood of consuming different soymilk flavors (Mean Score = 3.96), with lemongrass flavor being the most preferred, followed by vanilla and plain flavors. Significant differences were noted, as refugees expressed a higher likelihood of consuming these flavors compared to the host community. The willingness to consume soymilk improved significantly after participants were trained on soymilk preparation methods, with mean scores increasing from 4.12 to 4.88 among refugees and from 4.08 to 4.28 among host community members. Household size, education level, monthly income, cost of soymilk and its raw materials, sensory attributes, accessibility of soymilk, health and nutritional benefits were key factors influencing attitude towards soymilk consumption. Organizations, including Non-Governmental Organizations (NGOs) and government agencies, should leverage these factors and the high acceptance of locally made soymilk to design inclusive, culturally sensitive, and nutritionally adequate programs. These programs should address the nutritional needs of both host and refugee communities, fostering resilience and long-term health improvements.

Keywords: Soymilk, Refugees, Attitude, Willingness, Flavors, Plant-Based Alternatives

CHAPTER ONE: INTRODUCTION

1.1 Background

Globally, the number of refugees continues to rise, with over 26 million recorded in recent years, 80% of whom face food insecurity regardless of their location (Nisbet *et al.*, 2022). As of 2018, two-thirds of refugees originated from countries such as South Sudan, Afghanistan, Myanmar, Somalia, and Syria, primarily due to conflicts (Mandre *et al.*, 2021). Uganda hosts the largest refugee population in Africa and ranks third globally, with over 1.5 million people displaced from countries such as South Sudan, the Democratic Republic of Congo, and Burundi. These refugees are distributed across 13 districts within Uganda, with most residing in settlements and a smaller fraction in urban areas (The United Nations High Commissioner for Refugees (UNHCR), 2022). The refugee population in Uganda is expected to increase due to ongoing regional conflicts.

Refugees often face difficult living conditions, including confinement to camps and reliance on food aid. This dependency restricts access to essential services such as adequate food, healthcare, and education (Gezahegn *et al.*, 2017). High costs of animal protein render it unaffordable for many low-income households, resulting in diets dominated by starchy foods and deficient in protein. This dietary imbalance has led to high levels of malnutrition, particularly among vulnerable groups such as children, the elderly, and pregnant women, posing a significant public health challenge (Nisbet *et al.*, 2022; Sedibe *et al.*, 2023).

Among host community members, malnutrition is also rising, partly due to competition for limited resources with refugees. Scarcity of farmland and food in local markets, coupled with inflated prices, exacerbates the situation (Zhou *et al.*, 2023). Previous studies report high malnutrition levels in both refugee and host populations, with settlements such as Adjumani, Bidibidi, Palabek, Palorinya, Rhino Camp, and Kiryandongo classified under the Integrated Food Security Phase Classification (IPC) Phase 2 (Alert). Global Acute Malnutrition (GAM) prevalence rates in these settlements range from 5.3% in Palorinya to 8.7% in Kiryandongo (IPC, 2021). A more recent report indicated an average GAM rate of 8.6% across host community members in Palabek Refugee settlements (IPC, 2023).

To address this persistent challenge, innovative and locally relevant solutions are required. A multifaceted approach using readily available resources is critical, as no single intervention can fully eliminate malnutrition (Gezahegn *et al.*, 2017). Plant-based milk substitutes derived from

legumes, cereals, nuts, and seeds offer a promising, cost-effective protein source to mitigate malnutrition. Among these, soymilk, produced from soybeans, stands out due to its high nutritional value. Soybeans contain 35–45% protein (Vanga & Raghavan, 2018), and soymilk provides 2.6–3.98% protein (Besir *et al.*, 2022), making it a protein-rich beverage. Additionally, soymilk is affordable for low-income households compared to animal protein sources and can be complemented with other crops, such as cereals, to enhance nutritional content (Almghawesh *et al.*, 2022; Mazumder & Begum, 2016). Soymilk is particularly suitable for individuals who are lactose intolerant, allergic to dairy, vegan, or vegetarian.

Moreover, soybeans have higher protein productivity per acre than most grains, making them an ideal crop for households with small plots of land (Wakhu-Wamunga *et al.*, 2014). Despite its numerous benefits, locally made soymilk is scarce, and imported soymilk remains too expensive for many low-income households. Although production of soymilk is indeed an interesting and related area of study, the current research prioritizes consumption to understand existing attitudes and willingness to consume locally made soymilk. Insights gained could inform future studies or interventions aimed at increasing local production to meet consumer needs effectively. This necessitates promoting locally made soymilk, coupled with training for refugees and host community members on its production.

To increase the adoption of plant-based milk substitutes, challenges such as cost, beany taste, availability, and flavor preferences must be addressed (Almghawesh *et al.*, 2022; Estell *et al.*, 2021; Villegas *et al.*, 2009). Most studies on plant-based milk products focus on developed countries, making their findings less applicable to developing contexts like Uganda. This gap underscores the need to investigate attitudes and willingness to consume locally made soymilk among refugees and host community members in Northern Uganda. The findings aim to contribute to efforts toward improved food security, nutrition, and sustainable development in the region.

1.2 Problem statement

Refugees in Uganda face significant challenges that heighten their risk of developing nutritional deficiencies. These include reliance on diminishing food aid, limited financial capacity, restricted access to local markets, inadequate land for farming, and overpopulation in refugee camps (Kumbai, 2018). The food rations provided to refugees largely consist of starchy staples with little to no animal protein, potentially compromising dietary protein intake. This dietary imbalance

contributes to protein-energy malnutrition among households in refugee-hosting communities and underscores the urgent need for affordable, high-quality protein sources (Ugwu & Nwoke, 2011).

While plant-based milk substitutes, such as soymilk, offer a promising solution, their potential remains underutilized in Uganda. Locally made soymilk could serve as a cost-effective alternative to commercially available plant-based milk products, which are often too expensive and inaccessible for low-income households in refugee-host settings. However, for soymilk to be widely adopted, consumer attitude toward plant-based milk products must change to enhance acceptability and consumption.

Existing studies on plant-based milk substitutes have primarily been conducted in Western, often developed, countries. These studies focused on areas such as willingness to consume plant beverages (Rombach *et al.*, 2023), consumer opinions and beliefs about the health benefits of soy products (Bosman *et al.*, 2011), and factors influencing consumer perceptions and demand (Li, 2016; Moss *et al.*, 2022). However, findings from these contexts cannot be generalized to developing countries like Uganda, where unique socio-economic challenges and the influx of refugees significantly impact food security.

In Northern Uganda, the influx of refugees has compounded the food insecurity challenges, yet locally made, nutritious plant-based milk alternatives remain largely absent. This gap highlights the lack of research on attitude and willingness to consume soymilk among refugees and host community members. Understanding these factors is crucial for developing targeted interventions to promote the production and consumption of locally made soymilk. Such interventions could play a pivotal role in reducing malnutrition prevalence and enhancing food security in Northern Uganda

1.3 Objective of the study

1.3.1 General objective:

To investigate the attitude of refugees and host community members towards consumption of locally-made soymilk in Northern Uganda

1.3.2 Specific Objectives

The study sought to.

- i. Assess the attitude of refugees and host community members in Northern Uganda towards the consumption of locally made soymilk
- ii. To determine the willingness of refugees and host community members in Northern Uganda to consume different flavors of locally produced soy milk
- iii. To assess factors that affect attitude towards the consumption of locally made soymilk by refugees and host community members in Northern Uganda.

1.3.3 Research questions

- i. How do refugees and host community members in Northern Uganda perceive the consumption of locally made soymilk?
- ii. To what extent are refugees and host community members in Northern Uganda willing to consume different flavors of locally made soymilk?
- iii. What factors influence the attitude of refugees and host community members towards the consumption of locally made soymilk in Northern Uganda?

1.4 Conceptual framework

The study was conceptualized to examine the influence of consumer attitude and willingness to consume on the consumption of locally produced soymilk. Specifically, it highlighted how sociodemographic factors, product-related attributes, and personal beliefs shape attitude, which, in turn, influence willingness and actual consumption behavior.

Drawing from consumer behavior theories for example the Theory of Planned Behavior (Ajzen, 1991), attitudes are key predictors of willingness and subsequent behaviors. For example, research by (Pandey *et al.*, 2021) demonstrated that attitude influence intentions, which affect the consumption of plant-based yogurt alternatives. Similarly, studies by (Haas *et al.*, 2019; Szűcs & Szabó, 2018) indicate that attitude toward plant-based foods are shaped by factors such as environmental sustainability, health benefits, and food neophobia.

In this study, attitude is considered an independent variable influenced by sociodemographic factors (for example age, marital status, educational level), product-related factors (for example sensory attributes, taste, flavor), and personal beliefs (such as animal welfare, health benefits).

Willingness to consume soymilk serves as a mediating variable that bridges attitude and actual consumption the dependent variable.

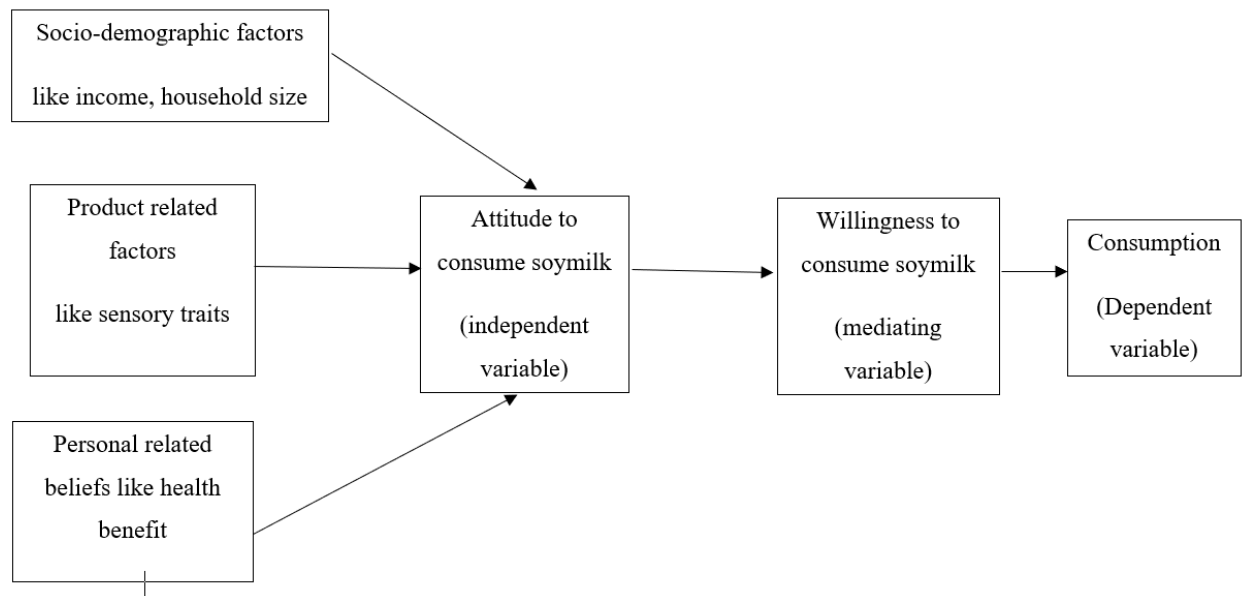


Figure 1: Conceptual framework showing factors influencing attitude and willingness to consume soymilk. (Adapted and modified by the researcher from (Szűcs & Szabó,2018))

1.5. Significance of the study

The findings from this research on the attitude, willingness, and factors influencing soymilk consumption among refugees and host community members contribute significantly to knowledge and practice. Specifically, the study provides critical insights for policymakers and stakeholders in health, nutrition, and food security. Policymakers at the government level, such as the Ministry of Health, Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), and Ministry of Gender, Labour, and Social Development (MGLSD), can utilize this information to design policies and programs that promote the consumption of plant-based milk alternatives. Additionally, local government authorities in refugee-hosting districts can integrate these findings into district-level nutrition and livelihood plans to enhance community health and resilience.

Key stakeholders include international organizations like the World Food Programme (WFP), UNHCR, and the Food and Agriculture Organization (FAO), which could use the data to inform nutrition assistance programs and develop interventions targeting refugees and host communities. NGOs focusing on food security, such as Action Against Hunger and the International Rescue Committee, could leverage these findings to design community-based projects that promote the production and consumption of soymilk. The private sector, particularly food manufacturers and

agribusinesses, can also use the findings to identify consumer preferences and market opportunities for locally produced soymilk.

A key strength of the study is its practical impact: participants, particularly refugees and host community members, benefited from learning the process of soymilk production. This skill not only empowers them to produce soymilk for personal consumption but also positions them to engage in income-generating activities through local production and marketing. By enabling them to supply soymilk on the market, the study contributes to increased food security, economic independence, and resilience.

For food manufacturers, the findings offer valuable insights into consumer preferences regarding new flavors of soymilk. This can inform production strategies to cater to the Ugandan market's tastes, ensuring a higher likelihood of product acceptance. Overall, the study bridges knowledge gaps while demonstrating practical benefits for government agencies, international organizations, NGOs, private sector actors, and local communities. These combined efforts contribute to the broader goals of food security, economic empowerment, and improved nutrition in refugee-hosting areas.

1.6 Scope of the study

The study concentrated on the attitude and propensities of host community members and refugees in Northern Uganda to consume locally produced soymilk. It sampled 365 respondents, with 225 refugees and 140 host community members. The disparity in sample sizes was due to the difference in GAM prevalence between the two groups, with refugees having a higher GAM rate of 13.9%, compared to 8.6% for the host community members. To gain a deeper understanding of the characteristics of soymilk consumption in a refugee-host settlement setting, the two groups were combined for the study. The study evaluated the willingness of refugees and host community members towards three different soymilk flavors, as these flavors were more familiar to them at the time of data collection than others such as chocolate or strawberry. Due to ethical considerations, the study did not assess the sensory preferences of soymilk but instead conducted an intervention study, which involved assessing the respondents before and after training them on how to prepare soymilk. A questionnaire developed by the researcher was the primary tool for data collection. Policymakers and other stakeholders, in addition to the respondents, are expected to benefit from the study's findings.

CHAPTER TWO: LITERATURE REVIEW

2.1 Overview of soymilk

Soymilk, an aqueous milky beverage produced by grinding, heating, and filtering soaked soybeans (Odo, 2003), is an important intervention in addressing malnutrition among refugee and host community members. It is a nutrient-dense food that is easy to process and can be combined with a variety of foods to enhance its nutritional value (Guli, 2022). Due to its accessibility, affordability, and ease of preparation, soymilk presents an ideal solution for combating malnutrition (He, 2015; Umer, 2021). Soymilk is a viable plant-based alternative to cow's milk, offering similar levels of protein, fat, omega-3 fatty acids, and peptides. Fermented soymilk, produced through the action of lactic acid bacteria (LAB), enhances these nutritional values and provides additional health benefits, including antihypertensive, antioxidant, antidiabetic, anticancer, and hypocholesterolemic effects (Kumari *et al.*, 2022). Studies have also demonstrated that fermented soymilk can protect against cancer, diabetes, hyperlipidemia, and offers immune-modulatory, memory improvement, anti-colitis, and wound healing properties (Kesika *et al.*, 2022; Neufingerl & Eilander, 2022; Storz *et al.*, 2023; Sun *et al.*, 2016). Furthermore, soymilk protein contributes to cardiovascular health, while fortified soymilk provides essential nutrients like calcium and vitamin D, which are vital for bone health (Li *et al.*, 2016).

In addition to these benefits, soymilk is an affordable non-dairy alternative with enhanced functional and nutritional properties, making it an attractive option for individuals seeking plant-based food products (Rahim *et al.*, 2022). These health benefits emphasize soymilk's role in supporting cardiovascular health, bone health, hormonal balance, and disease prevention. However, it is important to recognize the variations in individual responses to soymilk and the influence of factors such as the source, processing methods, and fortification on its overall nutritional impact. Continued research is needed to better understand the mechanisms underlying these health benefits and to provide more detailed dietary recommendations for integrating soymilk into a balanced and diverse diet.

Soymilk consumption patterns vary globally, and it is essential to distinguish between different types of soymilk. These include traditional or regular soymilk, made by grinding, heating, and filtering whole soybeans (Odo, 2003); reconstituted soymilk, which involves adding soybean meal, seasonings, and vegetable oils; and derivative products, which are made from either regular or

reconstituted soymilk. In marginalized communities, such as refugee and host settlements, where access to advanced processing methods may be limited, locally made soymilk plays a critical role in managing malnutrition. However, the nutritional quality and content of soymilk can vary significantly depending on production methods, fortification, and additional ingredients used by local producers.

While soymilk offers numerous health benefits, it is also important to consider the potential risks posed by antinutritional factors. Soybeans naturally contain compounds such as phytates, lectins, and protease inhibitors, which can interfere with nutrient absorption and may have negative effects on health if consumed in excess. These compounds are typically reduced through soaking, cooking, and fermentation, but variations in processing methods can impact their presence in the final product. Over-consumption of poorly processed soymilk, especially in regions where hygiene standards may be suboptimal, can lead to health risks. For instance, locally made soymilk may be contaminated with harmful bacteria like *Staphylococcus aureus* and *Escherichia coli* (Anagu *et al.*, 2015; Ezemba *et al.*, 2022), which could pose safety concerns and hinder its acceptance. Additionally, the presence of resistant pathogens in improperly produced soymilk may raise public health issues, including the spread of antibiotic resistance, affecting the uptake of this nutritious product. Despite these concerns, there is a significant gap in the literature regarding the attitude of refugees and host community members toward soymilk consumption. The lack of data on their willingness to consume soymilk further complicates efforts to promote its consumption, especially in refugee and host community settings. More research is needed to understand the factors influencing soymilk consumption in these contexts and to identify ways to mitigate potential health risks while maximizing the nutritional benefits of soymilk.

2.2 Attitude towards consumption of soymilk

The concept of attitude is defined as complex, multifaceted mental representations that influence behavior and are shaped by cognitive, affective, and behavioral components (Wolf *et al.*, 2020). Attitudes are, therefore, a summary of how people, groups, objects, and ideas are valued in terms of whether they are liked or disliked. Attitudes can be seen as propositional representations, with relational and truth information playing a key role in their formation (Houwer *et al.*, 2021). They can be favorable or unfavorable evaluations of objects, subjects, events, or actions, and may either be explicit (such as overt evaluations) or implicit (non-overt evaluations presented subconsciously) (Gelbrich *et al.*, 2023). According to (Johnson *et al.*, 2022), attitude is a mental tendency that

evaluates entities along an evaluative continuum, with some degree of like or dislike. Attitudes are important because they predict and are causally implicated in behavior. Attitude can be automatically activated by exposure to a given entity, enabling motivated reasoning (Briñol *et al.*, 2019). These attitude are often based on beliefs that have no basis in reality and can be formed in youth and maintained throughout one's lifespan. The fact that attitude is strongly cultural and plays a role in several fields suggests that they can be assessed using both explicit and implicit measures. These can be useful in predicting a person's behavior toward a given aspect, such as consumption, either separately or in combination.

Thus, attitude toward consumption can be defined as the learned predisposition of individuals to respond favorably or unfavorably to a given food (Anilkumar & Jerlsey, 2012; Iyer & Muncy, 2016). Attitude can vary in strength and are influenced by the consumer's intrinsic values, which are acquired over time and conditioned or dictated by prevailing situations (Martinho, 2021). According to (Manggu & Beni 2022), consumer attitude play a crucial role in guiding thoughts, influencing feelings, and affecting behaviors. This implies that attitude are composed of cognition, emotion, and intentions, and reflect the consumer's evaluation and assessment of a product or group of products (Anilkumar, 2012). In this regard, attitude toward a given food can be positive, negative, or indifferent, and they tend to be relatively permanent. This attitude is usually achieved through direct experiences or via conditioned observational learning. Attitude is, therefore, a function of beliefs dependent on factors such as emotions, knowledge, and behavior. Attitudes toward food consumption are critical because they shape consumer behavior and play a significant role in purchase decision-making processes.

In the context of consumption of locally made soymilk, the attitude of consumers may vary based on factors such as flavor, taste, blending with other ingredients, acceptability, environmental and socio-economic dynamics, cultural influences, and the perceived health benefits associated with its intake. According to (Adeleke *et al.*, 2000b), the acceptability of locally made soymilk as a substitute for cow's milk depends on factors such as flavor, appearance, smell, taste, and general acceptability.

The growing awareness about environmental sustainability could also be a key motivator for positive attitudes toward the consumption of locally made soymilk. As reported by (Kaplin, 2012; Shabir *et al.*, 2023), consumers view locally sourced products as having a lower carbon footprint due to reduced transportation distances and methane gas production. Studies by (Boaitey &

Minegishi, 2020; Lee *et al.*, 2024; Rombach *et al.*, 2023) have shown that individuals with strong environmental values are more likely to favor locally made soymilk, perceiving it as an eco-friendlier alternative to commercially manufactured options. This suggests that, to enhance acceptance of soymilk, proper branding is necessary to distinguish it from animal milk. Whether this is the case with refugees and associated host community members remains to be seen. Targeted research is, therefore, required to comprehensively assess the association between perceived environmental benefits and attitude toward consumption of soymilk.

Additionally, attitude toward the consumption of locally made soymilk could be influenced by health considerations. Consumers may view soymilk as a nutritious beverage, particularly when locally sourced and minimally processed. Perceived health benefits, such as being lactose-free, low in saturated fats, and rich in plant-based proteins (Kesika *et al.*, 2022; Sun *et al.*, 2016), may contribute to positive attitudes toward the consumption of locally made soymilk. Thus, increased emphasis on natural and less processed alternatives may resonate well with health-conscious consumers, facilitating positive attitudes that enhance soymilk intake.

Consumer preferences for taste and flavor play a crucial role in shaping attitude toward locally made soymilk. A study by (Głuchowski *et al.*, 2021) has shown that positive sensory experiences, including taste, texture, and aroma, contribute significantly to consumer acceptance. Findings by (Andersen *et al.*, 2019) also noted that the textural characteristics of food, especially its stickiness and cohesiveness in the mouth, taste, and aroma, are among the most important sensory attributes. A study by (Merlino *et al.*, 2022) have shown in their study that blending soymilk with pineapple is more acceptable than blending it with banana, which causes phase separation and lower acceptance. Similarly, different varieties of soybeans used in soymilk production may also affect soymilk's acceptability, with some varieties being more acceptable than others. The use of flavoring agents such as lemongrass, honey, or sugar can enhance the acceptability of soymilk (Rimal & Onyango, 2013). Even though (Laswai *et al.*, 2009) argued that further research is needed to explore other potential flavoring agents that promote the acceptability of soymilk, especially in communities where cow's milk is unavailable or unaffordable, local producers can still offer unique flavors using local production methods. This enhances the appeal of their soymilk products and positively influences consumer attitude.

While there is optimism for positive attitude toward locally made soymilk, challenges such as limited availability, pricing concerns, safety, and competition with established beverage brands

exist. However, there are opportunities in education campaigns to raise awareness about the benefits of consuming locally made soymilk. The above studies also shed light on the multifaceted nature of attitudes toward the consumption of locally made soymilk. Environmental consciousness, health considerations, taste preferences, socio-cultural factors, and perceptions of quality and transparency collectively shape consumer attitude.

Overall, even though several research studies have been carried out on plant-based milk consumption, there is a need for further studies to help understand consumer perspectives on locally made soymilk within diverse consumer markets. Interestingly, some conclusions on consumer attitudes toward plant-based dairy alternatives drawn from previous research seem to be limited to developed countries and primarily focus on one type of product (mostly plant-based beverages), which cannot be generalized to other countries due to variations in food, culture, and traditions. Therefore, research should be conducted to account for potential cross-country discrepancies (Adamczyk *et al.*, 2022). However, deeper insights into consumer attitude toward plant-based dairy alternatives among refugees and host community members remain poorly understood.

2.3 Willingness towards consumption of different flavors of soymilk

Willingness is a complex concept with various applications. It can be described as the maximum amount an individual is willing to either pay, sacrifice, or exchange to receive a good or service, or avoid an undesirable situation (Mariani & Pêgo-Fernandes, 2014). This concept encompasses readiness and ability as preconditions for adopting new behaviors. The concept of willingness can be used as a measure of the value an individual attaches to a given product, service, or situation. Individuals often undertake cost-benefit analyses to embrace a service or product that benefits their health. This concept is, therefore, susceptible to the influence of environmental, social, cultural, and economic conditions. For instance, a study by (Kumuh & Mendapatkan, 2022) has shown that the willingness to pay for water, which is an essential resource, is influenced by education level, family size, and community knowledge, among other factors.

Studies by (Duvenage *et al.*, 2012; Lawrence *et al.*, 2016; Lefevre, 2011) on consumer preferences for locally produced dairy products and soymilk indicated that willingness to consume these milk products is influenced by attributes such as income, household size, and cultural identity. A study by (Duvenage *et al.*, 2012) asserted that there is a high level of acceptance of home-prepared soy

dishes in low-income rural communities. This suggests an increased willingness to consume locally produced soymilk. Although studies on the consumption of locally made soymilk among refugee communities are limited, a study by (Lefevre, 2011) among Senegalese local communities noted that consumers are willing to consume local milk-based products. This can also serve as an indication of an enhanced preference for locally made soymilk. In another study by Lawrence *et al.*, (2016) identified flavor as one of the leading drivers of liking for unflavored soymilk among consumers. Several studies have shown that soymilk can be supplied either as unflavored or in different flavors, such as vanilla, almond, and chocolate, with unflavored soymilk being a high-quality protein source (El-Boraey, Ismail & Hoda, 2015; Zamal *et al.*, 2011). Plain and vanilla flavors were considered the most common among university students in the Philippines (Caluza, 2019), which aligns with the findings of (Moss *et al.*, 2022) that vanilla and chocolate flavors increased consumers' acceptability of almond and oat milk.

Contrarily, a study by Ebabhamiegbbeho *et al.*, (2016) conducted among Nigerian consumers found pineapple soymilk flavor (80% pineapple juice) to be more acceptable than plain soymilk. Similarly, both Ebabhamiegbbeho *et al.*, (2016) and Laswai *et al.*, (2010) reported that pineapple-flavored soymilk was preferred over banana-flavored soymilk among Tanzanian consumers. This preference may be due to the attractive and refreshing sugar-acid balance of pineapple. According to Syamsuri and Lestari (2021), reported that chocolate and coffee flavors were preferred, likely due to their effective suppression of the beany flavor in soymilk. These findings further confirm that the flavor of soymilk can significantly influence the willingness of different consumers to partake in this beverage.

Thus, the preference for specific flavors is context-dependent, varying between different communities. Therefore, the preferences of refugees and host community members for soymilk flavors may differ from those of other communities where studies have been conducted. This is worth investigating, as these groups live in complex situations. As such, this study aims to enhance the willingness to consume locally made soymilk. Specifically, this study will differ from previous research by focusing on the context of refugees and host community members, using flavors such as lemongrass, plain soymilk, and vanilla, which are more readily available in these areas.

2.4 Factors affecting attitude towards consumption of soymilk

The consumption of plant-based milk alternatives is influenced by various factors that differ across households and communities. These factors encompass health benefits, lifestyle choices, food safety concerns, environmental consciousness, cultural traditions, and sensory preferences. Several studies have investigated these factors in relation to plant-based milk substitutes, and their findings can be categorized as follows:

Health benefits play a significant role in encouraging the consumption of soymilk. For example, soymilk is often perceived as a suitable alternative for individuals with allergies to animal protein, as it is considered free from such allergens (Giacalone *et al.*, 2022). Additionally, the low amount of saturated fats, antioxidant properties, and absence of cholesterol in soymilk have been associated with a reduced prevalence of diseases such as cardiovascular conditions, cancer, and diabetes (Kostecka *et al.*, 2023), which further support the shift towards plant-based milk consumption. However, Besir *et al.*, (2022), noted that some individuals are discouraged from consuming soymilk due to the presence of anti-nutritional factors, which may affect its acceptance among certain consumers.

Lactose intolerance, resulting from the inability to digest lactose found in animal milk, is another factor that promotes the adoption of plant-based milk substitutes, such as soymilk (Cichonska & Ziarno, 2021). Furthermore, lifestyle choices, particularly among vegans who avoid dairy milk due to ethical reasons, support the consumption of plant-based milk alternatives. This view is echoed by Zandona *et al.*, (2021), who observed that vegan prevalence significantly increased the consumption of plant-based beverages.

Food curiosity is another influencing factor, as consumers' interest in exploring new food products has been found to positively affect their willingness to try plant-based milk alternatives (Rombach *et al.*, 2023). On the other hand, lack of curiosity can result in reluctance to consume new foods, limiting the acceptance of these beverages (Giacalone *et al.*, 2022). This suggests that overcoming reluctance and promoting the exploration of new food products can enhance consumer acceptance.

Food safety concerns, particularly the risk of zoonotic diseases, mycotoxins, and antibiotic-resistant pathogens linked to animal-based products, are also important factors influencing the consumption of plant-based milk alternatives (Rombach *et al.*, 2023). Consumers' growing awareness of the potential health risks associated with conventional dairy products has led to

increased demand for plant-based milk substitutes. Giacalone *et al.*, (2022) and Rombach *et al.*, (2023) highlighted the importance of eco-friendly features of plant-based beverages, which has contributed to the rising popularity of these alternatives. Moreover, Cichonska & Ziarno (2021) pointed out that plant-based milk production typically requires 70% less water than that of cow's milk, which appeals to environmentally conscious consumers. However, most green marketing efforts for plant-based beverages have been implemented in developed countries, and few studies have explored the market dynamics of such products among refugee and host community members in Northern Uganda (Schneider *et al.*, 2021).

Price is another key factor that affects the consumption of plant-based milk substitutes. While some studies, such as by Acquah *et al.*, (2023), have indicated that the higher cost of plant based proteins restricts their consumption, other studies, including those by (Idowu-Adebayo *et al.*, 2022; Makinen *et al.*, 2016), have found that soymilk can be more affordable than animal milk in certain contexts. This suggests that the price of soymilk should be carefully considered when promoting its consumption, especially in resource-constrained environments like refugee camps and host communities.

Cultural factors also play a significant role in shaping the consumption of plant-based milk alternatives. In their study, Mousel & Tang (2016b) suggested that cultural traditions can promote the uptake of plant-based milk alternatives, as seen in Sweden, where certain cultural norms support the consumption of these products. Similarly, Cichonska & Ziarno (2021) found that individuals who grew up consuming plant-based milk were more likely to continue this practice. In contrast, Acquah *et al.*, (2023) found that cultural factors could constrain the consumption of soymilk in Ghana, as many consumers were unfamiliar with the available varieties.

Sensory attributes, such as taste, flavor, and texture, also significantly influence consumers' perceptions of soymilk. As reported by Rombach *et al.*, (2023), taste is a critical factor for consumer acceptance of plant-based milk alternatives. In Ghana, Acquah *et al.*, (2023) found that taste was a major barrier to the consumption of soymilk, a finding supported by Giacalone *et al.*, 2022; Skalkos & Kalyva, 2023), who suggested that sensory preferences are essential for the widespread adoption of plant-based milk alternatives. As noted by Idowu-Adebayo *et al.*, (2022), the availability of soymilk enhanced its consumption, but (Acquah *et al.*, 2023) argued that the limited availability of plant-based milk alternatives could hinder their acceptance.

Sociodemographic factors, including age, income, and educational level, also influence the acceptance of plant-based milk substitutes. Studies by (Giacalone *et al.*, 2022; Li, 2016) found that factors such as higher income, better educational attainment, and age positively affect the likelihood of consuming plant-based milk alternatives. Furthermore, nutritional knowledge can significantly impact consumers' attitudes toward these beverages. For example, 75% of students willing to change their eating habits for health reasons were more likely to consume soymilk (Muth, 2019).

In conclusion, these studies suggest that a combination of health benefits, lifestyle choices, food safety concerns, cultural practices, sensory preferences, and sociodemographic factors all contribute to the acceptance and consumption of plant-based milk alternatives. While there is considerable literature on these factors, research focusing on the specific attitudes towards locally made soymilk, particularly in the context of Northern Uganda's refugee and host communities, remains limited. The unique interdependent behaviors of these communities further complicate generalizations from studies conducted in industrialized nations. This study, therefore, seeks to explore and address these gaps by examining the factors influencing the attitude toward locally made soymilk in this context.

CHAPTER THREE: METHODOLOGY

3.1 Study area

The study was carried out in Palabek Refugee Settlement, located in Lamwo District. The coordinates of the settlement are latitude 3.38045283 and longitude 32.53257751 (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), 2020). Palabek Refugee Settlement covers an area of approximately 50 square kilometers, spanning four sub-counties: Palabek Kal, Palabek Ogili, Palabek Nyimur, and Palabek Gem. The settlement is divided into 10 zones, each comprising several blocks that serve as the smallest administrative units. These zones and blocks facilitate effective management and coordination of activities such as food distribution, health services, and community engagement. The zonal structure was critical for the study, as it allowed for systematic sampling and representation of both refugees and host community members during data collection. Lamwo District, which hosts the settlement, experiences two rainy seasons from March to June and August to November favouring crop production. The common languages spoken in the hosting community are Acholi and English. The estimated host community population is 143,800, while the refugee population is 52,079 (GIZ, 2020).

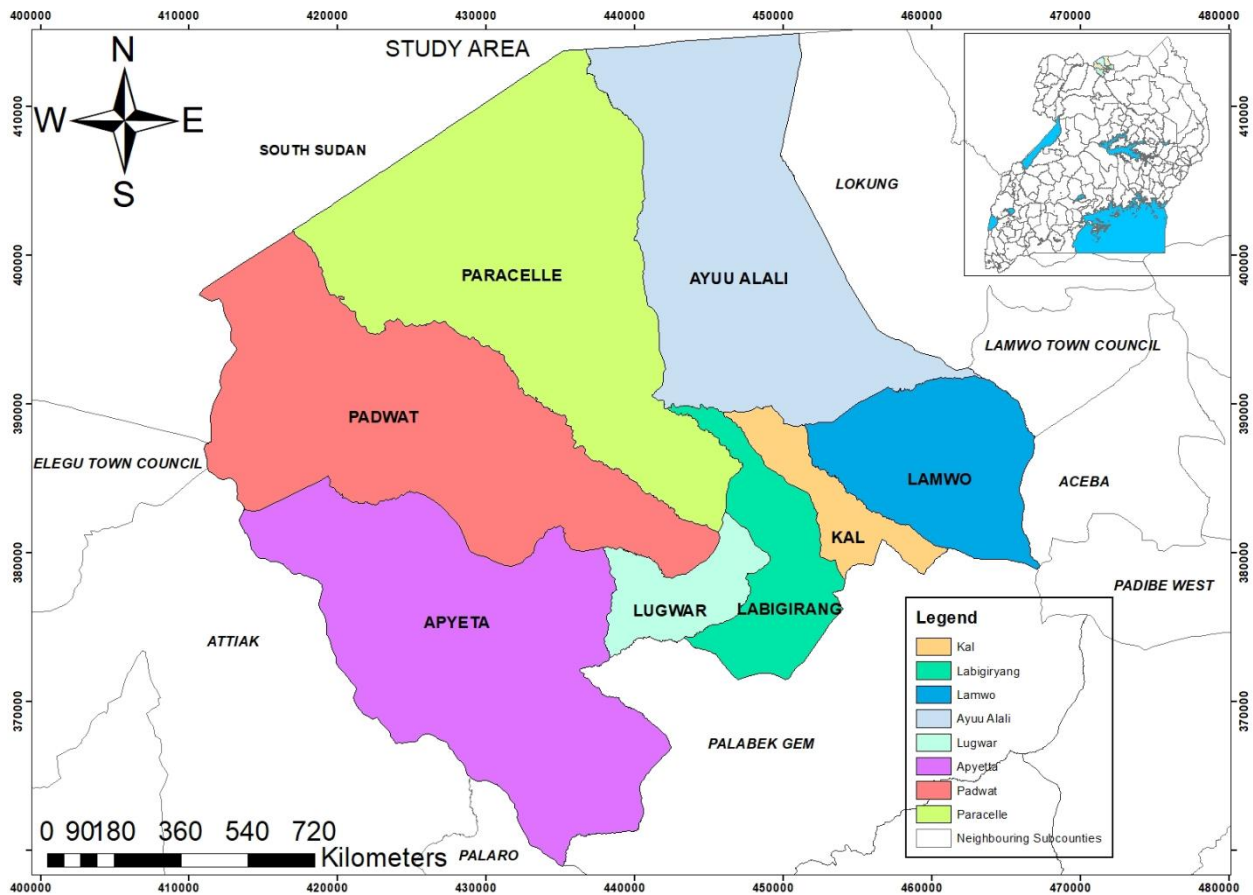


Figure 2: Map showing four sub counties in which Palabek Refugee Settlement is located in Lamwo District (Own drawing)

3.2 Study design

This study employed a cross-sectional design. This was because it allows data to be collected at a single point in time, providing a snapshot of the participants' views and behaviors. The study adopted both qualitative and quantitative approaches to ensure a comprehensive understanding of the research objectives. The qualitative approach was used to explore in-depth perspectives, while the quantitative approach quantified responses for statistical analysis. These complementary methods enhanced the reliability and depth of the findings. By combining these approaches, the study design facilitated a robust analysis of both numerical trends and contextual narratives, addressing the research questions effectively.

3.3 Study population

The study population included refugees and the host community of Palabek Refugee Settlement in Lamwo District. Palabek Refugee Settlement was chosen for this study due to its high prevalence of food insecurity, as evidenced by its 13.9% GAM rate from April to September 2023 (IPC, 2023). The refugees were chosen because they are faced with dietary restrictions that compromise their food security (Lawlis, *et al.*, 2018), hence making locally made soymilk a relevant product for this group. The host community too was chosen because they continuously interact with refugees socially through sharing foods in which their perception of food can influence refugee groups which affects the overall acceptability (Ozbay, 2018). It is worth noting that in Lamwo District, soymilk is produced locally at the household level rather than being commercially available in the market. The inclusion criteria included refugees and host community members who were 18 years and older were included in the study. When a randomly chosen family included a widower, in which case the male household member was interviewed.

3.4 Sample Size and Sampling Procedure

3.4.1 Sample size

The overall sample size for this study was 361 households, which included both refugees and host community members. The sample size was calculated as follows: For refugees, the initial sample size for refugees was determined using the formula by (Chaokromthong & Sintao, 2021):

$$\text{Sample size } n_0 = \frac{Z^2 P(1-P)}{e^2} \dots\dots\dots \text{Equation 1}$$

Where n_0 , is the sample size, P is the prevalence of GAM among children aged 6-59 months in Palabek Refugee Settlement which was 13.9% (IPC, 2023), Z is the level of significance at 5 % ($z = 1.96$) and e is the estimated error limit of 5%. Substituting these values into the formula, the calculated sample size was adjusted to account for a 20% non-response rate, resulting in a total of 221 respondents. However, during data collection, a total of 225 refugee respondents were surveyed to ensure data completeness and enhance the reliability of the analysis. This slight increase was informed by practical considerations and the need to maximize participation within the available resources and timeframe. The adjustment does not significantly alter the study's design but strengthens the robustness of the dataset.

For Host Community Members, the sample size for host community members was calculated using the same formula, with P as the prevalence of GAM among children aged 6–59 months in Lamwo host community (8.6%, IPC, 2023). After adjusting for a 16% non-response rate, the calculated sample size was 140 respondents. The total calculated sample size of 361 respondents was initially distributed between refugees and host community members based on their respective proportions in the population. However, recognizing the importance of proportional representation and ensuring robust statistical power, the overall sample size was revised to 365 households. This adjustment was made to provide a balanced and comprehensive dataset, reflecting the relative population sizes of refugees and host community households while maintaining scientific rigor. The additional sample size ensures improved precision in the analysis, catering to the diverse dynamics of the two groups.

3.4.2 Sampling Procedure

The study employed a systematic and structured sampling framework to identify participants from both the refugee settlement and the host community members. To identify participants in the refugee settlement, a two-stage cluster sampling method was employed. In Stage I, five zones were randomly selected from a total of ten zones within the settlement using the lottery method using flipped papers (Brhane, 2018). These zones were chosen based on a list obtained from the settlement commandant. In Stage II, household lists from the selected zones served as the sampling frame. Systematic random sampling was applied within each zone to proportionally select households until the required sample size was achieved. The first household was randomly selected, and subsequent households were chosen by selecting every fifth household on the list. This method ensured equal representation and minimized selection bias. The two-stage cluster sampling approach was appropriate given the homogeneity within zones and the logistical challenges posed by the settlement's size and dispersion to ensure efficiency and representation.

For the host community, a multistage sampling technique was used. First, two sub-counties were randomly selected from the four sub-counties in the study area. In each selected sub-county, two parishes were chosen randomly. Finally, within each parish, two villages were selected through random sampling. Households within the selected villages were then sampled using simple random sampling until the required sample size was reached. This multistage approach allowed for proportional representation of host community members across different administrative units.

Participants for the Focus Group Discussions (FGDs) were drawn from households that had already participated in the survey. In the refugee settlement, block leaders mobilized participants randomly from the selected zones, while local council leaders mobilized participants from the host community. A total of five FGDs were conducted: three in the refugee settlement (one per selected zone) and two in the host community (one per selected parish). Each FGD consisted of 8–12 participants and lasted approximately 45 minutes. Discussions were facilitated by a trained moderator, supported by a note-taker to ensure accurate data capture. This approach enabled the collection of in-depth qualitative data to complement the survey findings. To determine that we had obtained the right information, we applied the principle of data saturation. This was achieved when no new themes, insights, or information emerged during the discussions, indicating that the key issues had been thoroughly explored. Data saturation confirmed that we had gathered the right and most relevant information from the participants.

3.5 Data collection

Five research assistants pursuing bachelors from Gulu University at the time of the study collected the data. The requirements for eligibility included experience in focus group discussions, nutritional surveys, and proficiency in both Acholi and English languages. Before heading out into the field, they received extensive training on how to administer the questionnaire.

3.5.1 Data collection tools

Data on attitude and willingness towards various flavors of locally made soymilk were collected using a structured questionnaire (Appendix 2) for objectives one and two. The questionnaire was designed for in-person interviews and was divided into three sections: section one gathered sociodemographic characteristics of the respondents; section two assessed their attitude; and section three focused on their willingness to try different flavors of locally made soymilk, as well as other factors influencing their attitude towards consuming soymilk.

The questionnaire was pretested with 8 refugees and 8 host community members from Palabek Refugee Settlement to assess instrument reliability and ensure the correctness, clarity, and consistency of participant responses. As a result of the pretest analysis, three respondents were excluded from the final data collection procedure due to inconsistencies in their responses. Additionally, three statements measuring consumer attitude were revised based on feedback from

the pretest. For FGDs, a discussion guide was used, containing key questions focused on understanding the factors that shape attitude towards locally made soymilk

3.5.2 Assessment of attitude towards locally made soymilk

A five-point Likert scale was used to assess attitude towards locally made soymilk among refugees and host community members. The scale ranged from 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree (Gkana & Nychas, 2018). Examples of statements used to measure attitude include: (i) I believe soymilk is a more natural beverage compared to animal milk because sometimes animals are treated with hormones and antibiotics. (ii) I believe soymilk is important for people with lactose intolerance. The statements were designed to capture various aspects of participants' perceptions and beliefs about soymilk, as detailed in Appendix 2.

3.5.3. Determination of willingness to consume different flavors of locally made soymilk

Before determining willingness to consume several varieties of locally made soymilk, each respondent was asked whether they had previously consumed soymilk or not before the study. Respondents who said they had never consumed soymilk were asked if they were willing to consume locally made soymilk. Respondents who said they consumed soymilk before the study and those who never consumed soymilk were asked if they were willing to try different flavors of locally made soymilk on a 5-point Likert scale. Additionally, respondents, regardless of prior soymilk consumption, were asked to indicate their likeliness for each of the three major flavors of locally made soymilk. Examples of the statements used include: (i) Indicate your likeness to consume plain-flavored locally made soymilk. (ii) Indicate your likeness to consume vanilla-flavored locally made soymilk (Appendix 2).

The respondents were then trained on how to make soymilk locally based on the following procedure: Unroasted soybeans were soaked in water for 12 hours at room temperature. The hydrated soybeans were drained, rinsed, manually dehulled, and rinsed twice with tap water. The dehulled soybeans were then ground in a blender (or with a mortar and pestle) and sieved with a cheesecloth. The extracted soymilk was pasteurized at 68°C for 30 minutes, cooled, and then sugar, along with other flavors, was added to enhance the taste. Different flavors, such as vanilla and lemongrass, were added to improve the sensory acceptability of the soymilk. The locally made soymilk could be consumed within 3 days when stored at ambient room temperature (Navicha *et al.*, 2018). The training on the procedure for preparing soymilk lasted approximately 5 minutes. It

included a step-by-step demonstration of the entire process, from soaking the soybeans to flavoring and pasteurizing the soymilk. The concise nature of the training ensured that respondents could easily replicate the process with minimal resources. After the training, respondents' willingness to consume soymilk was measured on a scale of 1-5, where 1 = Completely unlikely, 2 = Unlikely, 3 = Neutral, 4 = Likely, and 5 = Completely likely.

3.5.4 Assessment of factors that shape consumer's attitude to consume locally made soymilk

A five-point Likert scale was used to measure the perceived factors influencing attitude towards the consumption of locally made soymilk among refugees and host community members. The scale ranged from 1 = Very Unlikely, 2 = Unlikely, 3 = Neutral, 4 = Likely, and 5 = Very Likely. These factors were assessed using a set of questions in Section C.2 of the questionnaire (Appendix 2). In addition to the Likert scale responses, quantitative data on willingness and sociodemographic characteristics were also collected to identify variables that could influence attitude towards consuming soymilk. Qualitative data were gathered from FGDs after explaining the soymilk production process to the respondents. Six key questions from the FGD guide were asked to explore these factors. Examples of the questions included: (i) What things would positively influence the consumption of soymilk in this community? (ii) What factors would deter the consumption of soymilk in this community?"

3.6 Data Analysis

Statistical Package for Social Sciences (SPSS) version 25 was used to enter, clean, edit, and conduct statistical analyses on the data. Frequencies, percentages, averages, and standard deviations were the descriptive statistics used to analyze respondent's sociodemographic data.

3.6.1 Assessment of attitude towards locally made soymilk

To ascertain the general attitude of refugees and host community members, a composite variable was created by calculating the mean score of 10 positively framed questions, where a score of 0 indicated strongly disagree and a score of 5 indicated strongly agree. Two codes were assigned to the nature of attitude: code 0 denoted a negative attitude with mean values in the range of 1 – 3, and code 1 denoted a positive attitude with the mean score in the range of 3.1 – 5.1 (Alkharusi, 2022). A normality test, specifically the Kolmogorov-Smirnov test was conducted to assess the distribution of the responses for attitude toward consuming soymilk from both study groups.

An independent sample t-test was then carried out to test for significant differences in the attitude toward consuming soymilk between refugees and host community members. The independent t-test was used after converting ordinal data to binary in order to simplify the analysis and focus on clear distinctions in attitudes (e.g., positive vs. negative).

3.6.2. Determination of willingness to consume different flavors of locally made soymilk

To ascertain the willingness of refugees and host community members, descriptive statistics were run to ascertain the proportion of respondents that were willing and unwilling to consume soymilk. To further examine the relationship between the study groups (refugees and host community members) and their willingness to consume locally made soymilk, a chi-square test of independence was performed. This test was used to determine whether there was a statistically significant association between the two categorical variables: the study group (refugees vs. host community members) and their willingness to consume different soymilk flavors. Additionally, means and standard deviation measures of central tendencies were run to ascertain the likelihood of respondents to consume specific flavors of soymilk. The decisions on likelihood to consume different flavors were made based on a scale of 1 – 1.80 for completely unlikely, 1.81 – 2.61 for unlikely, 2.62 – 3.41 for neutral, 3.42 – 4.21 for likely and 4.22 – 5.01 for completely likely (Alkharusi, 2022). After receiving brief training on the local production of soymilk, respondents' willingness to consume soymilk was reassessed. Pre- and post-training information was analysed by comparing the participants' mean responses of 5 point Likert scale before and after the training intervention. A paired samples t-test was conducted to evaluate the statistical significance of changes in participants' attitudes and willingness to consume soymilk. Quantitative data were collected using a structured questionnaire, which measured participants' willingness to consume soymilk on a 5-point Likert scale both before and after the training. The mean scores were calculated for each participant group (refugees and host community members), and differences in these scores were assessed to determine the impact of the training.

3.6.3. Assessment of factors that shape attitude towards consumption of locally made soymilk

A principal component analysis was done to assess the perceived attitude that influenced consumption of locally made soymilk among host and refugee communities. The outcome of exploratory factor analysis of Likert scale items for measurement of the perceived factors that influenced attitude of refugees and host community members towards consumption of locally made soymilk are presented in Appendix 1, Table 10. It is evident that the principal component-

based model run to extract key factors from Likert scale items showed a good fit (KMO = 0.639, Bartlett's Test of Sphericity ($\chi^2 = 365.11$, $p < 0.001$), extracting two factors, F1 (Accessibility factor) and F2 (Sensory appeal factor), each explaining 29.1% and 23.7% of the variation in the attitude of refugees and host community members towards the consumption of locally made soymilk. Descriptive statistics were then run to assess the likelihood of these attributes or factors to influence consumption of soymilk, with decisions made based on a scale of 1–1.80 for completely unlikely, 1.81–2.61 for unlikely, 2.62–3.41 for neutral, 3.42 – 4.21 for likely and 4.22 – 5.01 for completely likely. Furthermore, an independent sample t-test was run to compare the mean likelihood of these factors to influence consumption of different flavors among hosts and refugee communities.

Binary logistic regression was conducted to determine the factors influencing the attitude towards the consumption of locally made soymilk. The analysis was based on socio-demographic characteristics and other variables such as willingness to consume soymilk, and perceived factors affecting soymilk consumption among refugees and host community members. Before running the regression, correlation tests were performed to address potential multicollinearity issues among the independent variables. A Pearson correlation analysis was carried out, and variables with a correlation coefficient above 0.650 were flagged as highly correlated. Furthermore, scale variables such as age, income, and household size that were not normally distributed were transformed using logarithmic transformations to meet the assumptions of the regression model. Categorical variables, such as marital status and occupation, were transformed into dummy variables to allow inclusion in the binary logistic regression model. The dependent variable in this analysis was the binary measure of attitude towards the consumption of soymilk (1 = positive attitude, 0 = negative attitude).

The model that reflects the independent variables is shown in Equation 2:

$$Y_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_{11} X_{11} + \mu \dots \text{Equation 2}$$

Where Y_i is the binary dependent variable indicating attitude towards soymilk consumption, and X_1 to X_{11} represent the independent variables detailed in Table 1. The variables are defined in Table 1. The regression constant is defined as α is the regression constant, β represents the regression coefficients, and μ is the error term.

Table 1: Expected priori signs of the independent variables in the binary logistic model

Variable	Definition	Expected priori sign
X1	Monthly income	+
X2	Age of Household head	-
X3	Occupation	+
X4	Source of food	+
X5	Residential status	+
X6	Accessibility factor (F1)	+
X7	Household Size	-
X8	Willingness to consume soymilk	+
X9	Sensory appeal factor (F2)	+
X10	Sex of Household head	+
X11	Level of Education	+

The FGD data verbatim was transcribed and analyzed it using inductive qualitative thematic content analysis as described by Hennink *et al.* (2019). During the coding process, I focused on grouping similar responses into categories and identifying overarching themes that repeatedly emerged from the discussions. These themes helped me better understand the socio-economic and cultural dynamics shaping attitudes toward soymilk consumption among the study participants.

3.7. Ethical consideration

Ethical clearance was sought from the Gulu University Research Ethical Committee (GUREC-2023-777) (appendix 4), the Office of the Prime Minister (appendix 5), the Sub-county Chief of Palabek Nyimur (appendix 6) and Sub-county Chief of Palabek Ogili (appendix 7) to collect data from the refugee and host community. The respondents were informed about the purpose of the study and its gains to the community prior to signing either the English consent form (appendix II). Throughout the research procedure, confidentiality was preserved by utilizing serial numbers rather than participant names.

CHAPTER FOUR: RESULTS

4.1 The socio-demographic characteristics of the study population

The sociodemographic characteristics of the study population that took part in the survey are presented in Table 1. The results show that the majority (62%) of respondents were refugees. It is also important to note that a significant proportion (69%) of participants were male, with an average age of 42.6 years. However, the respondents from the host community were older, with an average age of 44.3 years, compared to refugees, who had an average age of 41.6 years. Most participants (59%) were married, with an average household size of six members. While most household heads had attained a primary level of education, respondents from the host community had the highest average number of years spent in school, at nine years. Similarly, although a significant proportion of household heads across both host and refugee communities were involved in farming as their occupation, those from the host community had a significantly higher average monthly income (Ugx. 3.2×10^5) compared to those from the refugee communities. Whereas the results indicate that 81% of participants obtained food through purchases, 99% of host community members obtained food through both purchases and their own production. On the other hand, 74% of refugees obtained their food through food aid. Overall, the average monthly food expenditure of participants was approximately Ugx. 1.1×10^5 .

Table 2: The sociodemographic characteristics of the study population

Variables		Frequencies & Proportions					
		Overall		Refugee		Host	
Categorical Variables		N	%	N ¹	%	N ²	%
Sex	Male	253	69	156	69	97	69
	Female	112	31	69	31	43	31
Residential status	Refugee	225	62	225	100	0	0
	Host	140	38	0	0	140	100
Marital status	Single	52	14	29	13	23	16
	Married	214	59	134	60	80	57
	Divorced	49	13	28	12	21	15
	Widowed	50	14	34	15	16	11
Education level	Non-formal	83	23	66	29	17	12
	Primary	152	42	91	40	61	44
	Secondary	113	31	58	26	55	39
	Tertiary	17	5	10	4	7	5
Occupation	Not employed	98	28	88	41	10	6
	Employed	39	11	21	10	18	13
	Trading	69	19	28	13	41	30
	Farming	190	53	84	39	106	77
	Casual labor	22	6	14	7	8	4
	Others	5	1	3	1	2	2
Sources of food	Farming	239	66	101	45	138	99
	Purchases	296	81	158	71	138	99
	Food aid	166	46	165	74	1	1
	Transfers	19	5	19	9	0	0
Continuous variables		μ	Std	μ	Std	μ	Std
Years at school		6.9	5.3	9.0	4.6	7.7	5.1
Age (Years)		41.6	14.8	44.3	14.0	42.6	14.6
Household size		6.0	3.0	6.0	3.0	6.0	3.0
Monthly income (Ugx)		2.0 x10 ⁵	1.96 x10 ⁵	3.2 x10 ⁵	2.6 x10 ⁵	2.5 x10 ⁵	2.3 x10 ⁵
Monthly expenditure on food (Ugx)		1.1 x10 ⁵	1.2 x10 ⁵	1.4 x10 ⁵	1.2 x10 ⁵	1.1x 10 ⁵	1.2 x10 ⁵

Note: N – Sample size (365), μ – Mean, Std – Standard deviation, N¹ – Sample size of refugee participants (225), N² – Sample size of host community participants (140), Ugx – Uganda shilling

4.2 Attitude towards locally made soymilk in Lamwo district

The summaries of responses to statements measuring attitude towards locally made soymilk by respondents in the Palabek refugee-hosting community are presented in Table 2 and Figure 3. On a Likert scale ranging from 1 to 5, the overall mean score for attitude towards soymilk was 3.92, indicating a generally positive attitude among both the host community members and refugees. Respondents were particularly positive about aspects such as soymilk's suitability for people with lactose intolerance (mean = 4.33), its high nutrient content comparable to animal milk (mean = 4.03), and the environmental benefits of growing soybeans for milk production (mean = 4.01). There was no significant statistical difference between refugees and host community respondents in their overall attitude scores ($p = 0.06$). However, some specific differences were observed. Refugees showed a significantly more positive attitude than the host community on several aspects: soymilk being a more natural beverage compared to animal milk (mean = 4.02), the taste of soymilk being as good as animal milk (mean = 3.82), and the visual appeal of soymilk (mean = 3.78). In contrast, the host community respondents scored higher on the aspect of soymilk having less fat (mean = 4.09) compared to refugees. Additionally, Figure 3 illustrates that the vast majority of respondents, 99% (360/365), expressed a positive attitude towards locally made soymilk. While no significant difference in the nature of attitude was found, a slightly higher proportion of refugee participants (99%) held a positive attitude towards soymilk consumption compared to those from the host community (98%).

Table 3: Mean scores of responses to statements measuring attitude towards locally made soymilk, segregated by respondent status in Lamwo district

Scale Items	Refugee		Host		Overall		p-value
	Mean	SD	Mean	SD	Mean	SD	
Soymilk is a more natural beverage compared to animal milk	4.02	0.668	3.72	1.004	3.90	0.825	0.009
Soymilk produces a less allergenic reaction	3.91	0.853	3.91	0.856	3.91	0.853	0.974
Soymilk has less fats	3.89	0.757	4.09	0.818	3.96	0.785	0.008
Soy milk is important for milk-intolerant people	4.30	0.660	4.36	0.751	4.33	0.696	0.180
Soymilk has as much nutrients closer to animal milk	4.07	0.807	3.98	0.933	4.03	0.857	0.526
Producing soymilk releases fewer Green House gas	3.71	0.872	3.83	0.777	3.76	0.837	0.190
Growing soybeans to produce milk may have less impact on the environment	3.99	0.871	4.04	0.728	4.01	0.819	0.816
Consuming soymilk supports animal welfare rights	4.07	1.096	3.87	1.313	3.99	1.186	0.369
The taste of soymilk may be as good as animal milk	3.82	0.691	3.40	0.904	3.66	0.805	< 0.001
I would like the appearance of soymilk as much as animal milk	3.78	0.682	3.54	0.851	3.69	0.760	0.017
Weighted averages	3.95	0.406	3.87	0.398	3.92	0.405	0.060

Attitude was measured as Mean $\pm$ SD based on a five-point Likert scale of 1-5 where 1=strongly disagree, 2=disagree, 3=neutral, 4= agree and 5=strongly agree; N = 365.

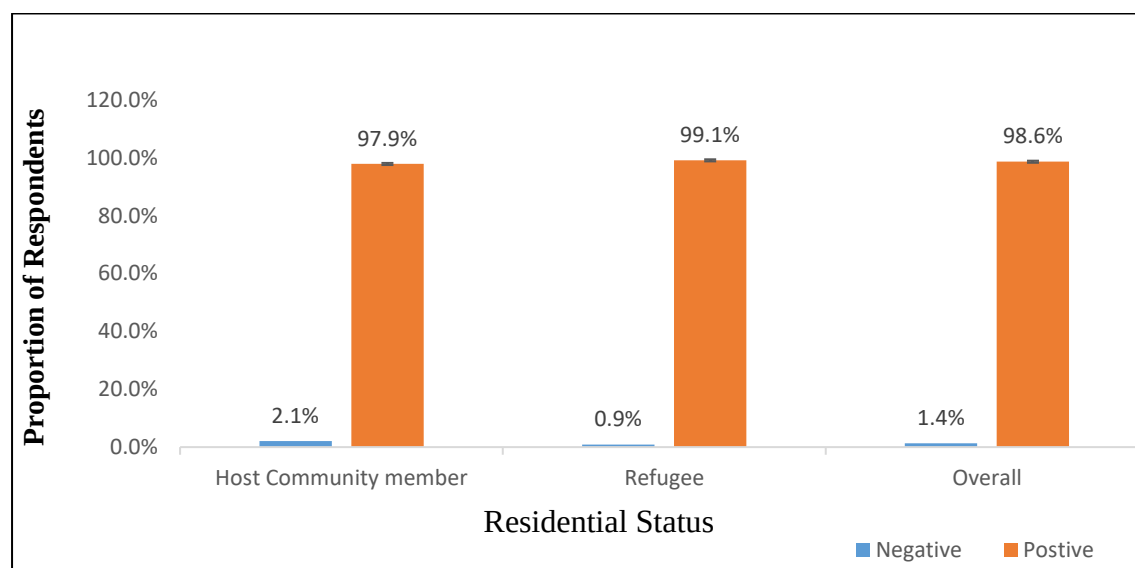


Figure 3: Nature of attitude towards locally-made soymilk among refugees and host community members

4.3. Willingness to consume locally made soymilk

4.3.1 Soymilk consumption among the study groups before the study

As shown in Table 4, seventy-five percent (75%) of the respondents had never consumed soymilk prior to the study. Among those who had consumed it, a higher proportion were from the host community members (29%) compared to the refugee respondents (22%). Interestingly, despite the low consumption rates, 91% of participants who had never tried soymilk expressed a willingness to do so. Of these, 91% of refugees and 89% of host community members indicated their willingness to consume soymilk. There was no statistically significant difference between refugees and host community members in their willingness to try different flavors of soymilk.

Table 4: Variation in the proportion of selected refugees and host community members who had consumed and were willing to consume soymilk before the study

Consumption Status	Overall		Refugees		Hosts		χ^2	p-value
	N	%	N ₁	%	N ₂	%		
Yes	90	25	50	22	40	29	1.873	0.171
No	275	75	175	78	100	71		
Willingness to Consume								
Completely not willing	4	1	3	2	1	1	0.333	0.564
Not willing	6	2	5	3	1	1	1.000	0.317
Neutral	17	6	8	5	9	9	1.143	0.285
Willing	153	56	96	55	57	57	0.036	0.850
Completely willing	95	35	63	36	32	32	0.235	0.628

Note: N = Overall Number of Participants (365), N₁ = Number of Refugee Participants (225) and N₂ = Number of Host community participants (140)

4.3.2 Willingness to consume different flavors of soymilk by the study groups

When asked about their likelihood of consuming different flavors of locally made soymilk, respondents showed diverse preferences. They were most likely to consume lemon grass flavor, followed by vanilla flavor and plain flavor as shown in Table 5. Notably, there were statistically significant differences ($p < 0.05$) between refugees and host community participants in their likelihood of consuming plain flavor, vanilla flavor, and lemon grass flavor. Refugees demonstrated a higher likelihood of consuming each of these flavors compared to host community members.

Table 5: Likelihood of respondents to consume three flavors of soymilk

Flavor	Overall		Refugees		Hosts		t value	p-value
	MS	Std	MS	Std	MS	Std		
Plain flavor	3.85	0.86	3.96	0.75	3.67	0.99	3.16	0.002
Vanila flavor	3.88	0.78	3.98	0.76	3.74	0.79	2.91	0.004
Lemon grass flavor	4.16	0.84	4.28	0.79	3.96	0.87	3.65	<0.001
Overall	3.96	0.64	4.07	0.59	3.79	0.68	4.24	< 0.001

Note: MS – Mean score, Std – Standard deviation, Decision on the likelihood made based on the cutoffs; - 1.0-2.40 (Unlikely), 2.5-3.40 (Neutral); 3.50-5.0 (Likely) (Harpe, 2015).

The other flavors of soymilk that participants expressed willingness to consume include ginger, avocado, coffee, pineapple, and orange, as shown in Appendix 1, Table 9.

4.3.3 Willingness to consume soymilk after training intervention

After receiving brief training on the local production of soymilk, respondents' willingness to consume soymilk was reassessed. The results in Table 6 show significant improvements in the mean scores for willingness to consume soymilk among both refugee and host community members. Among refugees, the mean score increased from 4.12 to 4.88, while among host community participants, it improved from 4.08 to 4.28, based on a five-point Likert scale. The results of a paired sample t-test revealed statistically significant differences in the mean willingness to consume soymilk before and after training for both study groups ($p < 0.001$). This indicates that the training intervention positively influenced respondents' willingness to consume locally made soymilk. Additionally, the results of a chi-square test of independence ($X^2 = 690.718$, $df = 16$, $p < 0.001$) confirm the association between the residential status and willingness to consume soymilk.

Table 6: Variation in likelihood to consume soymilk after training by refugees and host community members

Study group	Mean score before training	Mean score after training	Mean difference	p-value
Refugees	4.12	4.88	0.76	< 0.001
Host community members	4.08	4.28	0.20	< 0.001

4.4 Factors influencing attitude toward consumption of locally made soymilk

4.4.1 Perceived factors shaping attitude toward locally made soymilk

The factors influencing attitude toward the consumption of locally made soymilk among refugees and host community members are presented in Table 7. Results indicate that sensory appeal and accessibility were critical in shaping attitude toward soymilk consumption, with refugees being more influenced by these factors (Mean Score (MS) = 3.81) than host community members (MS = 3.71, $p = 0.04$). Sensory appeal, particularly aroma (MS = 3.97), mouthfeel (MS = 4.06), and taste (MS = 3.91), was rated higher by refugees than host community members. Accessibility showed no significant differences between refugees and host community members (Table 7, MS = 3.69, $p > 0.05$).

These findings also were also highlighted by the FGD participants as barriers where specifically for accessibility, participants expressed concerns about the scarcity of soybeans in which one participant said *“We don’t have enough soybean seeds in the community, which makes it expensive to produce soymilk. The scarcity of soybeans is because we don’t have enough seeds, there is not enough land for cultivation, and sometimes weather changes make it hard to get soybeans.”* (Female, refugee participant). Similarly, for sensory appeal, participants were discouraged from consuming soymilk by the beany taste as reported by a participant *“It’s the beany flavor, the bad aftertaste, and the smell that stop us from drinking soymilk. But when you sweeten soymilk with flavors like vanilla, ginger, or lemongrass, it’s better. Ginger even helps with headaches and has other health benefits.”* (Female, host community participant).

In addition, to accessibility and sensory appeal as barriers to soymilk consumption, FGD participants reported that cost of soymilk was a limitation to its consumption, in which participants attributed soymilk being expensive with a participant saying *“High cost of soybeans and other raw materials, such as flavors and strainers, was a significant barrier. Participants in both communities indicated that soymilk was too expensive to produce and purchase.”* (Male, host Community participant). Also, majority of participants emphasized technological limitation as restriction for soymilk consumption. A participant articulated this difficulty, stating *“Lack of machines to process soybean seeds into soymilk makes it difficult to produce compared to cow milk that is readily available in the community.”* (Female, refugee participant). Lastly, participants appreciated the nutritional and health benefits as motivator for soymilk consumption. Participants perceived soymilk to being a healthy beverage as mentioned by one participant that *“Soymilk contains vitamins, less fats and free from diseases which*

improve the body immunity of the malnourished child hence serving as a healthy option”
(Female, host community participant)

Table 7: Perceived factors influencing attitude toward soymilk consumption among refugees and host community members in Lamwo district

F	Scale Variables	Overall		Refugees		Hosts		t	p-value
		MS	Std	MS	Std	MS	Std		
1	Price	3.56	1.14	3.63	1.10	3.44	1.18	1.58	0.12
	Concerns about safety/quality	4.32	0.69	4.31	0.67	4.34	0.72	-0.327	0.74
	Packaging	3.48	0.97	3.48	0.98	3.49	0.96	-0.166	0.87
	Availability	3.39	1.02	3.37	0.98	3.44	1.07	-0.60	0.55
	CA	3.69	0.66	3.70	0.51	3.68	0.70	0.30	0.77
2	Mouthfeel	3.98	0.77	4.06	0.73	3.86	0.82	2.49	0.01
	Aroma	3.88	0.87	3.97	0.80	3.74	0.96	2.50	0.01
	Taste of soymilk	3.81	0.91	3.91	0.83	3.66	1.02	2.56	0.01
	CA	3.89	0.66	4.00	0.60	3.75	0.72	3.29	0.001
	Overall CA	3.78	0.49	3.81	0.47	3.71	0.51	2.06	0.04

Note: MS – Mean Score, Std – Standard deviation, F1 – Accessibility factor, F2 - Sensory appeal factor, CA – Composite Average

4.4.2 Determinants of attitude toward soymilk consumption (logistic regression analysis)

The results of the binary logistic regression analysis, presented in Table 8, explore the determinants shaping the attitude towards consumption of locally made soymilk by refugees and host community members. The model demonstrated a good fit for the data, χ^2 (df = 12, p = 0.047) = 21.204, indicating that the selected variables adequately described variations in attitude. However, the model accounted for 5.7% (Cox & Snell R²) to 42% (Nagelkerke R²) of the variability in attitude.

Among the factors assessed, only three variables showed a statistically significant influence on attitude toward soymilk consumption ($p \leq 0.05$). Specifically: An increase in household income led to an increase in the likelihood of refugees and host community members having a positive attitude towards the consumption of locally made soymilk ($\beta = 3.36$, $p = 0.038$). On the other hand, a unit increase in household size led to an increase in the likelihood of refugees and host communities having a negative towards the consumption of locally made soymilk ($\beta = -10.32$, $p = 0.038$). Similarly, attainment of post- primary level of education by the household head ($\beta = -3.47$, $p = 0.043$) led to an increase in the likelihood of hosts and refugee communities having a negative attitude towards locally made soymilk. Among these, household size had the most substantial effect, reflecting its critical role in shaping attitude toward soymilk consumption within the sampled population

Table 8: Determinants of attitude toward consumption of locally made soymilk: binary logistic regression analysis of refugees and host community members in Lamwo district

Variables	β	S.E.	p-value	OR
Monthly Income	3.36	1.62	0.038	28.70
Age of Household head	0.08	0.07	0.215	1.08
Occupation Farming	1.04	1.29	0.421	2.83
Small Scale Trading	-1.45	1.65	0.380	0.24
Source of Food	-1.20	2.83	0.672	0.30
Residential status	2.40	2.79	0.390	11.04
Accessibility factor (F1)	1.09	0.89	0.222	2.98
Household Size	-10.32	4.76	0.030	0.00
Willingness to Consume Soymilk	1.42	1.26	0.260	4.12
Sensory appeal factor (F2)	1.65	1.00	0.098	5.20
Sex of Household head	-18.70	2544.98	0.994	0.00
Level of Education	-3.47	1.71	0.043	0.03
Constant	2.38	2545.00	0.999	10.78

Note: S.E = Standard Error, OR = Odds ratio, Variables used include; Monthly Income, Age of the household head, Occupation (1=Farming, 0=others; 1 = Small scale trading, 0 = Others), Source of food (1 = Own production, 0 = Others), Residential status (0 = Host community, 1 = Refugee), Accessibility of Soymilk, household size, Willingness to consume soymilk (0 = No, 1 = Yes), Sensory attributes of soymilk, sex of the household head, level of education of the household head (1 = Post-primary education, 0 = Others).

CHAPTER FIVE: DISCUSSIONS

5.1 Attitude towards consumption of locally made soymilk

Attitude is a crucial determinant of food consumption behavior, as it not only predicts but is also causally implicated in one's dietary choices (Vassallo *et al.*, 2016). In this context, this study explored and discussed the attitude of refugees and host community members toward the consumption of locally made soymilk beverages in Lamwo District. The consistent positive attitude observed in Figure 3 toward locally made soymilk in Northern Uganda can be attributed to increased awareness about its nutritional, economic, and environmental benefits among both refugee and host community members. Specifically, awareness of the nutritional significance of soymilk such as its provision of reliable sources of protein, essential amino acids, and vitamins appears to have significantly contributed to its acceptance. Several studies, including those by (Afroz *et al.*, 2016; Basharat *et al.*, 2020; Begum *et al.*, 2016; Nowshin *et al.*, 2018), highlighted the rich nutritional profile of soybeans, the primary raw material for producing soymilk. Soybeans are an excellent source of proteins, essential amino acids, fats, vitamins and minerals. This assertion is further supported by the affirmative belief among respondents that soymilk's nutritional content is closer to that of animal milk as illustrated in Table 3. Moreover, the heightened awareness of soymilk's benefits may be attributed to deliberate efforts by the government and other stakeholders to integrate nutritional education and sensitization programs targeting nursing and expectant mothers, as well as other community members accessing outpatient treatment services.

Closely related to this, the positive attitude towards locally made soymilk beverages was reinforced by the observation that respondents strongly believe that soymilk is suitable for individuals who are lactose intolerant as presented in Table 3. Additionally, the high nutritional content of soymilk positions it as an ideal alternative to animal milk. As a widely consumed plant-based protein product, soymilk caters for individuals with lactose intolerance (Kundu *et al.*, 2018; Woodside *et al.*, 2016). Research by (Chughtai *et al.*, 2022; Sethi *et al.*, 2016) highlighted that the prevalence of lactose intolerance in various populations is a key factor in increasing the demand for, and acceptance of, plant-based products, including soymilk, as an alternative to cow's milk. Similarly, (Anusha-Siddiqui *et al.*, 2024) argued that soymilk and other plant-based protein sources present a valuable alternative to dairy-based animal proteins for individuals with lactose intolerance. Therefore, incorporating soymilk into dietary interventions for Severe Acute Malnutrition (SAM) can offer a high-protein, nutrient-dense solution for lactose-intolerant individuals.

Furthermore, the high level of awareness regarding the environmental benefits of soymilk production such as its lower carbon footprint and reduced land and water demand compared to dairy farming may resonate with the respondents' values as illustrated in Table 3. A Study by Wu *et al.*, (2014) have demonstrated that the environmental advantages of soymilk production, including reduced greenhouse gas emissions and water usage, significantly influence people's consumption behaviors. Research by (Boaitey & Minegishi, 2020; Lee *et al.*, 2024; Rombach *et al.*, 2023) indicated that individuals with strong environmental values are more inclined to support locally made soymilk, perceiving it as an eco-friendlier alternative to commercially manufactured products. This aligns with the observed awareness of how plant-based protein sources contribute to lowering greenhouse gas emissions. Such findings are consistent with the work of (Kaplin, 2012; Shabir *et al.*, 2023) which suggested that consumers view locally sourced products as having a lower carbon footprint due to shorter transportation distances and reduced methane emissions. This can be attributed to growing educational and advocacy campaigns that have increased awareness of the environmental impact of dairy production systems on climate change. Thus, the affirmative belief in the environmentally friendly nature of soymilk production fueled by the cultivation of soybeans further enhances the positive perception of locally made soymilk beverages. This reinforces the sustainability of soymilk production. These findings resonate with those of (Krizanova *et al.*, 2021; Perez-Cueto, 2020; Viroli *et al.*, 2023), which highlighted that increasing awareness of environmental sustainability strengthens attitude toward and acceptance of plant-based diets. Therefore, the recognition of locally made soymilk not only as a viable alternative to animal milk but also as a potential solution for addressing nutritional deficiencies, especially among vulnerable groups such as infants, pregnant women, the sick, and the elderly, solidifies its importance within these communities.

Additionally, the observed positive attitude toward the economic benefits of soymilk as shown in Figure 3 can be attributed to its affordability and accessibility, making it a more viable option than imported animal milk alternatives. The high costs associated with animal-based protein sources, particularly milk and other dairy products, have further reinforced the preference for soymilk as a more affordable alternative. This trend is supported by findings from (Aguirre *et al.*, 2021; Frýdlová & Vostrá, 2011; Wu *et al.*, 2014), which have emphasized that the cost of a food product plays a critical role in shaping consumer attitude toward its consumption. These studies suggest that promoting soymilk consumption could contribute to more sustainable and cost-effective nutritional interventions, especially in resource-limited settings. This, in turn, is crucial for ensuring long-term food security and resilience among vulnerable populations.

On the other hand, the consistent positive attitude observed among both refugee and host community members as represented in Figure 3 could be explained by the shared economic challenges and health concerns that drive the appreciation of affordable and nutritious plant-based protein alternatives. This observation aligns with findings from (Khusun *et al.*, 2022; Kuosmanen *et al.*, 2023), which discovered that communities with low socio-economic status tend to rely more on plant-based protein sources than on animal proteins. Similarly, (Aggarwal & Drewnowski, 2019) noted that the growing awareness of the cost-effectiveness of plant-based proteins has contributed to a more favorable attitude toward their acceptance. Therefore, promoting the consumption of locally made soymilk in these communities not only supports the sustainability of nutritional programs but also strengthens local agriculture, boosts local economies, and provides environmentally friendly, sustainable protein alternatives. These sustainable practices are especially important in resource-constrained settings, where the long-term success of nutritional interventions depends on local production and supply chains.

Additionally, the existence of integrated sensitization, outreach programs, and nutritional interventions promoting plant-based proteins to animal milk among both refugee and host community members may have significantly influenced their attitude, leading to the observed positive reception of locally made soymilk. Reports from (OPM, 2022; UNHCR & OPM, 2018) highlighted the importance of integrated nutrition and livelihood programs involving both refugees and host community members in fostering peace and encouraging coexistence between these groups. This suggests that soymilk-based interventions, designed to be inclusive, can benefit both groups equally, thereby strengthening social cohesion and mutual support among refugee and host community members.

However, despite the observed overall positive attitude towards locally made soymilk beverages as depicted in Figure 3, notable differences were observed in the levels of attitude towards certain aspects, such as its perception as a natural beverage, taste, appearance, and fat content between refugees and host community members as shown in Table 3. These differences can be attributed to variations in cultural backgrounds, levels of exposure to both plant-based and animal-based beverages, as well as adaptability to economic challenges and health consciousness regarding dietary fat intake. Specifically, the observation that refugees perceived locally made soymilk as a more natural beverage than host community members, when compared to animal milk, can be explained by the fact that refugees may have come from cultural settings with limited access to dairy products, thereby promoting the consumption of soymilk as a plant-based protein source. This prior exposure likely made refugees more open to embracing soymilk as a natural alternative to animal milk. Additionally, this exposure may

have contributed to the higher preference among refugees for the taste and appearance of locally made soymilk compared to host community members. Additionally, the limited economic resources that restrict access to animal milk and other dairy products could have played a crucial role in increasing the adaptability of refugee communities, necessitating the embrace of alternative food sources. This is especially true for refugees, the majority of whom depend on assistance programs such as transfers and in-kind support as their main food sources as presented in Table 2. This limitation significantly reduces the dietary options available to refugees compared to host community members. On the other hand, the observed higher belief among host community members that locally made soymilk contains less fat than animal milk could be attributed to increased nutritional education and awareness campaigns, which have enhanced their understanding of the nutritional and health implications of dietary fats. A study by Viroli *et al.*, (2023) also indicated that awareness of the health benefits and risks associated with dietary fats plays a significant role in shaping attitude toward the consumption of both animal and plant-based fats and oils.

5.2 Willingness to consume locally made soymilk flavors

The observation that the majority of respondents had not consumed soymilk before the study can be attributed to several factors, including limited accessibility, lack of knowledge about soymilk preparation, unfamiliarity with it as a dietary option, and the beany smell, as revealed by a participant who said that *“We don’t have enough soybean seeds in the community, which makes it expensive to produce soymilk. The scarcity of soybeans is because we don’t have enough seeds, there is not enough land for cultivation, and sometimes weather changes make it hard to get soybeans.”* (Female, refugee participant). This finding aligns with research by (Avermaete *et al.*,2022; Bowdren & Raychel,2019) which suggested that the availability of a food product and knowledge of preparatory processes are critical factors influencing its consumption.

The higher proportion of soymilk consumption among the host community members compared to the refugees could be due to better access to diverse food options and greater exposure to soymilk and other plant-based protein sources within host community members. Host community members have easier access to resources such as land and finances, enabling them to either engage in soymilk production or purchase raw materials for its preparation as shown in Table 2. Refugees, on the other hand, have limited access to these resources and primarily depend on food aid. This observation is consistent with findings by (Rapsomanikis, 2015), who argued that access to production factors such as land and finances plays a crucial role in shaping consumption behaviors.

Consumer willingness to consume a given product is a crucial component of consumer behavior and decision-making, as it not only reflects consumers' perceptions of the product's value but also shapes their preferences and choices, particularly in challenging circumstances. In this study, the observation that most respondents expressed willingness to consume soymilk can be attributed to increased awareness of its cost-effectiveness as a plant-based protein source, along with recognition of its nutritional benefits. Parashar *et al.*, (2023) and Plamondon *et al.*, (2022) have similarly emphasized that awareness of the nutritional and environmental advantages of plant-based foods significantly influences consumption patterns. This is particularly true in communities where widely adopted community-based outpatient therapeutic care practices are used to manage malnutrition. This trend also helps explain the observed indifference in willingness between refugee and host community members. As one participant shared: *“Soymilk is affordable, and it helps when we are short of resources, especially when animal milk is out of reach.”* (Female, refugee participant).

The high willingness observed in both communities reflects a positive attitude toward and acceptance of locally made soymilk, which is crucial for incorporating soymilk into the diets of marginalized populations as a nutritional intervention as observed in Figure 3. Respondents' high likelihood of consuming various flavors of soymilk can be attributed to the sensory appeals these flavors contribute, such as taste, aroma, and mouthfeel. Maina (2018) also emphasized that sensory attributes such as texture, aroma, and taste are crucial in shaping consumer consumption decisions. These findings suggest a general openness among participants to try flavored soymilk. However, the variation in the flavors preferred can be attributed to differences in perceived palatability and sensory qualities. For example, lemongrass flavor emerged as the most liked flavor, which can be explained by its ability to enhance the sensory characteristics of soymilk, including its taste, aroma, and mouthfeel. Several additional factors explain the preference for lemongrass flavor over others, such as vanilla. Lemongrass is more readily available within the local community, often grown in home gardens, which reduces its cost compared to other flavoring agents like vanilla, which is typically imported and less accessible. A participant explained that, *“Lemongrass is easy to get because we grow it here, unlike vanilla which is expensive and we have to buy from shops.”* (Male, refugee participant). Furthermore, lemongrass is known for its natural health benefits, including its antioxidant properties and its role in improving digestion, as noted by Gaba *et al.*, (2020). These health benefits likely enhance its appeal as a flavoring agent for soymilk. Additionally, Angelique & Niyibituronsa (2024) observed that the citrus-like aroma of lemongrass has a soothing effect, making it a preferred choice in food and beverage flavoring. One participant also mentioned, *“The refreshing taste of lemongrass makes soymilk more*

enjoyable, and it's much cheaper than other flavors." (Male, host community participant). This aligns with findings by Jang & Lee (2024), who noted that the cost and availability of flavoring agents significantly influence their adoption in food products. Lastly, lemongrass's versatility as both a culinary ingredient and a medicinal herb makes it culturally familiar and widely accepted in many communities. The flavor of lemongrass masks the strong taste of soymilk, making it easier to drink.

Moreover, the increased likelihood of consuming soymilk by both refugee and host community members after training sessions can be linked to the participants gaining practical knowledge and skills in soymilk preparation. This improvement in understanding not only reduced barriers to accessing locally made soymilk but also fostered a sense of empowerment in preparing nutritious beverages at home. A participant stated, *"After the training, I realized that making soymilk is not as difficult as I thought; now I can prepare it for my children."* (Female, refugee participant). This observation resonates with findings by Mogre *et al.*, (2024), which showed that educational interventions significantly increased soymilk consumption among school children. Similarly, Geissler (2015) emphasized that training and capacity-building efforts on home-based food preparation are crucial for addressing nutrient deficiencies in communities. Furthermore, the study highlights the role of educational programs in enhancing willingness to consume soymilk. By addressing gaps in knowledge and promoting hands on skills, these programs significantly increase the acceptability of new dietary practices and improve nutritional outcomes.

5.3 Factors influencing attitude towards consumption of locally made soymilk

A range of individual, environmental, and institutional factors influences consumption decisions. In this study, several key factors emerged as influencing attitude toward the consumption of locally made soymilk. The finding that household size negatively impacted attitude toward locally made soymilk can be attributed to the economic challenges that larger households often face. For instance, larger households may prioritize purchasing cheaper, bulk food items to meet the needs of all members, rather than opting for specialized products like soymilk. This observation aligns with the concept of resource dilution, as highlighted by (Bijukumar *et al.*,2018; Roemer *et al.*,2016), where the per capita availability of resources diminishes as household size increases. Additionally, larger households often exhibit more diverse tastes and preferences, making it harder to introduce and sustain a single product like soymilk within the family. These findings underscore the importance of designing targeted educational campaigns to raise awareness about the cost-effectiveness and nutritional benefits

of soymilk, particularly in larger households. Such efforts could help shift perceptions and encourage gradual integration of soymilk into their diets.

Another intriguing observation, was the negative influence of post-primary education attainment on attitude toward consuming locally made soymilk. This can be explained by the correlation between higher education levels and exposure to a wider variety of foods and nutritional knowledge. With increased exposure, individuals often develop a preference for branded or more familiar commercial products over locally made alternatives. This aligns with findings by (Guiné *et al.*, 2023, Manandhar & Kakchapati, 2023; Sabrina *et al.*,2020), which indicated that higher education levels are associated with greater dietary diversity and higher standards for food quality. However, in the context of this study, this knowledge may have led to skepticism toward locally made soymilk, which some perceive as inferior in quality or lacking proper safety standards. To address this issue, there is a need for enhanced marketing strategies and quality assurance measures for locally made soymilk. These could include obtaining quality certifications, creating awareness of the production processes, and emphasizing the nutritional benefits of the product. Such initiatives could mitigate skepticism among educated individuals and encourage their acceptance of locally made soymilk as a viable dietary option.

Sensory attributes, particularly the aftertaste and beany smell of soymilk, were identified as significant barriers to its consumption. Participants from both the refugee and host community frequently mentioned that the beany flavor and unpleasant aftertaste discouraged them from consuming plain soymilk. However, there was a strong preference for flavored soymilk, especially variants such as vanilla, ginger, and lemongrass, which were appreciated not only for masking the beany taste but also for their perceived health benefits. These findings are consistent with Maina (2018), which emphasized that sensory characteristics such as taste and aroma are pivotal in food acceptance. Similarly, (Appiani *et al.*,2023; Cai *et al.*,2021; Yamamoto & Inui-Yamamoto ,2023) found that flavor enhancements significantly improve the palatability and acceptance of soy-based products. These observations suggest that promoting flavored soymilk and improving its sensory appeal could significantly enhance its acceptance among local communities.

Interestingly, the observation that refugees, in particular, were more likely to rate sensory attributes, including aroma, mouthfeel, and taste, as highly influential in their decision to consume locally made soymilk. This heightened sensitivity can be attributed to their unique socio-economic circumstances and the psychological impact of displacement. Refugees often have limited access to a variety of foods and rely heavily on humanitarian assistance programs

(Ecega, 2022). This finding aligns with studies by (Hughes, 2019; Moffat *et al.*, (2017), which noted that displaced populations often seek comfort and normalcy through familiar or novel sensory experiences. The disruptions in refugees' food environments make them particularly perceptive to sensory qualities, using these as a coping mechanism in unfamiliar settings. Conversely, host community members displayed a relatively lower reliance on sensory attributes for food choices. Their more stable and diverse food environments allowed for broader access to various options, diminishing the relative impact of sensory characteristics on their preference for soymilk. This finding parallels Chen & Antonelli (2020), which observed that while sensory attributes are critical determinants of food choice across populations, their influence is moderated by socio-economic and cultural contexts. These findings highlight the importance of considering sensory qualities in the development and promotion of locally made soymilk, particularly within food aid programs. Beyond nutritional content, attributes such as aroma, taste, and mouthfeel must be tailored to the needs of specific consumer groups. For refugees, incorporating these sensory qualities into food distribution strategies could significantly increase acceptance rates and improve health outcomes. For instance, developing flavored soymilk variants that cater to refugees' sensory preferences could enhance dietary diversity while providing comfort and familiarity.

The finding that household monthly income positively influenced attitude toward locally made soymilk can be attributed to the financial flexibility that higher income households enjoy. Such households are more likely to allocate disposable income toward diverse food products, including locally made soymilk, and can afford the necessary ingredients and equipment for soymilk production. This aligns with findings by (Laraia *et al.*,2017), which observed that higher income is often linked to greater access to nutritious and specialized food products, such as plant-based proteins like soymilk. However, the study also revealed that economic constraints, particularly the high cost of soybeans and related production expenses, were significant barriers to soymilk consumption. This finding corresponds with research by French *et al.*, (2019), which demonstrated that limited financial resources restrict access to healthier food options, including plant-based proteins like soymilk.

The accessibility of soymilk also played a critical role in shaping attitude. Limited access to soybean seeds, restricted land for cultivation, and seasonal variations due to weather conditions were identified as key factors influencing production and consumption. This finding is consistent with observations by (Blackmore *et al.*,2021; Gerbens-Leenes *et al.*,2010), which noted that raw material availability significantly impacts food consumption patterns in low-

resource settings. Seasonal variability in agricultural cycles, as reported by (FAO,2020), further compounds this issue by driving up the prices of essential raw materials.

Whereas the cost of soymilk and associated raw materials was cited as a barrier to soymilk consumption, the finding that host community members consumed soymilk as an alternative to cow milk can be linked to the fact that soymilk production is cheaper and more sustainable as compared to animal milk. Additionally, the limited availability of cow milk and other dairy products could have facilitated the substitution of plant-based soymilk for cow milk in this study. This is consistent with findings by (McNamara *et al.*, 2020; Savage *et al.*,2020) which demonstrated the adaptability of communities in optimizing their nutritional intake based on available resources. This means that addressing the availability and cost barriers through improved agricultural practices, subsidies, or financial support could enhance soymilk accessibility. Interventions such as subsidies, and financial incentives specifically increase affordability and accessibility which are crucial for fostering positive attitude and greater consumption of locally made soymilk among lower-income households.

Technological limitation, such as inadequate skills and equipment for soymilk production, also emerged as significant challenges. The reliance on rudimentary production methods adds labor intensity, reducing efficiency and uptake. A participant explained, *“Lack of technology such as machinery to process soybean seeds into soymilk makes it difficult to produce, unlike cow milk which is readily available.”* (Male, host community participant). This perspective echoes findings by (Konfo *et al.*,2023; Pokharel, 2023) which emphasized that technological advancements can significantly improve food processing efficiency and product quality. Therefore, adopting appropriate technologies and providing training to local producers could streamline soymilk production, making it more accessible and appealing.

The health and nutritional benefits of soymilk also influenced attitude positively. Participants highlighted its role in managing chronic illnesses such as high cholesterol, diabetes, and osteoporosis. For example, a participant noted, *“We were told that drinking soymilk can help lower cholesterol and boost immunity, which is why we encourage our children to drink it.”* (Female, refugee participant). This finding is consistent with studies by (Hossen *et al.*, 2022; Qin *et al.*,2022), which highlighted the nutritional value of soymilk, including its rich protein content, essential amino acids, vitamins, minerals, and antioxidants. These attributes are critical for managing protein-energy malnutrition and diet-related illnesses. Similarly, (McGrath & Fernandez ,2022; McMacken & Shah,2017) advocate for plant-based diets in addressing metabolic syndromes. Promoting the health advantages of soymilk through public health

campaigns that emphasize these benefits could increase its acceptance and consumption across diverse communities.

5.4 Limitations of the study

The approach used in this study has some drawbacks. Respondents evaluated three soymilk flavors as part of an examination of their readiness to try diverse flavors, which restricted them from comparing other flavors to determine which they liked best. The lack of samples for sensory assessment hindered the respondents' ability to get a more in-depth, tactile experience and identify their favorite flavors. To acquaint participants with some experience, some samples of soymilk were carried to the respondents for demonstration purposes only.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The positive attitude exhibited towards locally made soymilk by refugees and host community members in Northern Uganda reflects recognition of its benefits. A high level of willingness to consume soymilk indicates potential for its inclusion in nutritional programs targeting vulnerable groups.

Factors including household size, education, income, cost of soymilk and associated raw materials, sensory attributes, technological limitation, accessibility of soymilk, health and nutritional benefit of soymilk significantly influence the consumption of locally made soymilk. Addressing these factors can enhance acceptance and consumption, contributing to improved nutritional outcomes for both refugee and host community members.

6.2 Recommendations

6.2.1 Recommendations for practice and policy

To encourage the utilization of locally made soymilk, nutrition and health-focused organizations, including NGOs, Government agencies, and community-based groups, should design targeted programs that promote soymilk consumption. These programs should be culturally sensitive and inclusive, addressing the specific needs of both refugee and host community members. The interventions could involve educational campaigns to increase awareness of the health and nutritional benefits of soymilk, training sessions on affordable production methods, and initiatives to improve access to raw materials and processing equipment. Local producers should prioritize improving sensory attributes such as taste, texture, and aroma to align with consumer preferences, particularly among refugee populations, as identified in this study. Such improvements can enhance dietary satisfaction and encourage greater adoption of soymilk in daily diets.

Given that soy is a high-value crop that farmers often prefer to sell rather than consume, promoting soymilk consumption requires an integrated approach. This includes value addition for farmers, community education on the dual economic and nutritional benefits of soy-based products, integrating soymilk into nutrition programs, subsidizing local production, and offering training on efficient soymilk production methods. Such initiatives aim to balance economic incentives for farmers with improved public health outcomes by encouraging local utilization alongside market sales.

6.2.2 Recommendations for future studies

Future research by academic researchers and organizations involved in food security and nutrition should investigate the sustained acceptance and consumption of locally made soymilk over extended periods, particularly when the product is readily accessible within the study area. Additionally, studies should explore the specific impact of soymilk consumption on nutritional and health outcomes across different demographic groups, including children, pregnant women, and the elderly.

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APPENDICES

Appendix 1: Additional results

Table 9: Other flavors of soymilk liked by respondents

Flavor	Frequency (N = 365)	Percentage (%)
Tangawizi (Ginger)	361	99
Pineapple	15	4
Mango	18	5
Citrus or Orange	12	3
Tamarind	22	6
Coffee	13	4
Straw berry	21	6
Banana	17	5
Avocado	4	1

Table 10: The outcome of exploratory factor analysis showing the factors extracted from 7 scale items used for measurement of perceived factors influencing consumption of soymilk

Scale Items	F1	F2
Price	0.788	
Concerns about safety or quality	0.698	
Packaging	0.659	
Availability	0.572	
Mouthfeel		0.831
Aroma		0.742
Taste of soymilk		0.741
Eigenvalues	2.040	1.662
Percentage of variance explained (52.9%)	29.148	23.748
Cronbach alpha	0.612	0.657
Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0.639		
Bartlett's Test of Sphericity ($\chi^2 = 365.11$, df = 21, $p < 0.001$)		

F1 – Accessibility factor, F2 - Sensory appeal of soymilk factor

Appendix 2: Data collection tools

A.2.1 Questionnaire

Topic: Attitude and willingness to consume locally made soymilk by refugees and host community members in Northern Uganda

Instructions: Circle the number corresponding to the responses given.

Record the appropriate response in areas where choices have not been given.

All (any other response should be specified).

SECTION A: HOUSEHOLD DEMOGRAPHICS AND SOCIO-ECONOMIC DATA			
	QUESTION	RESPONSE	CHOICE
A.1	Residential zone for the respondent		
A.2	Sex of household head	Male Female	1 2
A.3	Age of household head	years	
A.4	Sex of respondent	Male Female	1 2
A.5	Age of respondent	years	
A.6	Are you a refugee or host community member	Refugee Host community member	1 2
A.7	Marital status of Household Head	Single Married Separated Widowed	1 2 3 4
A.8	Education level of household head	No formal education Primary Secondary Tertiary	1 2 3 4
A.9	How many people are in your household		
A.10	Occupation of household head	Not employed. Employed (salaried). Small scale trading. Farming. Causal labor. Any other (specify).	1 2 3 4 5
A.11	How much is your monthly income in Ugx?		
A.12	What is the estimated amount of money that your household spend on food per month?		
A.13	What are the 2 major sources of food in your household	Farming Purchase Food aid Transfers Any other (specify)	1 2 3 4 5
SECTION B: ATTITUDE TOWARDS LOCALLY MADE SOYMILK			
B.1	I believe soymilk is a more natural beverage compared to animal milk because sometimes animals are treated with hormones and antibiotics	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5

B.2	I believe that soymilk produces less allergenic reaction than animal milk	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.3	I believe that soymilk has less fats (cholesterol) compared to animal milk	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.4	I believe soy milk is important for people with lactose intolerance	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.5	I believe soymilk has as much nutrients closer to animal milk	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.6	Producing soymilk instead of animal milk, releases fewer greenhouse gas emissions	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.7	Growing soya to produce milk may have less impact on the environment than producing animals	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.8	Consuming soymilk supports animal welfare rights	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.9	The taste of soymilk may be as good as animal milk	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
B.10	I would like the appearance of soymilk as much as animal milk	Strongly disagree Disagree Neutral Agree Strongly agree	1 2 3 4 5
SECTION C.1: WILLINGNESS TO CONSUME DIFFERENT FLAVOURS OF LOCALLY MADE SOYMILK			
C.1	Have you consumed soymilk before	Yes No	1 2
C.2	If no, would you be willing to consume locally made soymilk	Completely not willing Not willing Neutral Willing Completely willing	1 2 3 4 5

C.3	How likely are you to try the different flavors of locally made soymilk?	Completely unlikely Not likely to try Neutral Likely Completely likely	1 2 3 4 5
Indicate your likeliness to consume the following flavors of locally made soymilk			
C.4	Plain flavor	Very unlikely Unlikely Neutral Likely Very likely	1 2 3 4 5
C.5	Vanilla flavored soymilk	Very unlikely Unlikely Neutral Likely Very likely	1 2 3 4 5
C.6	Lemon grass flavored soymilk	Very unlikely Unlikely Neutral Likely Very likely	1 2 3 4 5
C.7	Which other flavors of locally made soymilk are you willing to try?		1 2 3 4 5
C.8	If soymilk was produced locally in your area, how likely would you be able to consume it?	Very unlikely Unlikely Neutral Likely Very likely	1 2 3 4 5
C.9	If you knew how to produce soymilk, how likely would you be able to consume it?	Very unlikely Unlikely Neutral Likely Very likely	1 2 3 4 5

SECTION C.2 ADDITIONAL INFORMATION ON FACTORS AFFECTING WILLINGNESS						
S/N	How likely are you to consider the following factors when buying soymilk	Tick in the box according to the level of likeliness				
		Very unlikely	Unlikely	Neutral	Likely	Very likely
1.	Taste of soymilk					
2.	Mouthfeel					
3.	Aroma					
4.	Availability					
5.	Price					
6.	Packaging					
7.	Concerns about safety or quality					
8.	Lifestyle factors such as vegan					
9.	Food curiosity					
10.	Cultural beliefs					
11.	Others specify					

Thank you for taking the time to complete this survey. Your responses will help us better understand attitude and willingness of the refugees and host community to consume soymilk.

A 2. 2 Focus group discussion guide

Subcounty:

Parish/ Zone:

Village/Block:

Introduction

The team leader will briefly introduce the other members, followed by the introduction of members. The team leader will then explain to the members the purpose of the session and immediately open discussion.

Describe here what plantbased milk substitutes are and the examples as well as describing what soymilk is. This will help to guide the discussion. You may also carry a sample to the discussion!

Guiding questions

1. Tell us about your experience of plant-based milk alternatives. Do you know about the existence of plant-based milk? Have some of you consumed any of the plant-based milk products?

2. Explain why you would recommend your family members to consume soymilk.

3. What things would positively influence the consumption of soymilk in this community?

4. What factors will deter the consumption of soymilk in this community?

5. Do you think the addition of flavors or spices would improve the consumption of soymilk?

If so, how will the flavors help?

6. If members of your community were trained to produce soymilk locally, how would that influence its consumption in this location?

7. Is there something that you would like to add, comment, or ask?

Thank you for your participation!

Appendix 3: Informed consent form for household interview

Title of the study: Attitude and Willingness to consume locally made soymilk by refugees and host community members in Northern Uganda

Investigator(S): Okello Emmanuel

Institution(S): Gulu University

Introduction

Good morning/afternoon! My name is (Interviewer mentions his/her name)

I'm a student of Gulu University and I'm conducting research on the topic: "**Attitude and willingness to consume locally made soymilk by refugees and host community members in Northern Uganda.**"

The study is approved by the Gulu University Research Ethics Committee (GUREC).

During the study, you are provided with 3 locally made soymilk flavors and requested to taste each and express your degree of liking using the scale above. You will be provided with clean water to rinse your mouth before tasting and in between tasting each sample and you' will be requested to indicate your degree of liking for each.

Please feel free to ask about anything you would like to understand about the study at any given time. After the study has been explained, any questions you may have answered, and you have decided to participate in the study, you will be asked to sign a consent, which you will be given a copy to keep.

1.1.1 Purpose:

The study seeks to improve the uptake of protein intake by increasing access to cheap protein foods using locally made soymilk contents to enhance intake by refugee and host community members. The findings of this study will contribute efforts towards the use of locally available foods in order to produce locally nutritious foods to address malnutrition among refugees and host community members in Northern Uganda.

1.1.2 Procedures

Your participation in this study will involve preparation of each soymilk flavor sample. The prepared soymilk will be served to you using a disposable cup and you will be requested to taste and give your degree of liking for the various attributes. The interview will last for 20 to 30 minutes. You have been chosen to participate in this study because you are a woman of reproductive age and mostly you participate in the food choices, preparation in the household. The number of participants in the study will be 365.

1.1.3 Risk/discomforts

There is no foreseeable risk of harm or discomfort that will arise from your participation in this study. This is because the ingredients of the locally made soymilk have less likelihood of causing allergic reaction. However, those with allergy will not be allowed to participate in the study. In addition, in case of any discomfort during tasting of the different locally made soymilk flavors participants are free to withdraw from the study any time and at will.

1.1.4 Benefits

We are therefore seeking your consent to participate in the study. Your involvement in all the phases of the study will help you learn how to prepare and blend the different flavors of locally made soymilk to increase its acceptability. Additionally, this will help reduce the risks of malnutrition among refugees and host community members. There is also no financial or other personal benefit attached to your participation in the study.

1.1.5 Confidentiality

Your identity won't be revealed to any one as we will use codes to identify participants. Information obtained will only be accessible by the research team. Soft copies of the data will be protected by password and hard copy files will be kept under lock and key. Confidential information will only be accessed by the principal investigator.

1.1.6 Alternative

You do not have to participate in this study if you are not interested

1.1.7 Cost

There will be a few additional costs incurred such as time and your equipment that you will be requested to use for preparation of locally made soymilk if you accept to participate in the study.

1.1.8 Questions

If you have any questions related to the study, or your rights as a research participant, you can contact the principal investigator, **Okello Emmanuel** on **0778287008** or via email on okello607@gmail.com

1.1.9 Statement of voluntariness

Participation in the research study is voluntary and you may join on your own free will. You have a right to withdraw from the study at any time without penalty.

If you have any issues pertaining to your rights and participation in the study, please contact the chairperson, Gulu University Research Ethics Committee, Dr. Gerald Obai's Telephone no., 0772305621; Email: lekobai@yahoo.com/lekobai@gmail.com; or the Uganda National Council for Science and Technology, on plot 6 Kimera road, Ntinda, Kampala on Telephone No., 0414705500.

1.1.10 Statement consent

.....has described to me what is going to be done, the risks, the benefits involved and my rights as a participant in this study. I understand that my decision to participate in this study will not affect me in any way. In the use of this information, my identity will be concealed. I am aware that I may withdraw at any time. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the research study in which I am voluntarily agreeing to participate. A copy of this form will be provided to me.

Name of participant.....Signature/Thumbprint.....Date.....

Name of witness.....signature.....Date.....

Name of interviewer..... Signature.....Date.....

Appendix 4: Approval from Gulu University Research Ethics Committee (GUREC)



21/08/2024

To: OKELLO EMMANUEL

256778287008

Type: Initial Review

Re: GUREC-2023-777: ATTITUDE AND WILLINGNESS TO CONSUME LOCALLY MADE SOYMILK BY REFUGEES AND HOST COMMUNITIES IN NORTHERN UGANDA

I am pleased to inform you that at the **116th** convened meeting on **18/07/2024**, the Gulu University REC meeting voted to approve the above referenced application.

- Approval of the research is for the period of **21/08/2024** to **21/08/2025**.

As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the REC for review and approval **prior** to the activation of the changes.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit: ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight weeks** prior to the expiration date of **21/08/2025** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by Gulu University REC:



Appendix 5: Approval from the Office of the Prime Minister


THE REPUBLIC OF UGANDA
OFFICE OF THE PRIME MINISTER
PLOT 9-11 APOLLO KAGGWA ROAD, P.O. BOX 341, KAMPALA, UGANDA
TELEPHONES: General Line 0417 770500, Web: www.opm.go.ug, E-mail: ps@opm.go.ug


Uganda
Vision 2040

In any correspondence on this subject, please quote No: OPM/R/163

15th January 2024

Dr. Solomon Olum (PhD),
Coordinator NORPART Project,
Faculty of Agriculture & Environment,
Gulu University.

PERMISSION TO CONDUCT RESEARCH IN REFUGEE SETTLEMENTS UNDER ADJUMANI AND LAMWO REFUGEE DESKS

Office of the Prime Minister is in receipt of your letter dated 2nd January 2024, in regard to the above subject matter.

Permission is hereby granted to a team of six students to conduct research on *"Partnership for Education in Refugee-host Contexts: Joint Learning Towards Food Security and Sustainable Development in Uganda (NORPART),"* in Refugee Settlements under Adjumani and Lamwo Refugee Desks, in January and February 2024.

They are requested to observe the rules and regulations governing the settlements.

Office of the Prime Minister Authorities in the Settlements are hereby requested to accord them the necessary support.


Bafak Charles
FOR: PERMANENT SECRETARY.

c.c.: The Refugee Desk Officer, Adjumani
c.c.: The Refugee Desk Officer, Lamwo

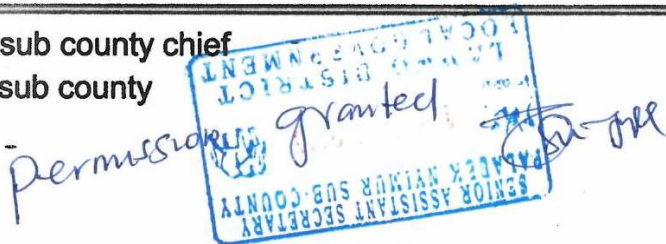
Appendix 6: Approval from the subcounty chief for Palabek Nyimur Subcounty



The office of the sub county chief
Palabek Nyimur sub county
Lamwo District

18th January, 2024

Dear Sir/Madam,



RE: PERMISSION TO CONDUCT RESEARCH IN REFUGEE SETTLEMENTS IN NORTHERN UGANDA

Gulu University, Makerere University, Center for African Research and Norwegian University of Life Sciences are jointly implementing a research project titled, *Partnership for Education in Refugee-host Contexts: Joint Learning Towards Food Security and Sustainable Development in Uganda (NORPART)*. The overarching goal of the project is to contribute towards enhancing the quality of higher education in Uganda and Norway focusing on the theme 'Food Security and sustainable development' in refugee-host contexts. The research component of the project aims at examining sustainable food production practices and livelihood strategies that contribute to sustainable outcomes, including food security and biodiversity conservation. Thus, the primary focus is on studying food-related strategies and food security practices in refugee-host communities. The research has been approved by Gulu University Research Ethics Committee (GUREC), approval number GUREC-2023-687 and has been submitted to Ugandan National Council of Science and Technology (submission reference SS2233ES).

The project facilitates student exchange between Norway and Uganda with students from Norway coming to-Uganda for joint research with Ugandan students who later go to Norway for Spring Courses and to write their dissertations. The students and staff research activities will run for three years starting January 2024 to December 2026. This year, we shall have a total of 6 project-supported students conducting research in Adjumani and Palabek refugee settlements in **January and February 2024**. These include 2 students from Gulu University, 3 students from the Norwegian University of Life Sciences, and 1 student from Makerere University. They will interview refugee and host community farming households and representatives of development partners as key

informants. The Research is strictly for academic purposes leading to the Award of Masters Degrees in the respective universities.

This letter is to seek permission to conduct the NORPART project research activities in Adjumani and Palabek refugee settlements from 10th January to 29th February 2024. We shall be grateful for your kind consideration

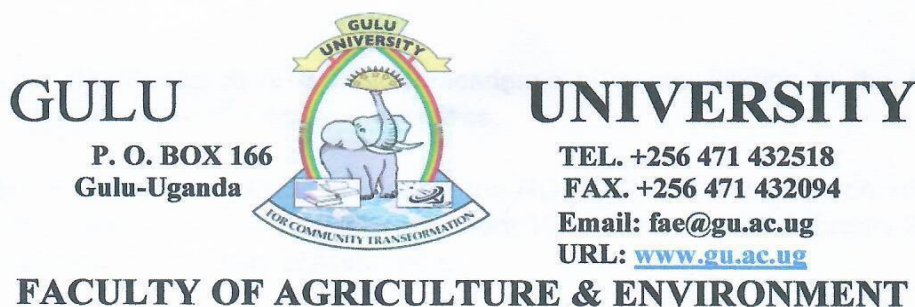
Yours Sincerely,



Dr. Solomon Olum (PhD),
Coordinator, NORPART Project
Faculty of Agriculture and Environment, Gulu University
Tel: 0779 486193; Email: s.olum@gu.ac.ug



Appendix 7: Approval from the subcounty chief of Palabek Ogili Subcounty



14th January, 2024

Office of the Sub County Chief,
Palabek Ogili Sub County,
Lamwo District, Uganda.

Approved
[Signature]



Dear Sir/Madam,

RE: PERMISSION TO CONDUCT RESEARCH IN REFUGEE SETTLEMENTS IN NORTHERN UGANDA

Gulu University, Makerere University, Center for African Research and Norwegian University of Life Sciences are jointly implementing a research project titled, *Partnership for Education in Refugee-host Contexts: Joint Learning Towards Food Security and Sustainable Development in Uganda (NORPART)*. The overarching goal of the project is to contribute towards enhancing the quality of higher education in Uganda and Norway focusing on the theme 'Food Security and sustainable development' in refugee-host contexts. The research component of the project aims at examining sustainable food production practices and livelihood strategies that contribute to sustainable outcomes, including food security and biodiversity conservation. Thus, the primary focus is on studying food-related strategies and food security practices in refugee-host communities. The research has been approved by Gulu University Research Ethics Committee (GUREC), approval number GUREC-2023-687 and has been submitted to Ugandan National Council of Science and Technology (submission reference SS2233ES).

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Yours Sincerely,



Dr. Solomon Olum (PhD),
Coordinator, NORPART Project
Faculty of Agriculture and Environment, Gulu University
Tel: 0779 486193; Email: s.olum@gu.ac.ug

Appendix 8: Plagiarism Certificate

GULU

P.O. Box 166
Gulu, Uganda



UNIVERSITY

Tel: +256-471-32924

Fax: +256 471343095

Emails: ul@gu.ac.ug

URL: www.gu.ac.ug

OFFICE OF THE UNIVERSITY LIBRARIAN

PLAGIARISM CHECK

Declaration for Originality Form

This form must be completed and signed for all scholarly work produced.

Name: OKELLO EMMANUEL (MR.)

Personal File No.(staff) Reg. (student). 22/U/1208/MFN/PS

Faculty/Institute: AGRICULTURE AND ENVIRONMENT, GULU UNIVERSITY

Department: FOOD SCIENCE AND POSTHARVEST TECHNOLOGY

Title and bibliographic description of the work

**ATTITUDE AND WILLINGNESS TO CONSUME LOCALLY MADE SOYMILK BY
REFUGEES AND HOST COMMUNITIES IN NORTHERN UGANDA**

Declaration.

1. I understand what plagiarism is and I am aware of the University policy on this regard,
2. I declare that this ..., **Dissertation** ... (thesis, Proposal, essay, assignment, paper, report etc.) is my original work and has not been submitted elsewhere for examination, award of a degree or publication. Where other people's work or my work has been used, this has been properly acknowledged and referenced in accordance with Gulu University requirements,
3. I have not sought or used the services of any professional agency to produce this work,
4. I have not allowed, and shall not allow anyone to copy my work with the intention of passing it off as his/her own,
5. I understand that any false claim of this work shall result in disciplinary action in accordance with University Policy on Plagiarism.

Signature 

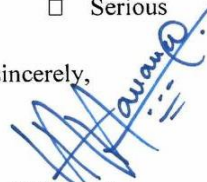
Date 02nd October, 2024

Originality Report

The article/thesis/document titled above have been subjected to plagiarism check and the level was found to be.....**18%** (percent) this is classified as:

- ☒ Minor
☐ Moderate
☐ Serious

Yours sincerely,


Manana N Herbert
Ag. University Librarian

