

**ATTITUDE AND CONSUMPTION PATTERNS OF SUN-DRIED VEGETABLES
AMONG HOUSEHOLDS IN TESO SOUTH SUB-COUNTY, KENYA**

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Technology in Partial Fulfillment for the Requirements of the Award of Masters of
Science in Public Health Nutrition of Masinde Muliro University of Science and
Technology**

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DEDICATION

This study is dedicated to my son Cyril David Osere. He has taught me what it means to be patient as a mother, and he is the reason behind efforts put in this study.

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I would like to extend my sincere gratitude to my supervisors, Dr. Jane Situma and Dr. Lydiah Waswa for their immense support and guidance in helping me develop this thesis. They have been constantly available and encouraged me to do better, hence the successful compilation of this thesis. I am also indebted to the member of staff from the Department of Nutritional Sciences MMUST for the intellectual guidance and the challenging platforms they offered to ensure that I completed all the stages of developing this thesis. My appreciation also goes to the investigators of the Education and Training for Sustainable Agriculture and Nutrition in East Africa (EaTSANE) project. The EaTSANE project formed the basis of this study and the investigators have been very instrumental in my data collection and analysis processes. Special thanks to Dr. Irmgard Jordan for the selfless financial support towards completion of my master's program. I also appreciate the local administration in Teso South Sub-County and members of the community, including the study participants and community health volunteers, who were pivotal in facilitating data collection for this study. My sincere appreciation also goes to my family for the moral support and always believing in me. Above all, I thank the Almighty God for the strength and ability to achieve this great milestone.

ABSTRACT

Low intake of vegetable is common during the dry season due to scarcity and increased prices. Consuming sun-dried vegetables during such periods helps bridge the seasonal gaps and reduce the risk of micronutrient deficiencies. Sun-drying of vegetables was promoted by the Education and Training for Sustainable Agriculture and Nutrition in East Africa (EaTSANE) project as a means to close the nutritional gap among smallholder farming households in Teso South Sub-County, Busia County, Kenya in 2019. As a follow-up to the EaTSANE project activities, this study sought to assess the attitude and consumption patterns of sun-dried vegetables among households in Teso South Sub-County. The specific objectives of the study were to: determine the socio-economic and demographic characteristics of the households; assess the attitude towards sun-dried vegetables; assess the consumption patterns of sun-dried vegetables; and determine factors influencing consumption of sun-dried vegetables among households. Data was collected using a semi-structured questionnaire and focus group discussion (FGD) guide. The study involved women who participated in the EaTSANE project's trials of improved practices (TIPs) that involved sun-drying of vegetables (TIPs participants) and those from villages in close proximity to the TIPs villages but did not take part in the TIPs activities (non-TIPs participants). Data was analysed using the Statistical Package for Social Sciences (IBM Version 25). Data from the FGD guide was analyzed thematically. Overall, 49 TIPs and 50 non-TIPs participants took part in the study. The mean ages for TIPs and non-TIPs participants were 36.82 ± 11.56 and 34.94 ± 10.94 years respectively. Majority (52.9% $n=55$) of the participants did not complete primary education. Both groups recorded a positive attitude towards sun-dried vegetables, with mean attitude scores of 14.02 ± 2.04 (95% CI = 8-16) for the TIPs participants and 9.38 ± 3.25 (95%CI = 4-16) for non-TIPs participants. The most preferred sun-dried vegetables were cowpea leaves, jute mallow, amaranth, sun hemp and black nightshade. Only the TIPs participants (79.6%, $n=39$) consumed sun-dried vegetables and consumption was mostly on a monthly basis (17.3%). Factors that influenced consumption of sun-dried vegetables included awareness of the sun-drying practice [$X^2 (4) = 35.233, p = .009$], confidence in preparing a meal using sun-dried vegetables [$X^2 (4, N=99) = 26.964, p = .001$], ease of preparing sun-dried vegetables ($p = 0.006$), color [$X^2 (4, N=99) = 19.3, p = .001$], and taste [$X^2 (4, N=99) = 25.4, p = .000$]. There is need to create more awareness on the sun-drying technique to increase consumption and close seasonal gaps associated with vegetable scarcity.

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LIST OF ABBREVIATIONS AND ACRONYMS

BCIDP	Busia County Integrated Development Plan
CNAP	County Nutrition Action Plan
EaTSANE	Education and Training for Sustainable Agriculture and Nutrition in East Africa
FAO	Food and Agriculture Organization
FGDs	Focus Group Discussion
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
KNMS	Kenya National Micronutrient Survey
MoALF	Ministry of Agriculture, Livestock and Fisheries
MoH	Ministry of Health
NGO	Non-Governmental organization
SPSS	Statistical Package for Social Sciences
TIPs	Trials of Improved Practices
TPB	Theory of Planned Behavior
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Household:	Persons living in the same house including non- family members. In this study, it will refer to a residence group, carrying out domestic activities together, eating together from the same pot and living together.
Attitude:	Participants' feeling or opinion about sun-dried vegetables
Consumption patterns:	Encompasses the types of sun-dried vegetables consumed, sources and the frequency of consumption.
Micronutrient deficiencies:	Lack of essential vitamins and minerals required in small amounts by the body for proper growth and development
Sun-dried vegetables:	Vegetables whose water content has been reduced through hot air circulation induced by sunlight, which prohibits the growth of enzymes and bacteria that speed up vegetable spoilage

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Vegetables including the leafy green stem and root parts of an edible plant (Mwale et al., 2019) constitute a significant component of the human diet due to the vast benefits associated with their intake. Their inclusion in meals cannot be overemphasized as they are abundant in micronutrients, dietary fiber, and phytochemicals (Singh et al., 2014). The World Health Organization (WHO) emphasizes the need to include vegetables in daily meals to promote health and reduce the risk of chronic lifestyle diseases (WHO, 2018). While the WHO suggests a minimum consumption of 400g per day per person per day of fruits and vegetables, equivalent to approximately five servings daily, low consumption of vegetables remains a problem worldwide (WHO, 2020). According to Miller et al., (2016), the global average consumption of fruits and vegetables was 3.76 servings per day with significant variations across regions. While most high-income countries exceed their minimum recommended servings, the average servings of fruits and vegetables in middle and lower-income countries was 3.17 and 2.14 per person per day (Miller et al., 2016).

According to Mwenda et al., (2018), about 95% of Kenyans typically eat fewer than five servings of fruits and vegetables daily per individual. Low consumption of vegetables cuts across both urban and rural dwellers. As Blake et al., (2020) posit, low consumption of vegetables among Kenyans is partly due to food preference, education level, larger households, access, affordability and seasonality of vegetables.

Teso South Sub-County is majorly rural and vegetables form a major part of the community's diet. The common vegetables consumed in Teso South Sub-County include but are not limited to cowpea leaves (*Vigna unguiculata*), black night shade (*Solanum nigrum*), jute mallow (*Corchorus olitorius*), spider plant (*Chlorophytum comosum*), sun hemp (*Crotalaria juncea*), collard greens (*Brassica oleracea*), tomatoes, and onions (Ebere et al., 2017). However, very little has been documented regarding consumption patterns of vegetables in the area, with regards to servings cannot be quantified

Vegetable production is seasonal and not necessarily readily available throughout the year. It is affected by climate variability and extremes, leading to difficulties in accessing vegetables during the dry season. According to the Busia County Integrated Development Plan (CIDP, 2018), the county experiences the long and short rain seasons between March and May and between August and October, respectively. The period from December to early March is characterized by a dry season interspersed with sporadic rainfall. During the rainy season, a variety of vegetables are produced hence making vegetables always available in plenty during this season. The dry season is often characterized by insufficient availability of vegetables due to water shortage, high production costs, high market prices and high postharvest losses experienced as a result of poor and insufficient preservation techniques (Van der Lans, 2012).

During the rainy season, there is a sufficient yield of vegetables that can be stored for consumption during the dry season when they become scarce and more expensive. Preservation of vegetables through sun-drying boosts supply during the lean season, contributes to household food security, helps families meet their vegetable intakes, consequently increasing the intake of essential nutrients key for averting micronutrient

deficiencies (Kiremire et al., 2010). According to the Food Agricultural Organization (FAO), sun-drying of vegetables is the most common preservation technique used in rural settings. Despite the association between preservation of vegetables and the various benefits it serves, studies on sun-drying of vegetables in Teso South Sub-County are very limited, creating a knowledge gap for this study.

This study was a follow up of previous work carried out within the Education and Training for Sustainable Agriculture and Nutrition in East Africa (EaTSANE) project, an international collaborative research project that was conducted in Teso South Sub-County in Kenya and Kapchorwa District in Uganda. The project's objective was to enhance the sustainability of farming methods and enhance the dietary quality of the households by diversifying the food system through a participatory action learning strategy. The project consisted of four work packages (WP) and this study specifically sought to follow up on the activities which were conducted within WP3: food culture and nutrition. The goal of WP3 was to evaluate gender dynamics within agri-food value chains, focusing on farmers' knowledge, attitudes, and perceptions regarding legumes, vegetables, and fruits, particularly concerning the sensory attributes, health benefits, and preparation options as well as conservation strategies. The Trials for Improved Practices (TIPs) approach was used within WP3 of the project to promote consumption of vegetables among households. TIPs, a formative research method designed by the Mannof Group, facilitates planners in pretesting the specific practices they intend to promote. It involves a sequence of visits during which the interviewer and the participants assess the existing practices, deliberate on potential enhancements, and collaboratively agree on one or a few solutions to implement for a trial period. The trial experience is then assessed and results moved directly into a

program design. Sun-drying of vegetables using protected sun-driers was one of the simple innovations introduced using TIPs to help households preserve surplus vegetables which can be used during the lean seasons.

This study sought to assess the attitude and consumption patterns of sun-dried vegetables among households in Teso South Sub-County, Kenya. It involved households that were introduced to the sun drying technique during the TIPs within the EaTSANE project site in Teso South Sub-County (TIPs households), as well as households within villages in close proximity to each of the villages that participated in TIPs that were not involved in the project activities (non-TIPs households). The rationale for inclusion of the two groups in the study was to compare the attitude and consumption practices of sun-dried vegetables between the groups, and also to find out whether the EaTSANE project activities had spill-over effects to villages that were not targeted by the project activities.

1.2 Problem statement

Among rural dwellers with limited resources, vegetables serve as the primary source of essential vitamins and minerals. When adequately consumed, vegetables promote health, lower the risk of micronutrient deficiencies and chronic lifestyle diseases. However, deficiencies in micronutrients continue to pose a significant public health issue, particularly among women of reproductive age and young children among middle- and low-income countries and affecting more than two billion people worldwide (WHO, 2020). The deficiencies of Vitamin A, folic acid, iron, zinc and iodine present a significant risk, with

approximately one-third of children aged below 5 years experiencing vitamin A deficiency and a 32.8% prevalence of anemia among women of reproductive age (WHO, 2020).

The most recent Kenya National Micronutrient Survey (KNMS) conducted in 2011 showed that the prevalence of vitamin A, zinc, and iron deficiencies are 9.2%, 83.3% and 21.8% respectively among preschool children. Among school aged children, the prevalence was 3.6%, 80.2% and 9.4% for vitamin A, zinc and iron deficiencies respectively (Ministry of Health, 2013). The prevalence of micronutrient deficiencies especially among the rural poor can be lowered through various interventions such as fortification, supplementation, and dietary diversification. The latter can provide the required micronutrients through adequate inclusion of vegetables in the daily diets.

While vegetables can be easily accessed by most households in rural settings, they are prone to seasonality and high post-harvest losses. The seasonal variations in vegetable availability compels families to subsist on starch-based diets consisting of sweet potatoes, cassava, green bananas and arrow roots often accompanied with black tea. During such times, vegetables are usually included in only one meal, usually supper, contributing to consumption of poor-quality diets (Ebere et al., 2017). Consequently, the intake of essential nutrients, particularly micronutrients remains inadequate, leading to a compromised health and nutrition status.

1.3 Objectives

1.3.1 General objective

To assess the attitude and consumption patterns of sun-dried vegetables among households in Teso South Sub-County, Kenya.

1.3.2 Specific objectives

- i. To determine the socio-economic and demographic characteristics of households in Teso South Sub-County, Kenya
- ii. To assess the attitude towards sun-dried vegetables among households in Teso South Sub-County, Kenya
- iii. To assess the consumption patterns of sun-dried vegetables among households in Teso South Sub-County, Kenya
- iv. To determine factors influencing consumption of sun-dried vegetables among households in Teso South Sub-County, Kenya

1.4 Research Questions

- i. What were the socio-economic and demographic characteristics of households in Teso South Sub-County, Kenya?
- ii. How was the attitude towards sun-dried vegetables among farm households in Teso South Sub-County, Kenya?
- iii. What were the consumption patterns of sun-dried vegetables among households in Teso South Sub-County, Kenya?
- iv. What factors influenced consumption of sun-dried vegetables among households in Teso South Sub-County, Kenya?

1.5 Justification of the study

Even though seasonality and perishability contribute to low consumption of vegetables, there is limited literature focusing on the status of vegetable preservation as well as consumption of sun-dried vegetables in Teso South. This study contributes to new knowledge concerning the attitude and consumption patterns of sun-dried vegetables among households in Teso South.

It will help in policy implementation, especially with regards to reducing micronutrient deficiencies through adequate consumption of vegetables rich in vitamins and minerals regardless of the season.

Additionally, it is important to the community because sun drying of vegetables enhances their availability and accessibility. When availability and accessibility of vegetables is enhanced consumption likely increases.

1.6 Significance of the study

This study holds significance as it contributes to the attainment of Sustainable Development Goal 2: Zero Hunger. When vegetables are preserved through sun drying, families will be able to include vegetables into their daily meals.

It also aligns with the Kenya National Nutrition Action Plan, strategic objective 3, which aims at reducing the prevalence of micronutrient deficiencies in the population. Therefore, adequate consumption of vegetables throughout the year could contribute significantly in reducing the burden of micronutrient deficiencies including morbidity and mortality.

1.7 Scope of the study

This study was conducted in Teso South Sub-County, Busia County, Kenya and targeted households that were introduced to the sun-drying technologies during the TIPs sessions conducted within the EaTSANE Project in 2019 (TIPs households). The study also included a comparison group that consisted of households selected from villages neighboring those that participated in the TIPs sessions, but did not participate in the TIPs sessions (non-TIPs households). The study majorly focused on assessing participants' attitude towards sun-dried vegetables, consumption patterns and factors that influenced the established consumption patterns.

1.8 Limitation of the study

The researcher only relied on reported information of the study participants, which may have introduced response bias. Therefore, in order to minimize response bias, the researcher ensured that questions were framed appropriately and respondents probed for responses to elicit rich and more in-depth information from the study participants. Further, focus group discussions were conducted to validate data collected through interviews in the cross-sectional survey.

1.9 Theoretical model

Various health promotion theories have been developed to help people understand how behavior change can be achieved. This study adopted the Theory of Planned Behavior (Ajzen, 1991), which explains people's ability to exert self-control in a bid to change their behaviors. Based on the TPB, motivation and capability influence behavior change. Motivation and capability consist of six constructs that collectively represent an individual's effective control over behavior. These constructs include attitudes, behavioral intention, subjective norms, social norms, perceived power and perceived behavioral control.

In line with the first objective which aimed at assessing participants' attitude towards sun-dried vegetables, the researcher used the Theory of Planned Behavior to derive the assumption that the more favorable the attitude towards consuming dried vegetables, the stronger the people's intention to diversify their diets through increased consumption of vegetables regardless of the season. Perceived behavioral control as a construct of the Theory of Planned Behavior explains the households' ability to sun-dry vegetables, which translates to consumption patterns of sun-dried vegetables. It looks into the participant's self-efficacy with regards to their confidence in preparing meals consisting of sun-dried vegetables. Perceived behavioral control also focuses on external factors such as the availability of vegetables for sun-drying, time required to sun-dry and other resources, including the sun-drying facility.

Another Theory of Planned Behavior construct linked to this study is behavioral intention, which refers to factors that motivate adoption of a desired behavior. It takes stronger

intentions for an individual to perform the anticipated behavior. In the context of consumption of sun-dried vegetables, one is likely to consume them if only they intend to. Intentions to consume sun-dried vegetables could be driven by various factors, including awareness of the benefits associated with consuming them, perceptions, preference and ability to prepare the vegetables. The listed factors also have a crucial impact on shaping the consumption patterns of sun-dried vegetables.

1.10 Conceptual framework

The conceptual framework depicted in the study below illustrates the relationship among the independent, dependent, and intervening variables along with their respective indicators, Figure 1.1. Aligning it with the TPB, consumption patterns of sun-dried vegetables, which is the dependent variable, is the behavior change sought to be achieved. The indicators of consumption include the type of sun-dried vegetables consumed, source, quantity consumed, and the frequency of consumption. The conceptual framework depicts that consumption of sun-dried vegetables is dependent on the socio-demographic characteristics of a household and attitude of the people. The socio-demographic attributes include the age of the respondent, gender, education level and the household income. The specific indicators for attitude include the sensory attributes of sun-dried vegetables (taste, color, and texture) and their inclusion in family meals. The conceptual framework also shows that while the socio-demographic characteristics of a household may directly influence consumption of sun-dried vegetables, the variables could also be moderated by people's attitude towards sun-dried vegetables.

Dependent Variable

Consumption patterns of sun-dried vegetables:

- Type of sun-dried vegetables
- Source of sun-dried vegetables
- Frequency of consuming sun-dried vegetables

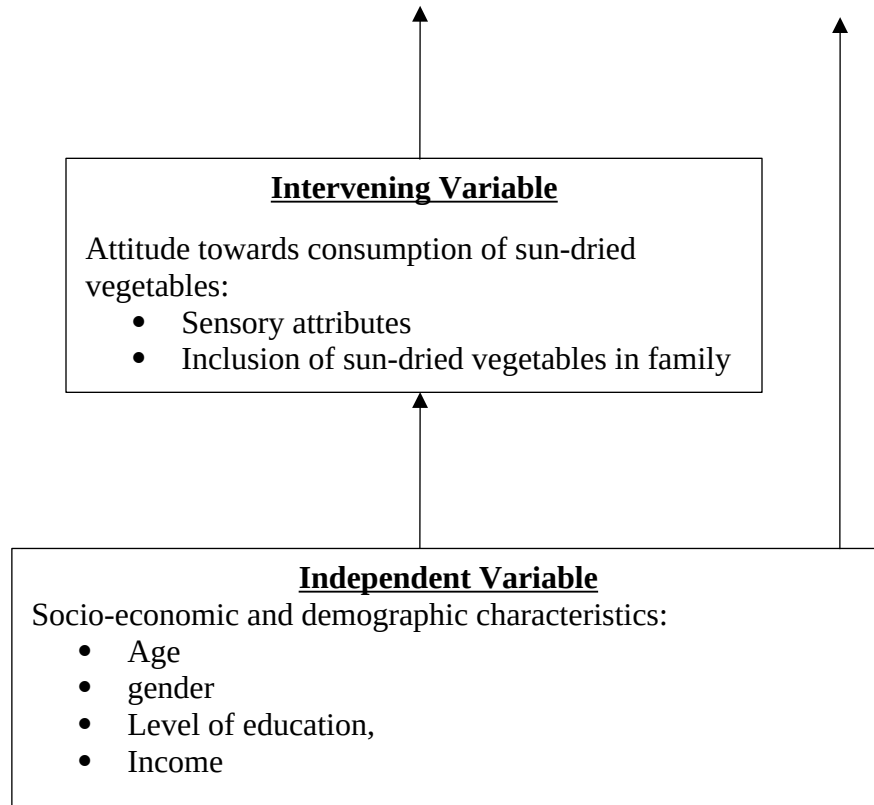


Figure 1.1: Theoretical Framework based on Theory of Planned Behavior. Adopted and modified from Antonio (2014.)

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The second chapter of this study examined pertinent literature regarding the general overview of vegetable consumption; vegetable preservation practices; socio-economic and demographic characteristics in relation to consumption of sun-dried vegetables; consumption patterns of sun-dried vegetables; factors influencing consumption patterns of sun-dried vegetables, and lastly perceptions and attitudes towards sun-drying vegetables and consumption of the same in order to identify knowledge gaps.

2.1 Overview of Vegetable Consumption Practices Among Households

Vegetables are recommended in all food guidelines, each emphasizing on the need for vegetables to occupy the largest portion of the plate than starch and protein-rich foods. They form an indispensable part of the diet since vegetables are rich sources of micronutrients, fiber and phytochemicals. Vegetables are known for their essential role in supporting body maintenance and lowering the risk of non-communicable diseases (CDC, 2013). They are naturally low in fats and calories, making them appropriate for weight management and nutritional management of certain NCDs such as type 2 diabetes, hypertension, some forms of cancer, and cardiovascular diseases (Boeing et al., 2012).

Despite vegetables playing a crucial role in fostering health and preventing micronutrient deficiencies and associated illnesses, their consumption still falls below the minimum intake recommended by the WHO (Miller et al., 2016). Low consumption of vegetables in Sub-Saharan Africa has been associated with preference of starchy foods which quickly

satisfy hunger and supply energy (Chauvin et al., 2012). Most of these starchy foods are also found in Teso South Sub-County and they require very little efforts to prepare them. Their availability and the ease of cooking, which often involve boiling, predict the likelihood of recording similar results.

Low consumption of vegetables in Kenya has been linked to various factors, including the socio-economic and demographic characteristics of households, cultural practices, beliefs, norms, habits and attitude related to vegetables, as well as availability and accessibility of vegetables (Lans *et al.*, 2012). Kenya boasts of 42 ethnic groups, each with its own food preference, norms, cultures, myths, and socio-economic practices. In light of the mentioned variations, the likelihood of vegetable consumption practices to vary from one ethnic group to another is high. Geographical settings of the groups could also contribute to the differences in consumption practices of vegetables.

A cross-sectional study conducted in Nairobi Metropolis indicated that kales were the most purchased in the region because they were readily available and were considered easy to cook (Lans *et al.*, 2012). Additionally, Kimiywe *et al.*, (2007) found out that consumption of indigenous vegetables in urban and peri-urban Nairobi was low as only 34% of the population consumed indigenous leafy vegetables. The study further reported that the indigenous vegetables were mostly consumed once a month with cowpea leaves being the most consumed (8.2%), followed by amaranth (8.1%). A larger proportion of Teso South Sub-County is rural, and it boasts of both the exotic and indigenous vegetables. Relative to the two studies above, the consumption practices of vegetables in Teso South Sub-County may be different due to the difference in geographical settings.

Results from a cross-sectional study by Wasike *et al.*, (2018), conducted in Busia County revealed that local crops have been perceived as food for the poor, with traditional vegetables termed as inferior to processed foods. This has contributed to low consumption of vegetables with a shift from indigenous to exotic vegetables. Consumption of indigenous leafy vegetables may also vary between urban and rural dwellers. Findings from a study conducted by Gido *et al.* (2017) indicated that rural residents had a notably higher frequency of consumption, approximately four times a week, whereas urban residents consumed about twice a week. The study further reported that the high consumption of vegetables in the rural area was attributed to the high number of the elderly who had a long-term experience with the indigenous vegetables.

While the global consumption of vegetables is generally lower than the WHO recommendation, it is likely to be lowest during the dry season due to lack of rains, prolonged drought, and lack of or limited access to preserved vegetables. Vegetable preservation through the sun-drying technology whenever they are in season is one of solutions to bridging the seasonal gap experienced in vegetable consumption. It could go a long way in diversifying household diets, improving food security, ultimately contributing to improved nutrition status.

In light of the above findings, the health benefits linked to consumption of vegetables don't equate to households' consumption practices. Variations in consumption are majorly influenced by food preference, ethnicity, socio-economic and demographic profiles of households, and geographical locations. The above studies further revealed that geographical locations affected the availability of vegetables, accessibility, type, and perception towards consumption of vegetables. Very little has been documented on the

consumption practices of vegetables in Teso South Sub-County yet it serves as the food basket for Busia County (CIDP, 2018, Ebere et al., 2017). The Sub-County is majorly inhabited by the Iteso, who form the only minority group in the entire formerly Western Province. They are a Nilotic-speaking group located at the border of Kenya and Uganda. Paucity of literature focusing on consumption practices of vegetables among this ethnic group created a gap for this study. The present study sought to assess the attitude and consumption patterns of sun-dried vegetables among households in Teso South Sub-County.

2.2 Vegetable preservation practices

The seasonality of vegetables make it difficult to maintain continuity of their supply. Also, vegetables have high water content which makes them highly perishable. Perishability of vegetables is more prevalent during the rainy season when vegetables are in plenty and it occurs as a result of knowledge gap and lack of preservation facilities (Ayua & Omware, 2013). In order to avoid losses that occur as a result of perishability, different vegetable preservation techniques have been adopted including drying, canning, fermenting, freezing, and salting. Apart from minimizing wastage of vegetables, these preservation techniques also help prolonging the durability of vegetables, enhancing their availability throughout the year.

Like other parts in Western Kenya, Teso South Sub-County experiences one dry and two rainy seasons (CIDP, 2018). The area also experiences extreme vegetable shortage during the dry season, leading to consumption of more starch-based diets. Results from a cross-

sectional study conducted in Teso North Sub-County showed that during the dry season, very little/no vegetables were served except for cowpea leaves with the average portion size of vegetables being 100g per person per day (Ebere et al., 2017). The study further showed that no vegetables were dried during the rainy season for use during the dry season when they were scarce.

In a cross-sectional study carried out in Siaya County, Kenya, Ayua & Omware (2017) found that sun-drying was the most prevalent method of vegetable preservation among farmers, accounting for 45% of the cases, followed by fermentation (32%) and solar drying (13%) as a way of closing seasonal gaps. Solar drying of vegetables was also reported in Nyamira County, with farmers drying vegetables such as cowpea leaves, spider plant, night shade and amaranth (Ongwae, 2015). Sun drying of vegetables is also practiced in Busia, Trans-Nzoia, Mombasa and Uasin-Gishu Counties (Ayua & Omware, 2013).

2.3 Socio-economic and Demographic Characteristics

Socio-economic and demographic characteristics of a population can influence food choices and vegetable consumption is not an exemption (Ricciuto, 2006). Such factors may include age, gender, education level, income, household size, household head etc. Ochieng *et al.*, (2018), in a cross-sectional study conducted in rural Tanzania, found out that there was a significant relationship between education level and attitude towards consumption of solar dried vegetables. Generally, education plays a vital role in decision making, adoption of newer technologies such as solar-drying of vegetables, and food choices.

As people age, they become more sensitive to their food choices in a bid to stay healthy (Khairunnisa *et al.*, 2012). Results from a study involving Moroccan women showed that elderly women consumed a significantly wider variety of vegetables in comparison to their younger counterparts (4.9 v. 4.7, $P=0.032$) (Landais *et al.*, 2015). This was similar to results from a study conducted in France which found out that women aged 60 years and above bought more fresh vegetables than women in their twenties (Marie, 2013). However, the same study found out that age did not affect consumption of processed vegetables. Contrary to these findings, Okello *et al.*, (2015) reported that consumption of sun-dried vegetables in the Kenyan Coastal region was significantly high in households with elderly people.

Income level has also been linked to food choices including vegetable consumption as Middaugh *et al.*, (2012) found out that vegetable consumption increased with income and the two were mediated by nutrition education. The role of nutrition education cannot be overemphasized as it helps consumers make informed food choices, diversify their diets, and improve their nutrient intake. Middaugh's study assumption was that nutrition education influenced the amount of money spent on vegetables purchase. This was supported by Ochieng *et al.*, (2018) who found out that there was a significant relationship ($P < 0.0001$) between gross household income and perception towards consumption of dried vegetables.

Household size and structure has also been found to have an impact on the types of foods consumed as well as their purchasing patterns. According to Ricciuto (2006), a larger household size partly influences food choices including choices to consume dried vegetables. In the dry season, when vegetables are in limited supply, the key decision

maker of a large household may be influenced to purchase cheap carbohydrate-rich foods that have high satiety value in place of vegetables. Women play a key role in food security (Brown, 2011). As per Ochieng et al., (2018), being a female household head was discovered to significantly influence ($p < 0.005$) the decision-making process regarding the consumption of dried vegetables. This is attributed to women's roles in family feeding and food preparation within the household, providing them with a greater likelihood of determining what their families consume.

Socio-economic and demographic factors can also influence activities involving sun drying of vegetables which include construction of protected sun driers as well as preparation of vegetables for sun drying as women tend to be more involved in sun drying of vegetables. This is backed up by Asogwa, et al., (2017), who found out that it was women who were more inclined to vegetable harvesting, processing and preservation. There is limited literature focusing on whether or not socio-economic and demographic characteristics affect consumption of vegetables among households in Teso South Sub-County. Thus, the researcher sought to establish whether socio-economic and demographic factors influence consumption of sun-dried vegetables among households in Teso South Sub-County.

2.4 Attitude towards sun-dried vegetables

Adopting new practices such as sun-drying of vegetables as well as their consumption may depend on how both practices are regarded by the target population. It also depends on whether or not community-based nutritional outreaches regarding preservation of vegetables have been conducted in the target areas since such outreaches may help in

enhancing the community's perception on vegetable preservation and consumption. Results from a study conducted in Northern Tanzania by Kansiime *et al.*, (2017), showed that prior to community-based outreaches, indigenous vegetables were hardly consumed in the region as they had been perceived as poor man's food. Nevertheless, heightened awareness of the nutritional benefits resulted in a deliberate increase in the consumption of indigenous vegetables by households. Approximately 98% of women and 78% of men reported initiating the consumption of indigenous vegetables. Nightshade, amaranth, sweet potato leaves, pumpkin leaves, spider plant, and Ethiopian mustard emerged as the most frequently consumed and preferred indigenous vegetables.

Another factor affecting attitude towards sun-dried vegetables was the quality, encompassing aspects such as nutritional value, hygienic conditions, and the sensory attributes. People are likely to consume dried vegetables when they are as green as the fresh ones, tasty with an appealing color. Findings by Ochieng *et al.*, (2018) revealed that 60.4% of the participants consumed dried vegetables because they were hygienically dried and packaged. Also, 47% of the participants reported that they consumed dried vegetables because they believed dried vegetables had nutritive value which was important in strengthening the immunity of the body while 26.8% pointed out that the color of the dried vegetables was considerably good (Ochieng *et al.*, 2018).

Results from a study by Mugande (2015), also showed that perception regarding consumption of sun-dried vegetables was highly influenced by preference. More than 50% of the participants reported that they had never consumed dried vegetables as they preferred fresh vegetables to fresh vegetables. Freshness of vegetables was associated with high nutritive value, hence drawing conclusions that they perceived dried vegetables to be less

nutritive. The respondents also considered appearance, uniqueness and color of the dried vegetables as well as vegetables locally grown (Mugande, 2015). The color aspect was also looked into by a study conducted by Okello *et al.*, (2015), who reported that consumers in Coastal Kenya who were more conscious about the color of vegetables were not willing to buy sun-dried vegetables as they appeared brownish due to open sun-drying technique used.

Additionally, results from the same study by Mugande (2015), also showed that the act of sun-drying vegetables was hardly practiced as majority of the respondents reported that it was time costly and not so necessary because fresh vegetables were always available throughout the year. This is similar to results from a study by Ayua & Omware (2013), which revealed that even though sun-drying of vegetables was practiced by 45% of the respondents, it was perceived to be time consuming as vegetables took several days to completely dry up. The prolonged sun-drying duration resulted to poor quality sun-dried vegetables as they turned brown in color and smelly (Ayua & Omware, 2013).

Results from a study focusing on indigenous traditional plants conducted in South Africa, showed the superiority of AIVs in energy supply, enhanced immunity, and health promotion (Van der Hoeven *et al.*, 2013). As a result, during the rainy season, indigenous vegetables were sun-dried and stored in sacks for use during the dry season. Sun-drying of vegetables was the most popular in the study area since it was cheap and convenient compared to other preservation methods such as refrigeration and freezing. Participants also regarded vegetables as more nutritious than meat hence very crucial to them (Van der Hoeven *et al.*, 2013).

Consumption of sun-dried vegetable largely depends on how they are perceived by individuals as well as their willingness to sun-dry vegetables. A positive perception and attitude towards sun-drying of vegetables could result to more consumption of sun-dried vegetables. There is limited literature focusing on people's perceptions and attitude towards sun-drying vegetables as well as consuming them, forming the gap for this study. The study seeks to assess perception and attitudes with regards to sun-drying of vegetables and their consumption among farm households in Teso South Sub-County, Kenya.

2.5 Consumption patterns of sun-dried vegetables

Consumption of sun-dried vegetables varies across countries as well as households. Gadaga *et al.*, (2007) in a study conducted in Zimbabwe found out that consumption of sun-dried vegetables was more pronounced among low-income households with 65.6%, 47.9% and 44.5% of low, middle and high-income households consuming sun-dried vegetables at least once a month. The study also found out that 66% of the surveyed households sun-dried their own vegetables at home. Results from a study conducted in Rural Tanzania indicated that households mostly consumed sun-dried vegetables 2-3 times a week (Ochieng *et al.*, 2018). This was attributed to drought as well as high level of awareness of sun drying of vegetables. Nguni & Mwila (2007), in a study conducted in Zambia, reported that 50% of households consumed both sun-dried and fresh vegetables in equal measures. This was attributed to knowledge and the positive perception people had on the nutritional value of dried vegetables. Findings from the same study revealed that certain participants were aware of the nutrient depletion caused by sun drying and understood methods to offset these losses.

Sun-dried cowpea leaves were also found to be occasionally consumed in Coastal Kenya (Okello *et al.*, 2015). This was majorly influenced by the taste of the sun-dried cowpea leaves after cooking in coconut milk. Taste is one of the inter-personal factors affecting consumption of vegetables as well as other foods in general. The more delicious the food, the higher the likelihood of consumption. Okello *et al.*, (2015) further reported that apart from taste, consumption of sun-dried vegetables was also influenced by familiarity with the sun drying technology. Most people shunned from eating frozen vegetables because they were unfamiliar with the technology. Results from a study conducted in Western Kenya by Tumwet *et al.*, (2014) indicated a rare intake of sun-dried vegetables during the dry season due to the availability of other options such as wild weeds.

Consumption of sun-dried vegetables is very important as it could go a long way in enriching diets as well as preventing micronutrient deficiencies occurring as a result of inadequate consumption of vegetables especially during the dry season. However, there is a scarcity of literature on the consumption patterns of sun-dried vegetables, highlighting the need for this study. It is impossible to generalize the findings of other studies to Teso South because the sub-county is known to be the food basket for Busia County. A large proportion of vegetables sold in Busia town, the headquarters of Busia County, are sourced from Teso South Sub-County. This necessitated the need to investigate if the vegetables produced generously are sun-dried for consumption during the dry season.

2.6 Factors influencing consumption patterns of sun-dried vegetables

Consumption patterns of sun-dried vegetables may be influenced by several factors including dietary habits, knowledge on nutritional value of sun-dried vegetables, beliefs, perceptions, attitudes among others (Lans *et al.*, 2012). Findings from research carried out

in rural Tanzania indicated that awareness of the availability of dried vegetables played a crucial role in their consumption (Ochieng *et al.*, 2018). All participants (100%) were familiar with sun-dried vegetables, as the practice of sun-drying vegetables directly in the sun had been a traditional method within the community to improve food security among households. Sun drying of leafy vegetables was particularly prevalent after the rainy season, when household members would harvest vegetables from their farms, sun-dry them, and store for use during leaner periods. Similar findings were reported by Okello *et al.*, (2015) who indicated that awareness of the sun drying technique contributed to the occasional consumption of sun-dried cowpea leaves among households in Coastal Kenya. Nguni & Mwila (2007), in a study conducted in Zambia, found out that 50% of households cooked both fresh and sun-dried vegetables because women had knowledge of 2-4 preparation methods of both kinds of vegetables. These findings are similar to the findings of Ochieng *et al.*, (2018), who also reported that consumption of dried vegetables in Rural Tanzania was attributed to the easiness of preparation methods of dried vegetables.

The Theory of Planned Behavior (TPB) emphasizes the importance of a person's perception towards change in behavior. How a population perceives sun-dried vegetables will determine whether or not they will consume sun-dried vegetables. This is not far from what Ochieng *et al.*, (2018) found out, that perception of rural inhabitants towards dried vegetables greatly influenced its consumption. In their study, 45% of participants perceived sun-dried vegetables as nutritious, crucial for boosting the body's immunity. Gupta *et al.*, (2013), stated that the green color in dried vegetables signifies chlorophyll's presence, indicating the retention of nutrients even after drying. Approximately 26.8% of households surveyed in the study emphasized that vegetables which retained their green color after sun

drying were as nutritious as fresh ones (Ochieng et al., 2018). Brumfield et al., (1993) asserted that taste plays a critical role in influencing the consumption of dried vegetables. Results from a study in Rural Tanzania by Ochieng *et al.*, (2018) found out that dried cowpea leaves were commonly consumed because they didn't taste any different from fresh cowpea leaves. Similarly, in Coastal Kenya, occasional consumption of dried cowpea leaves was linked to its appealing taste which was enhanced by adding coconut milk (Okello *et al.*, 2015)

Dried vegetables can be declined by a population due to quality as Fabre & Mihailov (2003), found out that sun-dried vegetables may be of unsatisfactory quality. Depending on conditions under which vegetables were prepared and sun dried, they may be dusty and may contain stones, sand and other foreign particles. The quality could also be compromised if the vegetables sun-dried were of poor quality e.g. bruised, discolored, not fresh, not ready for harvesting, too old to be harvested etc. Normally, the quality of a final product majorly depends on the quality of the raw materials used, and vegetables are not any different. Lastly, depending on the weather, sun drying of vegetables may take up to three days. This could be a hindering factor to sun drying of vegetable due to inconveniences caused. As Berinyuy & Fonten (2011) posit, vegetables that take days to completely dry up are often unattractive and smelly. Once sun-dried vegetables are found to be unpleasant, there is a likelihood that they won't be consumed. This could be improved by using advanced drying methods such as solar drying.

Sun-dried vegetables can be consumed or not depending on several factors which may positively or negatively influence their consumption as they have been described in this section. However, there is limited literature focusing on factors influencing consumption

patterns of sun-dried vegetables in the study area, creating the gap for this study. The researcher seeks to find out factors influencing consumption of sun-dried vegetables in Teso South and how they relate to what other studies have found out. It was impossible to generalize findings of studies carried out in other areas to Teso South due to cultural differences, beliefs and the geographical setting of the sub-county, which could play a significant role in influencing consumption of sun-dried vegetables.

2.7 Summary

Studies reviewed in this section provided information on the socio-demographic characteristics in relation to consuming sun-dried vegetables, attitude, consumption patterns, and factors influencing consumption of sun-dried vegetables across different settings. However, there were limited studies that reflected the enlisted variables in Teso South. Due to cultural differences, beliefs and geographical setting of Teso South, there was need to investigate the variables in the context of Teso South Sub-County and compare the results with findings of studies reviewed.

CHAPTER THREE: METHODOLOGY

3.1 Study area

The study was carried out in Teso South Sub-County, Busia County, Kenya. The sub-county was purposively selected since the present study was a follow-up of the EaTSANE project's TIPs activities that involved sun-drying of vegetables. Teso South Sub-County lies between latitude 0° and 0° 45 north and longitude 34° 25 East and covers an area of 299.6 square kilometers (CIDP, 2018). It has an estimated population of 168,116 people (KNBS, 2019). The Sub-County is divided into 6 wards namely: Amukura East, Amukura Central, Amukura West, Angorom, Chakol South and Chakol North. Settlement patterns in the Sub-County are determined by soil fertility, availability of productive resources including land and level of economic development such as urbanization and location of industry. It is majorly inhabited by the Iteso ethnic group and predominantly depends on agriculture as the main economic activity with main crops produced including maize, beans, groundnuts, finger millet, sorghum, bananas, sweet potatoes, green leafy vegetables among others. Teso South Sub-County also produces cash crops such as sugarcane, tobacco and cotton and also engages in livestock farming. The soils are majorly sandy loam and dark clay, which makes it suitable for both food and cash crop farming. It receives annual rainfall of between 760mm and 2000mm. The annual mean maximum temperatures range between 26°C and 30°C while the mean minimum temperatures range between 14°C and 22°C (CIDP, 2018). Since vegetables are seasonal, their production as well as consumption in Teso South Sub-County is greatly influenced by rain patterns. During the rainy season, a wide variety of vegetables become available, with a few such as amaranth, jute mallow, black jack etc. growing on their own. On the other hand, the supply of vegetables during the

dry season is low due to water scarcity and high costs of vegetable production which contributes to hiked vegetable prices across markets. Dried vegetables are mostly used during the dry season when fresh vegetables are limited in supply.

3.2 Study design

The study design utilized is descriptive cross-sectional. This is a point prevalence study in which data is collected from the study group at a single time point, with the participants chosen according to targeted criteria or parameters. This type of study aims to describe existing attributes of a population and can offer insights into potential associations or provide initial information to aid in additional study research and trials (Cherry, 2019). Mixed research method was helpful in eliciting more insights about the study problem. According to Ngoepe and Van der Walt (2010), mixed methods enhance the quality and reliability of the study because the approach facilitates confirmation of findings, provides an in-depth understanding of the study variables, provides exhaustive results, and increases validity. Pertaining to this research, data generated from the panel group discussions were triangulated with the quantitative data gathered using questionnaires.

3.3 Study population

The subject group of interest for this study were women from the TIPs and non-TIPs households of the EaTSANE project. Women were considered as participants for this study since they were the ones who were actively involved in most of the activities that involved sun-drying of vegetables during the TIPs. The TIPs households consisted of participants who were introduced to the sun drying technique during the TIPs conducted within the EaTSANE project in 8 villages in Teso South Sub-County. On the other hand, the non-TIPs

households consisted of participants from households within 8 villages in close proximity to each of the villages that participated in TIPs but were not involved in the project activities.

3.3.1 Inclusion criteria

- i. Participants from households within the eight villages that were involved in the EaTSANE project activities that included sessions on sun drying of vegetables. The comparison group were drawn from households from 8 villages in close proximity to each of the villages that participated in TIPs but were not involved in the sun drying technology
- ii. Only participants who consented to take part in the study were involved in the interviews and focus group discussions.

3.3.2 Exclusion criteria

- i. Participants who were lost to follow up thus not able to provide reliable information as required by the research.

3.4 Sample size determination

The sample size for the study was calculated based on the formulae by Yamane (1967):

$$n = \frac{N}{1+N}$$

where:

n - Sample size

N - The size of the population of Teso South Sub-County (KNBS, 2019)

e - Margin of error $\pm 10\%$

n

n = 100

3.5 Sampling procedure

Study subjects were selected through a sequential sampling approach. At the outset of the selection phase, Teso South Sub-County was selectively chosen following the sun-drying technology that was introduced through the TIPs sessions carried out within the EaTSANE project activities in the sub-county in 2019. The second stage involved purposive sampling of 8 villages in which the TIPs activities involving sun-drying of vegetables were carried out (TIPs villages), as well as 8 villages in close proximity to each of the villages that participated in TIPs but were not involved in the project activities (non-TIPs villages). The next stage involved sampling of the targeted households, where the TIPs and non -TIPs households were selected using purposive and systematic sampling methods respectively. The sampling procedure applied during the study is summarized in Figure 2 below:

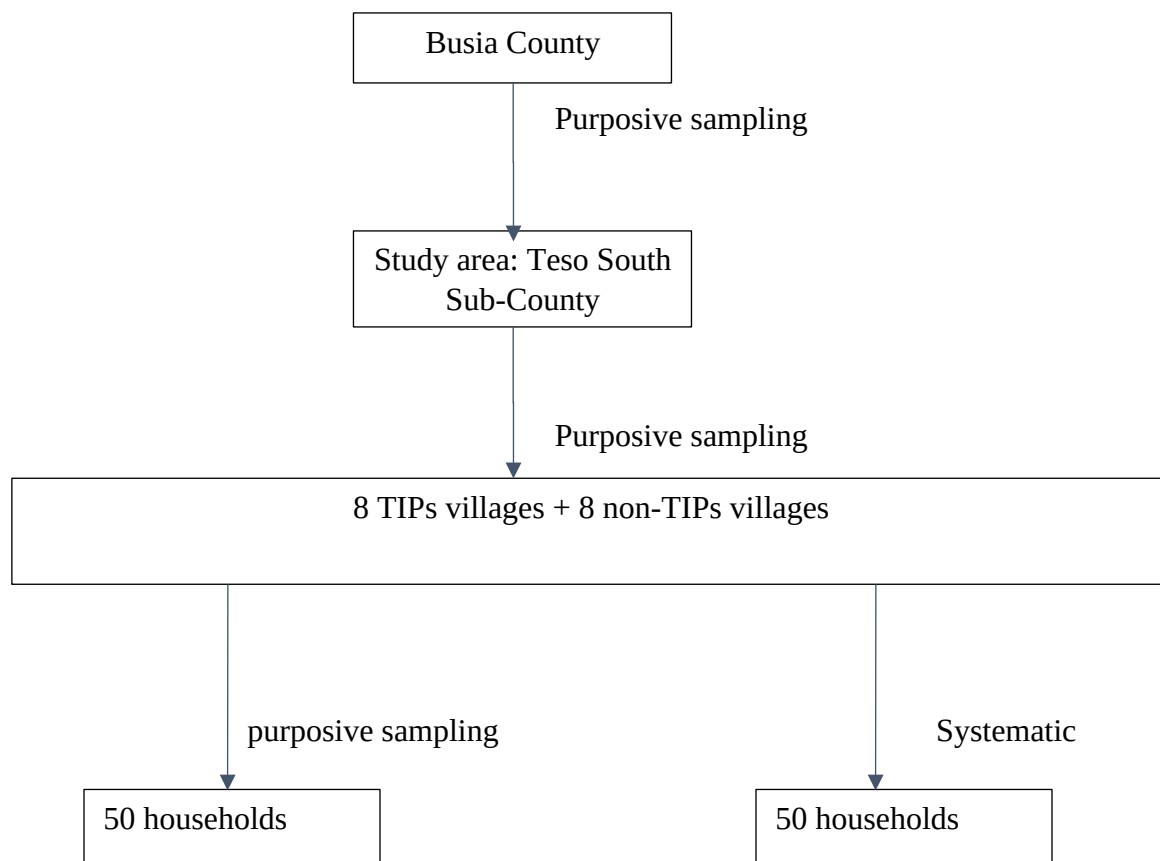


Figure 3.1: Sampling technique process flowchart

3.6 Data collection tools

The study collected information using a combination of approaches, including a semi-guided questionnaire and a targeted group discussion, that enabled collection of qualitative and quantitative information respectively. The data survey instruments are explained in the section below:

3.6.1 Semi-guided questionnaire

The attributes of the study subjects such as their age, gender, relationship status, household head, academic attainment, occupation, source of income, and size of household unit were

gathered using semi-guided questionnaires. Additional details on sun-drying and consumption patterns of sun-dried vegetables were also gathered. These questionnaires were again utilized in obtaining data on the attitude towards sun-dried vegetables among participants. The questionnaire developed was converted into XLS format which was later uploaded onto the Open Data Kit (ODK) software. This ODK source set was downloaded from Google Play Store and installed on android-based tablets to facilitate information gathering through interviews. Research assistants aided in conducting the interviews in the language best understood by the participants, which consisted of Swahili and Ateso. 104 participants were interviewed and the information gathered was verified by the researcher while in the field for quality control purposes.

3.6.2 Focus Group Discussions Guide

FGDs were mainly used for purposes of completing and confirming data collected using interviews. Whereas interviews were used to explore participants' personal views and experiences regarding sun drying and consumption of sun-dried vegetables, FGDs were used to corroborate the findings already gathered. The guide was developed based on the findings gathered through interviews and subjects were requested to share their perspectives about the same. The FGDs were conducted in four TIPs villages and four non-TIPs villages and consisted of women who took part in the interviews. The number of participants in each FGD ranged between 8 and 12 and the discussions were facilitated by a moderator who kept the discussion on track and a note taker who documented what was discussed. The FGDs were conducted in Swahili and/or Ateso which is the local dialect of the Iteso community and were recorded for transcription purposes.

3.6.3 Recruitment and training of enumerators

The researcher selected and instructed four individuals with knowledge and experience on nutrition to serve as enumerators, providing them with training on the study's goals and objectives. The training focused on the administration of questionnaires, the use of ODK for data collection as well as ethical issues in research. With regard to the FGDs, enumerators were trained on the principles of FGDs and roles of the moderator and note-taker.

3.6.4 Pre-testing of the questionnaires

Before gathering information, the developed questionnaire was pre-tested in one village (Amerikwai) which was not part of the 16 sampled villages for the study. The pre-test involved two household interviews per research assistant together with the researcher, amounting to 10 households. The pre-test was helpful in determining whether or not respondents were able to interpret questions correctly. Also, it was helpful in finding out if the questions were able to elicit responses that could enable data analysis. The pre-test was followed by a feedback session from the enumerators and necessary adjustments were made on the questionnaire for the actual data collection.

3.6.5 Validity

Validity refers to an instrument's capacity to accurately measure its intended target (Mugenda & Mugenda, 2003). Mixed methods used to ensure validity of the data where the researcher combined both interviews and focus group discussions in data collection. According to Lambert & Loiselle (2008), when individual interviews and focus group discussions are used together in a study, data obtained by either of the methods corroborates

data acquired by the other method. This significantly contributes to the completeness of data hence facilitating a thorough comprehension of the phenomena under investigation. The investigator also ensured validity of the data by carrying out a pre-test of the questionnaire. Hilton (2017) posits that pre-testing of questionnaires prior to the actual data collection is a crucial stage as it ensures that valid data is gathered. It helps in the selection of the most suitable questions and refining of the questionnaire to enhance data quality. Additionally, validity of qualitative data was ensured by audio-recording the focus group discussions which allowed repeated revisiting of the data to check on emerging themes..

3.6.6 Reliability

Reliability pertains to the stability a tool exhibits when used in comparable situations (Mugenda & Mugenda, 2003). Ensure reliability, the researcher shared the transcribed notes of the focus group discussions with research colleagues who are experts in the evaluation of qualitative data. The experts generated topics which were compared with the themes developed by the researcher. Themes which were found to be similar to the researcher's were adopted while the varying ones were harmonized into common themes.

3.7 Logistical and ethical considerations

Permission to collect data was first requested from Masinde Muliro University of Science and Technology (MMUST) Directorate of Post Graduate Studies, followed by MMUST's Institutional Research Ethics Committee (IREC). Afterwards, clearance to proceed with the study was provided by the National Commission for Science, Technology and Innovation (NACOSTI) and the County Commissioner, Busia County as well as the local administration in the study area. Prior to conducting interviews and FGDs, the study

subjects were requested for their oral and written approval after being briefed on the study's objectives, anticipated time, study's protocols and processes; rights to opt out or withdraw, expected risks and discomforts; anticipated benefits, inducements, and liaison contact for inquiries. To ensure privacy and confidentiality of participants, households were assigned identity numbers that varied among the households and villages. The study was conducted amidst the SARS-CoV-2 health crisis period. So as to adhere to the rules and guidelines set by the Ministry of Health to control the spread of the coronavirus, the interviews and FGDs were conducted outside while observing social distance of 1.5m, wearing face masks and using sanitizers.

3.8 Data preparation and analysis

Verified data collected using the ODK collect application were downloaded on a daily basis and converted from CSV file to SPSS to facilitate analysis. Data was cleaned and thereafter grouped based on whether the respondents participated in the TIPs activities that involved sun-drying of vegetables or not. The analyses of data gathered through interviews utilized the Statistical Package for Social Sciences (IBM SPSS 25.0). Statistical description including averages, proportions, and rates and ratios described the socio-economic and demographic characteristics of the participants as well as consumption patterns of sun-dried vegetables. Deductive analysis like Chi-square tests, correlations and binary logistic models aided in establishing factors influencing consumption patterns of sun-dried vegetables.

Qualitative data collected through FGDs was thematically analyzed. According Kiger & Varpio (2020), thematic analysis refers to methods used to assess descriptive data, which

involves the identification, analysis and reporting of repetitive patterns. Thematic analysis seeks to understand the study participant's experiences, thoughts and behaviours. Prior to analysis, all the audio records were transcribed to text format. This was followed by coding which involved highlighting phrases and coming up with codes to describe their content. Related codes were then combined to develop themes which were reviewed over and over to ensure that they are accurate representations of the data. Lastly, the themes developed were defined and written in a narrative format accompanied by excerpts from participants. A synopsis of data analysis is shown in the Table 3.1 below.

Table 3.1: Summary of the Data Analysis

Objective	Data analysis	Data presentation
1. To determine the social, economic, and demographic attributes of households in Teso South Sub-County, Kenya	Descriptive statistics: averages, proportions, rates, and ratios	Tabulations and bar graphs
2. To assess the attitude towards solar-dried vegetables among homes in Teso South Sub-County, Kenya	Descriptive statistics: means, frequencies and percentages Inferential statistics: Independent t-test, binary logistic regression Thematic analysis	Tables Themes accompanied by excerpts
3. To assess the consumption patterns of solar-dried vegetables among households in Teso South Sub-County, Kenya	Descriptive statistics including frequencies and percentages Thematic analysis	Tables, graphs Themes accompanied by excerpts
4. To determine factors affecting consumption trends of solar-dried vegetables among households in Teso South Sub-County, Kenya	Descriptive statistics: means, proportions, rates, and ratios Inferential statistics including Chi-square tests, Spearman Correlations, and binary logistic regression Thematic analysis	Tables, graphs Themes accompanied by quotes from participants

CHAPTER FOUR: RESULTS

4.0 Introduction

This section outlines the study's results derived from data collected in alignment with the purpose of the study. It provides a detailed description of participants' demographic and socio-economic characteristics, compares the consumption patterns of sun-dried vegetables among the TIPs and non-TIP households, describes factors that were found to be influencing consumption patterns of sun-dried vegetables as well as participants' attitude towards sun-dried vegetables. Tables, pie charts and bar graphs are some of the methods used for data presentation in this section, coupled with the discussion of motifs discovered from the thematic evaluation of qualitative information gathered through focus group discussions. P-values equal to 0.05 were considered to be statistically significant for the inferential statistics carried out including chi-square tests.

4.1 Questionnaire respondent rate

The number of participants involved in the study was 100 households, of which 50 included TIPs participants who had been introduced to the sun-drying technology and the other 50 representing the non-TIPs households. While data was collected from 100 respondents, data from one of the TIPs participants was dropped since the respondent was male, hence considered an outlier. Therefore, data for 99 respondents was analyzed, representing 99% respondent rate.

4.2 Focus group discussions

Eight FGDs were conducted in eight villages. Four villages took part in the EaTSANE Project TIPs activities that involved sun drying of vegetables. The other four villages were

in close proximity to the TIPs villages, but were not involved in the TIPs activities. Out of the 58 expected participants, 53 showed up for the discussions, 25 from the TIPs villages and 28 from the non-TIPs villages. Only women who took part in the interviews were involved in the focus group discussions due to their active involvement in meal preparations for families.

4.3 Demographic and socio-economic characteristics of the study participants

The social, economic, and demographic attributes of the study subjects are presented in the subsections below, with each characteristic reflecting comparison between TIPs and non-TIPs participants. Of the 99 participants involved in the research, 49% (n = 49) were TIPs participants while 50% (n = 50%) were non-TIPs participants.

4.3.1 Age of the Respondents

4.3.2 TIPs participants ranged from 23-79 years, with the mean age of 36.82 ± 11.56 years. Among the non-TIPs participants, the age ranged from 21-66 years with the mean age of 34.94 ± 10.94 years. The majority of respondents for both the TIPs and Non-TIPs participants were aged between 30-39 years, i.e., 40.8% (n=20) and 46% (n=23) respectively. The distribution of respondents by age is as shown in Figure 4.1.

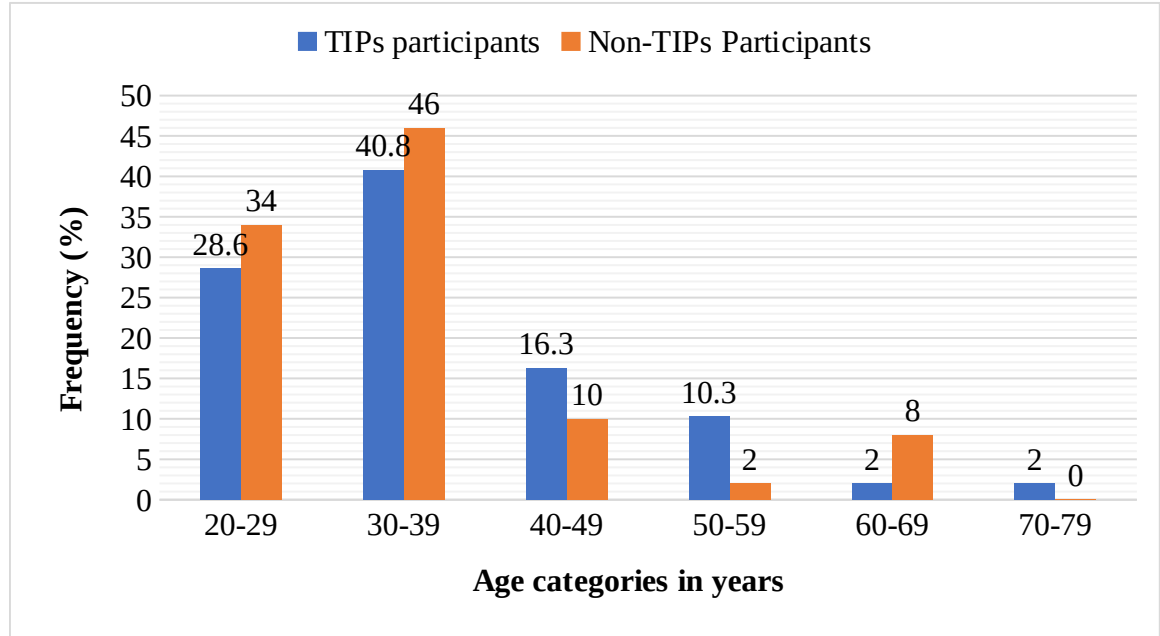


Figure 4.1: Distribution of Respondents by Age

4.3.2 Marital Status of Respondents and Gender of the Household Head

Regarding the marital status, nearly all TIPs (91.8%, n=45) and non-TIPs participants (86%, n=43) were married. In both groups, TIPs participants (n=49) and comparison group (n=50), households were mainly headed by men (87.8%, n=43 and 86%, n=43 respectively) and less by women (12.2%, n=6 and 14%, n=7 respectively). A summary of the above characteristics is provided in Table 4.1.

Table 4.1: Marital Status of Respondents and Sex of the Household Head

TIPs Participants				Non-TIPs Participants	
		Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Marital status	Married	45	91.8	43	86.0
	Widowed	4	8.2	3	6.0
	Separated	0	0.0	2	4.0
	Single	0	0.0	2	4.0
Sex of household head	Male	43	87.8	43	86.0
	Female	6	12.2	7	14.0

4.3.3 Main Occupation of Respondents and Household Heads

The main occupation varied among respondents and included farming of crops, mixed farming, business, casual labor, and wage employment, Table 4.2. However, for both the TIPs (46.9%, n=23) and Non-TIPs (36%, n=18) participants, crop farming was the predominant occupation, followed by business (24.5%, n=12 and 30% n=15). While crop farming was the predominant occupation for TIPs respondents, casual labor (30.6%, n=15) and business (20.4%, n=10) were the most common occupations among their household heads. A similar trend was also observed among the non-TIPs household heads, where business (28%, n=14) and casual labor (26%, n=13) were the most common occupations. Unlike the respondents, 18.4% (n=9) and 18% (n=9) of the TIPs and non-TIPs participants were formally employed.

Table 4.2: Main Occupation of Respondents and Household Heads

Participants		TIPs		Non-TIPs Participants	
		N	%	N	%
Main occupation of respondents	Crop farming	23	46.9	18	36.0
	Mixed Farming	8	16.3	8	16.0
	Business	12	24.5	15	30.0
	Casual labor	4	8.2	5	10.0
	Wage employment	0	0.0	1	2.0
	None	2	4.1	3	6.0
Main occupation of household heads	Crop farming	9	18.4	7	14.0
	Mixed farming	4	8.1	3	6.0
	Business	10	20.4	14	28.0
	Casual labor	15	30.6	13	26.0
	Wage employment	9	18.4	9	18.0
	None	2	4.0	4	8.0

4.3.4 Education Level of Respondents

The distribution of respondents' education level is as shown in Figure 4.2. Majority of the respondents from both the TIPs (61.2%, n=30) and non-TIPs (56%, n=28) did not complete primary education. Further, secondary education was attained by only 6.1% participants from both TIPs and non-TIPs households. Tertiary education was also achieved by only 6% of participants from both groups.

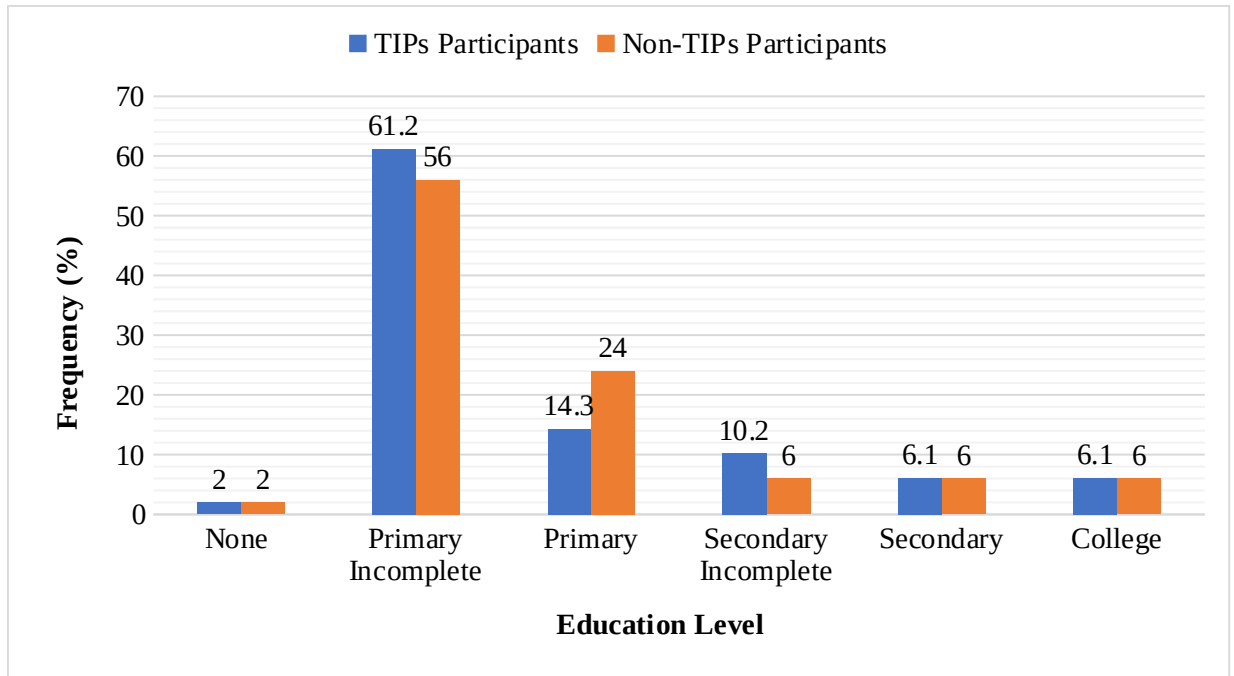


Figure 4.2: Distribution of the Respondents' Education Level

4.4 Attitude towards Sun-dried Vegetables

Figure 4.3 provides the descriptive statistics for the questions linked to participants' attitude towards sun-dried vegetables. Participants' attitude towards sun-dried vegetables was gauged by assessing their thoughts on the importance of incorporating sun-dried vegetables into family meals, their likelihood to recommend sun-dried vegetables to others, and the efforts required to sun-dry and cook the dried vegetables. Nearly all TIPs (81.6%, n=40) and less than half of the non-TIPs (30%, n=15) strongly agreed that it was important to include sun-dried vegetables into their family meals. Further, majority of the TIPs (77.6%, n=38) participants strongly agreed to recommend consumption of sun-dried vegetables to others, while 36% (n=18) of the non-TIPs participants were not sure. Regarding the efforts required to sun-dry vegetables, nearly half 40.8% (n=20) of the TIPs participants strongly agreed that sun-drying vegetables was easy, while 30.6% (n=15)

agreed that the practice was easy. Among the non-TIPs participants, nearly half (46%, n=23) neither agreed nor disagreed that sun-drying of vegetables is an easy practice. Further, most (71.4%, n=35) TIPs participants strongly agreed that it is easy to prepare sun-dried vegetables while 46% (n=23) of the non-TIPs participants found it neither easy nor not easy.

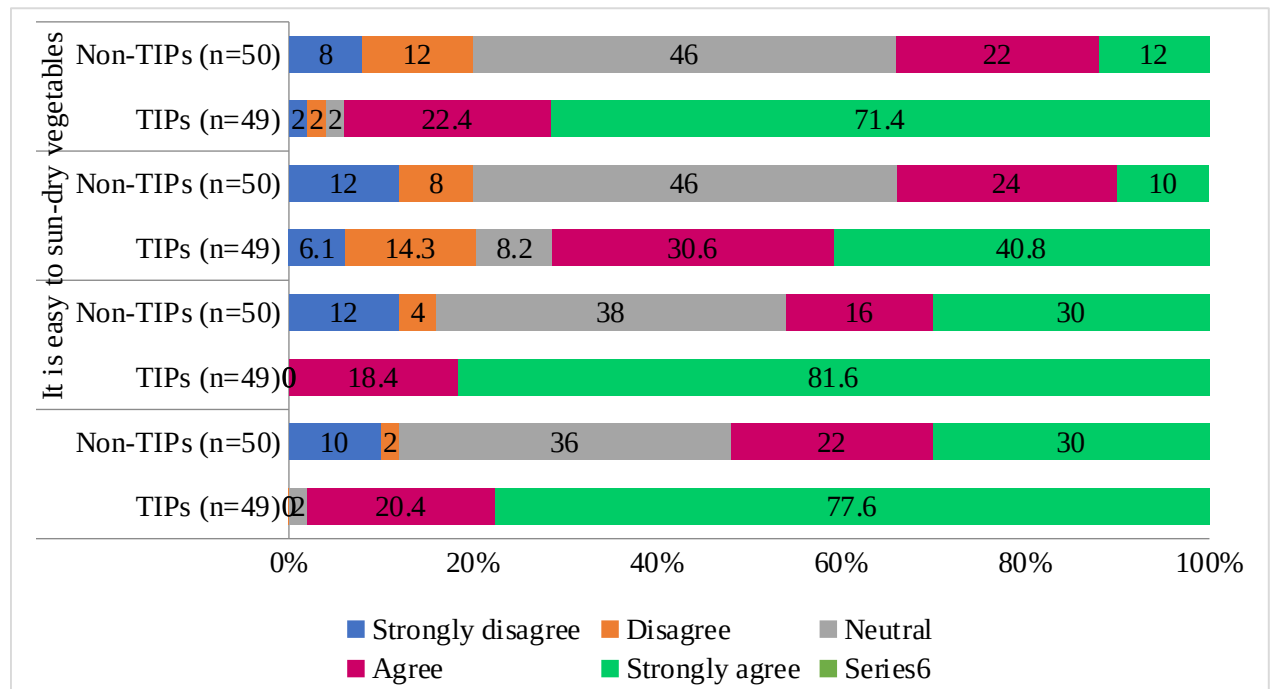


Figure 4.3: Attitude towards Sun-dried Vegetables

Since only the TIPs participants consumed sun-dried vegetables, they were further grouped into consumers (79.6%, n=39) and non-consumers (20.4%, n=10) and descriptive statistics for the Likert scale items above conducted, Figure 4.4. Based on the figure below, majority (74.4%, n=29) of the consumers strongly agreed that they would recommend sun-dried vegetables to others while 82.1% (n=32) strongly agreed that it was important to include sun-dried vegetables in family meals. Similarly, almost all (90%, n=9) and 80% (n=8) of the non-consumers strongly agreed that to recommend sun-dried vegetables to others and

that it was important to include them in family meals. Also, most (71.8%, n=28) consumers and 70% (n=7) of the non-consumers strongly agreed that it was easy to prepare sun-dried vegetables.

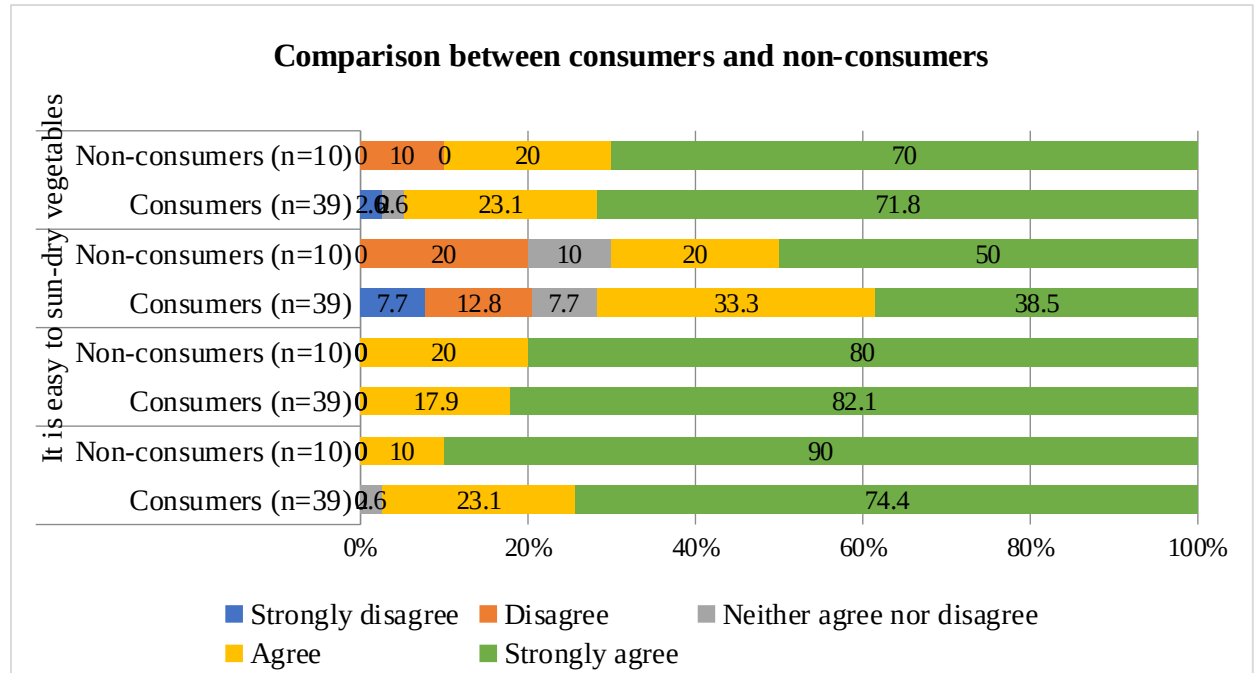


Figure 4.4: Comparison in attitude between Consumers and Non-consumers

4.4.1 Attitude Scores

The descriptive statistics associated with participants' attitude scores towards sun-drying and consumption of sun-dried vegetables are presented in Table 4.6. Participants were asked four questions which were geared towards establishing their attitude towards sun-drying as well as consumption of sun-dried vegetables. The questions were presented on a five-point Likert scale with ranges of 0 – 4 hence attitude scores ranged from 0 – 16. Participants who scored below the mean attitude score of 8.0 were classified as having a negative attitude, while those who scored above the mean attitude score were classified as having a positive attitude. The mean attitude scores between the TIPs and non-TIPs

participants as per the independent t-test analysis were 14.02 ± 2.04 and 9.38 ± 3.25 respectively. The t-test results further showed that the difference in means between the two groups was statistically significant ($p = .000$) at both 0.05 and 0.01 levels. Computation of the attitude scores revealed that all (100%, $n=49$) TIPs participants and majority (84%, $n=42$)) had a positive attitude towards sun-dried vegetables, Data collected through the FGDs also echoed a positive attitude towards sun-drying and consumption of sun-dried vegetables.

“I have never eaten sun-dried vegetables, but I would love to taste.” (FGD Obekai B)

“I think sun-drying vegetables is a good thing. I can sun-dry in plenty and even attempt to sell during the dry season because I am sure some people will buy. If people eat arrow root leaves due to vegetable scarcity, how about sun-dried vegetables like cowpea leaves? They will buy and eat.” (FGD Obekai A)

“Having sun-dried vegetables brings a sense of security. If I don’t know what to cook or time doesn’t allow me to look for vegetables, I just cook the sun-dried vegetables available in the house.”(FGD Olupe)

Table 4.6: Descriptive statistics for Attitude Scores

	n	Mean	Std. Deviation	CI 95%
TIPs participants	49	14.02	2.04	8-16
Non-TIPs participants	50	9.38	3.26	4-16

A Chi-square test of independence was performed to evaluate the relationship between attitude towards sun-dried vegetables and awareness of the sun-drying practice. The relationship between these two variables was significant, $X^2(4), N = 99 = 11.6, p = .001$. Those who had ever heard, seen or learnt about the sun-drying practice were likely to have a positive attitude towards the sun-dried vegetables.

Further, a binary logistic regression was used to ascertain the strength of the relationship between attitude towards sun-dried vegetables and awareness of the sun-drying practice. The logistic regression model was statistically significant, [$X^2(4) = 13.5, p < .009$]. The model also correctly explained 29.6% of the variation in the attitude towards sun-dried vegetables (Nagelkerke R^2) and correctly classified 91.9% cases of a positive attitude. Model estimates suggested that participants who had ever heard, seen, or learnt about sun-drying of vegetables 4 times more likely to exhibit a positive attitude towards sun-dried vegetables.

4.5 Consumption Patterns of Sun-dried Vegetables among Households

This section presents findings on the types of sun-dried vegetables consumed, sources and frequency of consumption of sun-dried vegetables.

4.5.1 Types of Sun-dried Vegetables Consumed

Throughout the year 2020, majority (79.6%, n=39) of the TIPs participants consumed sun-dried vegetables, with zero consumption among the non-TIPs participants. Quite a number of sun-dried vegetables were consumed, with notable variations across seasons. The sun-dried vegetables consumed included cowpea leaves, amaranth, night shade, pumpkin leaves, jute mallow, kales, cabbages, sun hemp, and tomatoes. Sun-dried cowpea leaves (34.7%, n=17) was the most consumed vegetable among TIPs participants between January and March, followed by 20.4% (n=10) 38.8% (n=19) and 32.7% (n=16) between April and May, June and August and September and December, respectively. The distribution of vegetables consumed across the year is shown in Figure 4.5.

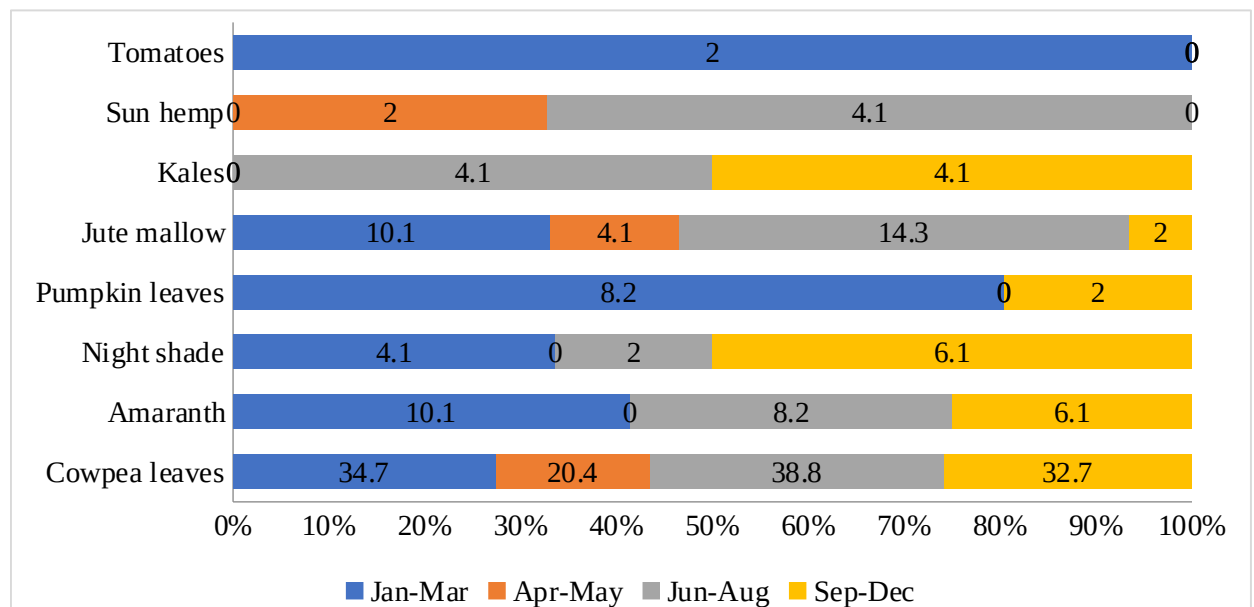


Figure 4.5: Distribution of Sun-dried Vegetables Consumed

Even though consumption of sun-dried vegetables was only reported among the TIPS participants, both groups mentioned their preferred sun-dried vegetables. For instance, among the TIPS households, the top five preferred sun-dried vegetables were cowpea leaves (98% n=48), jute mallow (42.9% n=21), black night shade (36.7% n=18), sun hemp (24.5% n=12), and amaranth (14.3% n=7). Among the non-TIPS participants, the five most preferred sun-dried vegetables included cowpea leaves (90% n=45), black night shade (36% n=18), jute mallow (32% n=16), amaranth (28% n=14), and kales (20% n=10). The distribution of sun-dried vegetables for the TIPS and non-TIPS participants is presented in Figure 4.6.

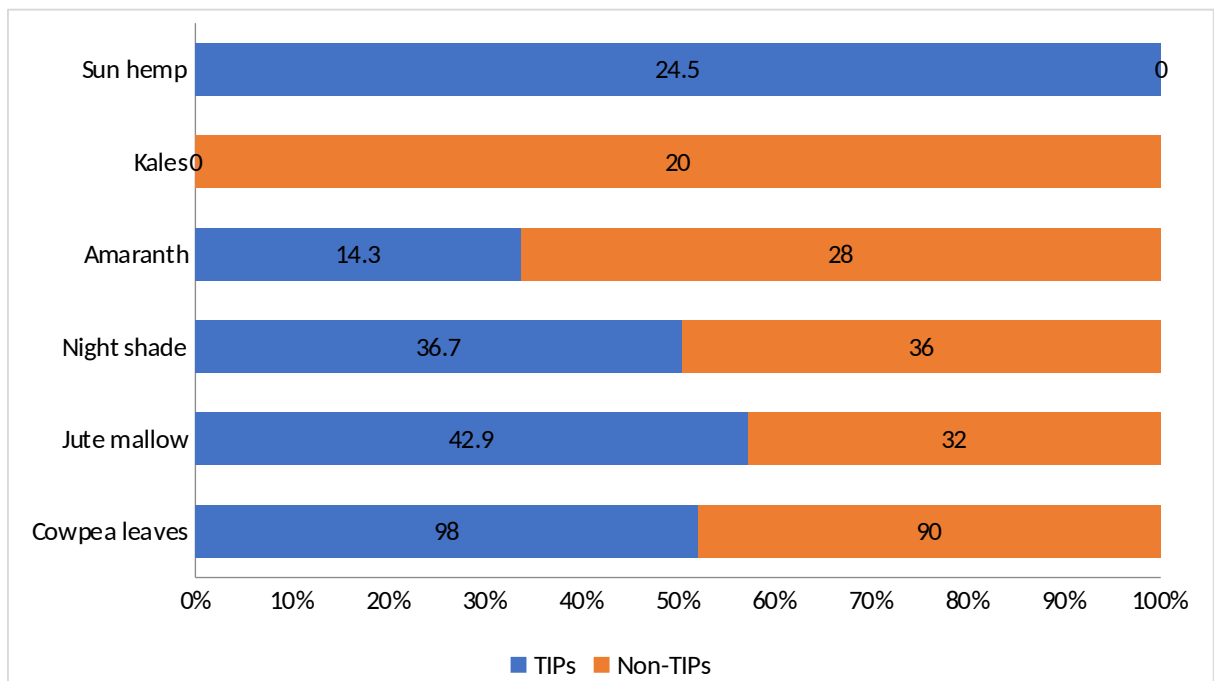


Figure 4.6: Sun-dried Vegetables Preferred by Participants

Based on the two graphical representations above, cowpea leaves were the most preferred sun-dried vegetables for both TIPS and non-TIPS participants. The FGD findings further

revealed that preference for cowpea leaves was attributed to the sensory attributes, specifically taste:

“My children said sun-dried cowpea leaves are even tastier than fresh ones. Sometimes they even eat it raw because of the salt that I add during blanching.” (FGD Acurut)

“I once prepared sun-dried cowpea leaves and added peanut paste. We ate as a family, including my husband, children and parents-in law. My parents-in-law really liked it and asked me to continue sun-drying cowpea leaves for their sake.” (FGD Olupe)

4.5.2 Sources of Sun-dried Vegetables

The main sources of sun-dried vegetables for the TIPs participants who consumed them included own harvest from the farm (67.3% n=33), followed by gift/donation in form of sun-dried vegetables (4.1% n=2), sun-dried vegetables prepared from purchased fresh vegetables (4.1% n=2). A further probe revealed that among the respondents who sun-dried vegetables harvested from their own farm, 42.4% (n=14) sun-dried vegetables because they always had a surplus. The sources of sun-dried vegetables are shown in Figure 4.7. These findings were linked to production capacity, which was one of the themes that emerged from the FGD results. Based on the discussions, vegetables were grown and harvested in plenty during the rainy season, allowing households to sun-dry the surplus.

“Sometimes i have surplus vegetables which I sun-dry instead of throwing away.” (FGD Palikite)

“Sometimes I have plenty of vegetables on my farm and the market price is not good, so instead of leaving them on the farm, I sun-dry them.” (FGD Obekai A)

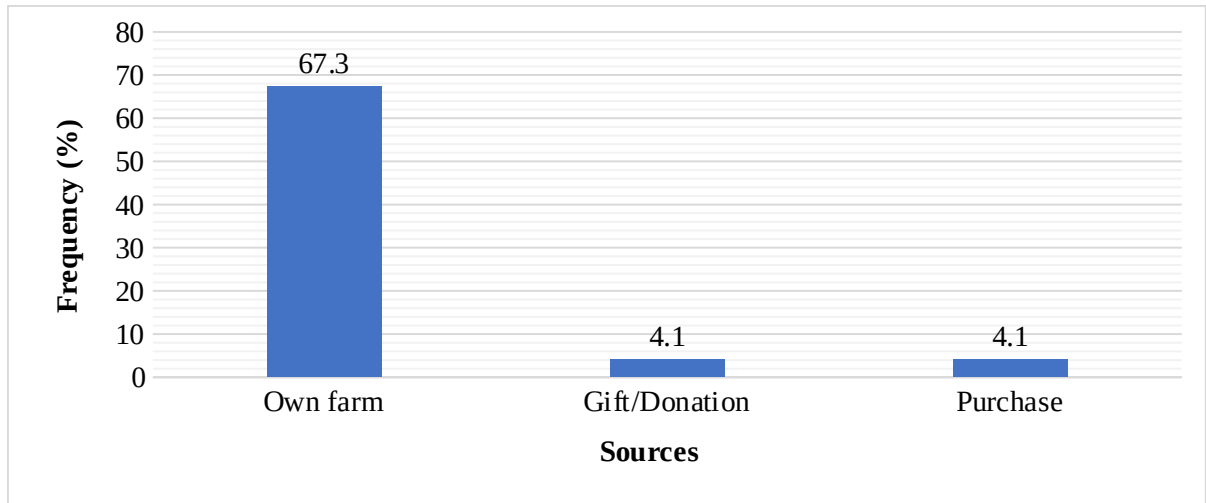


Figure 4.7: Sources of Sun-dried Vegetables

4.5.3 Frequency of Consumption of Sun-dried Vegetables

Variations in consumption of sun-dried vegetables across seasons are shown in Table 4.7. Of the two groups, only the TIPs participants (79.6%, n=39) consumed sun-dried vegetables in 2020. However, consumption varied across the seasons, with the highest (53.1%, n=26) occurring between September and December and lowest (24.5%, n=12) between April and May.

Table 4.7: Variations in Consumption of Sun-dried Vegetables across Seasons

	Jan-Mar 2020	Apr-May	Jun-Aug 2020	Sep-Dec 2020
	2020			
	n (%)	n (%)	n (%)	n (%)
TIPs participants	16 (32.7)	12 (24.5)	20 (40.8)	26 (53.1)

Based on the FGD results, the variations in consumption of sun-dried vegetables across the year were mainly due to seasonality of vegetables:

“I do intercrop maize and beans but I harvest beans quite early. So immediately after harvesting beans I plant vegetables which I harvest with maize in September. The vegetables are always in plenty at this time and it is sunny enough to allow my vegetables to be sun-dried.” (FGD Olupe)

“I always sun-dry vegetables from September because the weather is always friendly for sun-drying. It also helps me prepare for the upcoming dry season which always starts in December.” (FGD Obekai A)

The findings above showed that households consumed sun-dried vegetables within the exact season they were sun-dried. This could be an indication of either inadequate or poor storage facilities, preference of sun-dried vegetables over fresh vegetables, or sun-drying of minimal amounts of vegetables. Some of the facilities used for storing sun-dried vegetables included tins, bottles or buckets with lids (59.2% n=29), tins, bottles or buckets without lids (6.1% n=3), polythene bags (30.6% n=15), and sacks (4% n=2).

The frequency of consumption of sun-dried vegetables also varied within the different seasons of the year. Frequencies reported included once the whole season, three times the whole season, and every month of the season. A summary illustrating the frequency of consumption of sun-dried vegetables is provided in Table 4.8.

Table 4.8: Frequency of Consumption of Sun-dried Vegetables

	Jan-Mar	Apr-May	Jun-Aug	Sep-Dec
	n (%)	n (%)	n (%)	n (%)
Once the whole season	10 (20.4)	7 (14.3)	8 (16.3)	12 (24.5)
3 times the whole season	0	0	2 (4.1)	1 (2)
Monthly	6 (12.2)	5 (10.2)	10 (20.4)	13 (26.5)

4.6 Factors Influencing Consumption of Sun-dried Vegetables

Factors influencing consumption of sun-dried vegetables were categorized into three, including awareness of the sun-drying practice, skills of sun-drying, and the ability to prepare sun-dried vegetables as discussed in the following sub-sections.

4.6.1 Awareness of the Sun-Drying Practice

When asked if they had ever seen, heard or learnt about sun-drying of vegetables, all the TIPs participants (100% n=49) reported that they did. On the contrary, among the non-TIPs participants, 58% (n=29) reported that they had never seen, heard, or learnt about sun-drying of vegetables, 30% (n=15) heard about it, 8% (n=4) observed it somewhere, while 4% (n=2) heard, learnt and observed the practice. The main sources of knowledge regarding sun-drying of vegetables were the EaTSANE project (76.6% n=49) and family members (66.7% n=14) among the TIPs and non-TIPS participants respectively. Aspects

learnt included the sun-drying procedure, storage, and preparation of sun-dried vegetables. However, setting up a sun-drier was only known by the TIPs participants.

Table 4.9: Awareness of the Sun-drying Practice

Knowledge on sun-drying practice	TIPs Participants %	Non-TIPs Participants %
Ever seen, heard or learnt about sun-drying of vegetables		
Yes	100	42
No	0	58
Source of information		
EaTSANE project	76.6	0
Family members	0	66.7
Neighbors	7.4	9.6
Women groups	4.7	0
NGO	3.2	14.3
Agricultural self-help groups	3.2	0
School	3.2	0
Community health volunteer	1.7	9.5
What was seen, heard, or learnt		
How to set up a sun-drier		
Yes	73.5	0
No	26.5	100
How to sun-dry vegetables		
Yes	100	85.7
No	0	14.3
How to store sun-dried vegetables		
Yes	85.7	33.3
No	14.3	66.7
How to cook sun-dried vegetables		
Yes	71.4	23.8
No	28.6	76.2

A binary logistic regression was performed to examine whether awareness of the sun-drying practice helped to explain the consumption of the sun-dried vegetables among participants. The model was statistically significant [$X^2(4) = 35.233, p = .009$]. The model also correctly explained 65.4% of the variation in awareness of the sun-drying practice (Nagelkerke R^2) and correctly classified 86.9% participants who consumed sun-dried vegetables. Model estimates suggested that participants who had ever heard, seen, or learnt about sun-drying of vegetables 7 times more likely to consume sun-dried vegetables.

4.6.2 Skills of Sun-drying Vegetables

Skills of sun-drying vegetables were assessed by finding out about the methods used to sun-dry, the duration vegetables took to completely dry up, and challenges of sun-drying. Regarding sun-drying methods employed, 70.3% (n=23) of the TIPs participants who sun-dried vegetables used the open-air method, while 29.7% (n=11) used protected sun-driers. Based on the FGD results, durability of the sun-driers was a major challenge that contributed to more open-air sun-drying of vegetables as opposed to the technology introduced. Sun-driers were constructed using the locally available materials such as sticks, nets and polythene, which were easily destroyed by rain, domestic animals, and children.

The duration vegetables took to completely dry up varied, with 36.8% (n=14) reporting of less than twelve hours, 28.9% (n=11) a day, 28.9% (n=11) two to three days, and 5.3% (n=2) reporting more than three days. Nearly all (94.7%) of the TIPs participants who sun-dried vegetables reported that they didn't experience effort constraints in the sun-drying practice. As one of the FGD participants put it:

“Sun-drying vegetables is not difficult because I was taught how it is done and I do it with my children. I even showed them how they are dried and cooked so that whenever I am not at home, they can do it on their own.” (FGD Palikite)

Table 4.10: Sun-drying methods, Duration, and Effort Constrains Experienced

	%
Methods used to sun-dry vegetables	
Open air	70.3
Sun-dryer	29.7
Duration of sun-drying	
Less than 12 hours	36.8
1 day	28.9
2-3 days	28.9
More than 3 days	5.3
Experienced effort constraints	
Yes	5.3
No	94.7

Among the TIPs participants who sun-dried vegetables in 2020, half of them (50% n=19) reported that they experienced various challenges in the course of sun-drying. These challenges included unfavorable weather conditions (89.5% n=17), time constraints (26.3% n=5), interruption by domestic animals (26.5% n=5), and inability to construct a sun-dryer (31.6% n=6). These findings are presented in Figure 4.8.

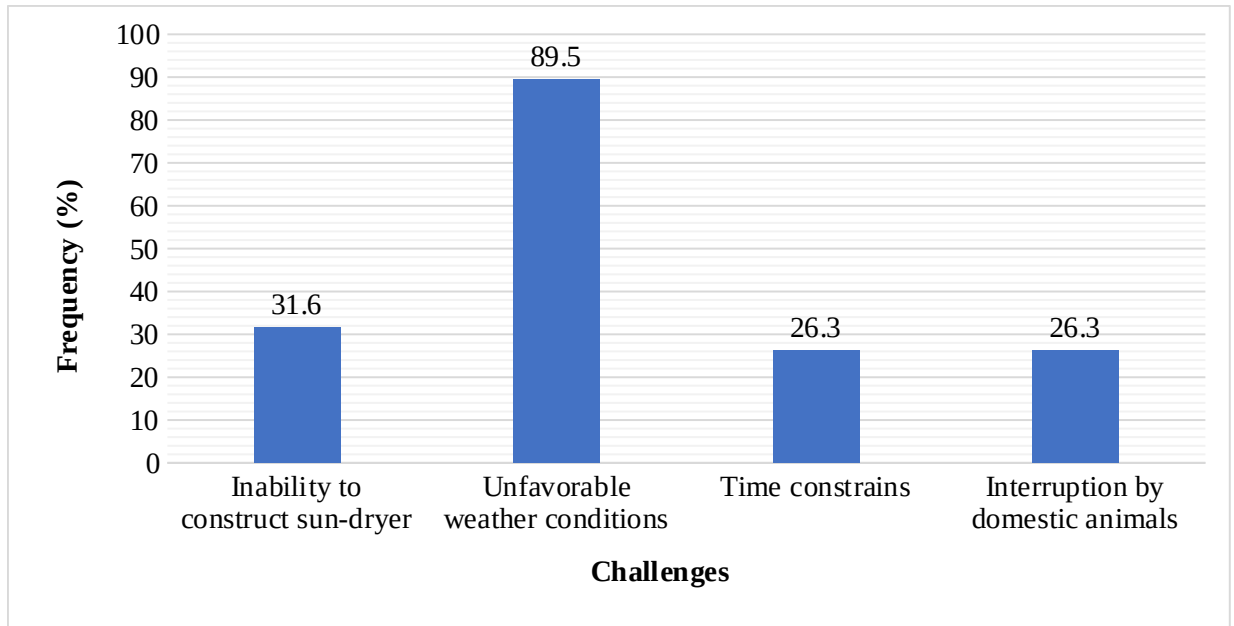


Figure 4.8: Challenges Experienced in Sun-drying Vegetables

Unfavorable weather conditions as a major challenge affecting the sun-drying practice were also echoed in the FGD findings, in which participants reported that they preferred sun-drying their vegetables between September and December. The main stated reason for this preference over other months was the favorable weather characterized by being sunny and less rainy. A participant said:

“I am comfortable sun-drying my vegetables around September or October because by this time, I have vegetables in plenty and it is sunny enough. I don’t even need a whole day to sun-dry them. If I sun-dry them at 10 o’clock, by midday they are completely dry.”

(FGD Acurut)

A Chi-square test of independence was performed to evaluate the relationship between consumption of sun-dried vegetables and skills for sun-drying. There was no significant relationship between consumption of sun-dried vegetables and duration of sun-drying ($p >$

0.05), and the constraints encountered in sun-drying of vegetables ($p > 0.05$). Those who had ever heard, seen or learnt about the sun-drying practice were likely to have a positive attitude towards the sun-dried vegetables.

4.6.3 Ability to Prepare Sun-dried Vegetables

A summary of the participants' ability to prepare a meal using sun-dried vegetables is presented in table 4.13. When asked how confident they felt in preparing a meal using sun-dried vegetables, 83.7% (n=41) of TIPs participants reported they were extremely confident, 14.3% (n=7) confident, and 2% (n=1) extremely not confident. Among the non-TIPs participants, 26% (n=13) were extremely confident, 10% (n=5) confident, 50% (n=25) not sure, 4% (n=2) not confident, and 10% (n=5) extremely not confident.

Table 4.11: Participants' Confidence in Preparing a Meal Comprised of Sun-dried Vegetables

		ENC	NC	N	C	EC
		n (%)	n (%)	n (%)	n (%)	n (%)
Confidence in	TIPs	1 (2.0)	0 (0)	0 (0)	7 (14.3)	41 (83.7)
preparing a meal						
using sun-dried	Non-TIPS	5 (10)	2 (4.0)	25 (50.0)	5 (10.0)	13 (26.0)
vegetables						

**ENC-Extremely not confident; NC-Not confident; N-Neither confident nor not confident; C-Confident; EC- Extremely confident*

A chi-square test of independence showed that there was a significant relationship between consumption of sun-dried vegetables and the level of confidence in preparing a meal using sun-dried vegetables $X^2 (4, N=99) = 26.964, p < .05$. A Spearman's correlation was run to determine the relationship between the perceived ease of cooking sun-dried vegetables

influenced participants' confidence in preparing sun-dried vegetables. There was a moderate positive correlation between the two variables, which was statistically significant ($r_s = .583, p < .05$). This implied that participants who perceived sun-drying of vegetables as an easy task felt more confident in preparing a meal comprised of it.

Table 4.12: Spearman Correlation between the Perceived Ease and the Confidence in Preparing a Meal Using Sun-dried Vegetables

			Perceived ease of preparing sun-dried vegetables	Confidence in preparing sun-dried vegetables
Spearman's rho	Perceived ease of preparing sun-dried vegetables	Correlation	1.000	.583**
		Coefficient		.000
		Sig. (2-tailed)	.99	.99
		N		
	Confidence in preparing sun-dried vegetables	Correlation	.583**	1.000
		Coefficient	.000	
		Sig. (2-tailed)	.99	.99
		N		

A binary logistic regression was further carried out to ascertain the effects of the ease of preparing sun-dried vegetables and the confidence in preparation, on the likelihood of participants to consume sun-dried vegetables. The logistic regression model was statistically significant ($X^2 (2) = 34.9, p < 0.01$ and explained 40.3% of the variation in consumption of sun-dried vegetables (Nagelkerke R^2) and correctly classified 74.7% of cases. Both the ease of preparing sun-dried vegetables ($p = 0.006$) and the confidence in preparing a meal comprised sun-dried vegetables ($p = 0.001$) were significant at .05 level.

4.5.4 Sensory attributes

A summary of how the sensory attributes influenced participants' willingness to consume sun-dried vegetables is presented in Table 4.15. The two sensory attributes looked into included the color and taste of sun-dried vegetables. Regarding the sensory attributes, 36.7% (n=18) of the TIPs participants reported that color would extremely influence their willingness to consume sun-dried vegetables, while 32.7% (n=16) were not sure. Among the non-TIPs participants, less than half of them (44% n=22) reported that the color would not influence their willingness to consume sun-dried vegetables. Concerning the taste, more than half (61.2% n=30) of the TIPs participants reported that it would extremely influence their willingness to consume sun-dried vegetables while 32.7% (n=16) were not sure.

A Chi-square test of independence was carried out to examine the relationship between the two sensory attributes. Results showed that the relationship between consumption of sun-dried vegetables and their color was significant, $X^2 (4, N=99) = 19.3, p = .001$. Further results from the chi-square test showed that there was a significant relationship between the taste of sun-dried vegetables and willingness to consume them, $X^2 (4, N=99) = 25.4, p = .000$. To delve more into the sensory attributes, the aspects of the color and taste of sun-dried were discussed in the FGDs. The theme derived was preference, where participants made comparisons between the taste and color of sun-dried vegetables vis a vis that of fresh vegetables. Some of the excerpts in support of the theme are as follows:

“I am not sure about how sun-dried vegetables taste, but I would eat if I find out that they taste as good as the fresh ones.” (FGD Omuye)

“When I first sun-dried cowpea leaves, they turned brown. But when I cooked, they still tasted as good as the fresh ones.” (FGD Obekai A)

Table 4.13: The Extent to which Sensory Attributes would Influence Consumption of Sun-dried Vegetables

		ENI n (%)	NI n (%)	N n (%)	I n (%)	EI n (%)
Color	TIPs	7 (14.3)	0 (0)	16 (32.7)	8 (16.3)	18 (36.7)
	Non-TIPS	7 (14.0)	22 (44.0)	8 (16.0)	3 (6.0)	10 (20.0)
Taste	TIPs	1 (2.0)	0 (0)	16 (32.7)	2 (4.1)	30 (61.2)
	Non-TIPS	7 (14.0)	23 (46.0)	8 (16.0)	1 (2.0)	11 (22.0)

**ENI-Extremely not influence; NI-Not influence; N-Neither influence nor not influence; I-Influence; EI- Extremely influence*

4.5.5. Demographic and socio-economic characteristics

The descriptive statistics for the demographic and socio-economic characteristics of the study participants are provided in sub-section 4.3 above. A Chi-square test of independence was performed to evaluate the relationship between consumption of sun-dried vegetables and each of the demographic and socio-economic characteristics of the households. The chi-square test results showed that there was no significant relationship between consumption of sun-dried vegetables and marital status ($p = .128$), gender of the household head ($p = .099$), main occupation of the respondent ($p = .982$), main occupation of the household head ($p = .645$), and the highest level of education attained ($p = .700$).

CHAPTER FIVE: DISCUSSION

5.0 Introduction

This chapter provides discussion of the study results in relation to findings from similar studies that focused on sun-dried vegetables. The discussion has been done as per the objectives of the study.

5.1 Demographic and Socio-economic Characteristics

All the study participants were females as they were purposively selected to take part in the study. This was similar to the results of a study conducted by Ochieng *et al.*, (2018) in rural Tanzania, in which majority (76%) of the participants were female. Similarly, a study focusing on sun-drying of vegetables conducted in Morocco revealed that 100% of the participants who consented to participate in the study were females (Landais, 2015). The similarity of the above studies can be attributed to the unanimous role women play in home keeping. Women's contribution to smallholder farming, household food security and meal preparations cannot go unrecognized.

The minimum and maximum ages of this study's participants were 21 and 79 years respectively, with a higher proportion aged between 30-39 years. Similarly, Ochieng *et al.*, (2018) and Yegon (2021) reported that participants in rural Tanzania were aged between 21-85 years. The similarity in the minimum ages of the present and comparison studies could be as a result of the rural settings in which the studies were carried out. Cases of early marriages and childbearing are prevalent in the rural due to poverty and low education levels (Melesse et al., 2021). In a study conducted by Yegon (2021), the mean age of the participants was 45.7 years, which was slightly higher than the mean age of participants in this study. However, both means indicate an active group of women involved in the production, sun-drying and preparation of sun-dried vegetables.

This study's results on marital status and gender of the household are in agreement with the findings of a study conducted by Ayua and Omware (2013). The duo, in a study involving preservation of vegetables in Siaya County, reported that majority (71.3%) of the participants were married. Male household heads were also found to be dominating in a study by Nguni & Mwila (2007) which revealed that 84.4% of the participating households in Zambia were headed by males. Males play a key role in making major decisions affecting households and sun-drying as well as consumption of sun-dried vegetables may not be an exception.

Regarding education level, a similarity was established between findings of this study and those of Okello *et al.*, (2015) who reported that majority (41%) of the participants attained primary education. These findings were also similar to the results of Yegon (2021) who reported that majority of the study respondents in Dodoma schooled for only up to six years and some did not have any form of formal education. According to Ngigi *et al.*, (2011), education level has a significant influence on knowledge regarding nutritional value of vegetables, which could in turn influence preservation of vegetables.

5.2 Participants Attitude towards Sun-dried Vegetables

Results of this study showed that both the TIPs and non-TIPs participants had a positive attitude towards sun-dried vegetables and this was attributed to the awareness of the sun-drying practice. Similar findings were echoed in a study by Okello *et al.*, (2015), in which participants regarded sun-dried vegetables as an essential part of family meals during the lean season. They considered sun-dried vegetables nutritious and good in boosting the body's immunity. According to Ahmed *et al.*, (2013), the nutritive value of dried vegetables largely depends on the drying procedures and methods used.

The ease of sun-drying (71.4%) and preparing sun-dried vegetables (93.8%) was mostly reported among the TIPs participants. Apart from learning about sun-drying of vegetables through the EaTSANE project, the TIPs participants attributed the ease of cooking sun-dried vegetables to the traditional knowledge passed to them by their mothers and grandparents. Similar results were reported by Kessy *et al.*, (2018) who indicated that 63.4% of the study participants considered preparation of sun-dried vegetables an easy task. The participants learnt about sun-drying of vegetables and preparation through an existing community based organization in the area. The similarity in findings of these studies is as a result of existing sources of information on the sun-drying technology and the support received from each of the sources.

5.3 Consumption Patterns of Sun-dried Vegetables

The most preferred sun-dried vegetables by participants in this study were cowpea leaves, amaranth, jute mallow, black night shade, and sun hemp. Findings of this study were almost similar to those of a study by Yegon (2021) who reported that the most consumed sun-dried vegetables in Dodoma were cowpea leaves, jute mallow and *Cleome hirta*. However, the results of this study differed from those of a study conducted in Nigeria by Okaiyeto *et al.*, (2020), which indicated that the most preferred sun-dried vegetables in the region were tomatoes, okra and baobab leaves. The difference in the findings of these studies could be attributed to the different geographical settings, vegetable preferences, culture, and food beliefs.

Consumption of vegetables may vary across seasons for various reasons including production dynamics. This study showed that out of 99 participants, only 39.3% consumed sun-dried vegetables in the year 2020, with the peak season of consumption being between

the months of September and December. During the FGDs conducted within the study, two key stated reasons for consuming sun-dried vegetables were the high cost of purchasing fresh vegetables associated with drought and availability. These findings differed with those from a study by Yegon (2021), which reported that 64.0% of participants within Dodoma consumed sun-dried vegetables. Reasons given by the participants for more consumption of sun-dried vegetables were the extended shelf life of sun-dried vegetables in comparison with fresh vegetables and habitual consumption of sun-dried vegetables which had almost become like a culture. The low consumption of sun-dried vegetables in Teso South in comparison with Dodoma may be attributed to inadequacy in awareness of the sun-drying practice. It was in this regard that the participants, during the FGDs suggested the need to create more awareness on consumption sun-dried vegetables through various channels such as farmer groups, churches, chiefs' barazas, and local radio stations.

Findings of this study also revealed that in the year 2020, the prevalence of consuming sun-dried vegetables was mostly once in a month (7.2%). This implied a very low intake of sun-dried vegetables in the study area. Contrary to these findings, Okello *et al.*, (2015) reported that in the Kenyan Coastal region, sun-dried vegetables were consumed 2-3 times a week on average. The findings also differed with those from a study by Ochieng *et al.*, (2018), which showed that in Rural Tanzania, sun-dried vegetables were mostly consumed 1-2 times a week (38.9%) and 3-5 times a week (37.3%). The difference in findings between the two studies may be attributed to the novelty of sun-drying practice in Teso South Sub-County while it was habitual in Rural Tanzania. The sun-drying practice was mostly known to the TIPs participants, who learnt about it from the EaTSANE project activities in Teso South Sub-County.

5.4 Factors influencing consumption of sun-dried vegetables

Results of this study revealed that there was no significant relationship between consumption of sun-dried vegetables and demographic and socio-economic factors such as sex of the household head. Contrary to these findings, the results of a study by Ochieng *et al.*, (2018) showed that the gender of the household head significantly influenced the consumption of dried vegetables. There was a significant ($p < 0.05$) relationship between households headed by females and the consumption of dried vegetables. This was attributed to women's role in food preparation which influenced their choices on what was to be consumed by their families. Similarly, Flagg *et al.*, (2014), also reported that females were more likely to be responsive towards food purchasing and preparation behaviors than males. Even though chi-square test results of this study indicated that there was no significant relationship between gender and consumption of sun-dried vegetables, women's active participation in food preparation emerged during the FGDs. Women who participated in the FGDs reported that they actively participated in the entire process involving sun-drying and preparation of sun-dried vegetables, with minimal support from their spouses.

Findings of this study also differed with those from a study conducted by Yegon (2021), which showed that education influenced consumption of sun-dried vegetables. There was a significant relationship between participants' level of education and consumption of sun-dried vegetables ($p < 0.05$). Gama *et al.*, (2018) posit that high education level is associated with good health as most consumers with adequate education are able to make informed and proper food choices. Education was also reported to influence consumption of sun-dried vegetables in a study in rural Tanzania by Ochieng *et al.*, (2018), which found out that

there was a significant relationship ($p < 0.05$) between the number of education years and consumption of sun-dried vegetables among households.

This study established that there was a significant ($p < 0.05$) relationship between participating in the TIPs process and consumption of sun-dried vegetables. This finding implies that the TIPs process was helpful in creating awareness about the sun-drying of vegetables practice and consumption of sun-dried vegetables in Teso South Sub-County. Similar results were reported in a study by Okello *et al.*, (2015), which showed that awareness of sun-drying as a vegetable preservation and value addition technique was significantly ($p < 0.05$) associated with willingness to purchase sun-dried vegetables for consumption. It also significantly influenced the consumption frequency of sun-dried cowpea leaves among households. Similar results were also reported by Okaiyeto *et al.*, (2020) who found out that awareness of sun-dried vegetables significantly influenced the consumption of sun-dried vegetables in Nigeria. According to Okaiyeto *et al.*, (2020), most participants were familiar with sun-dried vegetables as they were commonly sold in open-air markets. Awareness of sun-drying vegetables is key to consumption.

Results of this study also showed that sensory attributes significantly influenced participants' consumption of sun-dried vegetables. Such attributes included the colour ($p = .001$) and taste ($p = .000$) of sun-dried vegetables. According to Muniu (2020), sensory attributes such as colour and taste play a significant role in the acceptability of sun-dried vegetables. Similar to the findings of this study, Ochieng *et al.*, (2018) reported that colour and taste of sun-dried vegetables significantly influenced consumption of sun-dried vegetables in rural Tanzania. According to Albani *et al.*, (2017), the appearance, including

colour of sun-dried products, should be attractive to consumers as it is pivotal in their acceptability.

This study also indicated that there was a significant relationship between the ease of preparing sun-dried vegetables, the confidence in preparation, and the consumption of sun-dried vegetables. Similar findings were also reported in a study by Yegon (2017) whereby sun-drying of vegetables in Dodoma was an old practice that was already deemed to be habitual; hence done with a lot of ease. Participants also referred to sun-drying of vegetables as a very convenient, affordable and technology-free practice which would be carried out by both young and old individuals.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This section provides a conclusive summary of the findings outlined in chapter four of this study. Based on the conclusions of the study, a set of recommendations were provided as guided by the objectives of the study.

6.1 Demographic and Socio-economic Characteristics

All the study participants were females aged between 23-79 years. Majority of them were married and did not complete primary education. Most household heads were male and relied on casual labor to earn a living while study participants relied on farming as their source of income.

6.2 Attitudes Towards Sun-dried Vegetables

Overall, both the TIPs and non-TIPs participants had a positive attitude towards sun-dried vegetables. Findings of this study revealed that most participants, especially from the TIPs households, considered the sun-drying practice and consumption of sun-dried vegetables as a beneficial practice that contributed to household food security. Majority of the participants reported that it was extremely important to incorporate sun-dried vegetables in to family meals and that they were likely to recommend consumption of the sun-dried vegetables to others. The study participants also deemed sun-drying and cooking of sun-dried vegetables as slightly easy tasks.

6.3 Consumption Patterns of Sun-dried Vegetables

Consumption of sun-dried vegetables was evident among the TIPs participants, owing to the awareness created by the TIPs activities conducted within the EaTSANE project that

involved sun-drying of vegetables. A higher proportion of participants consumed sun-dried vegetables between the months of September and December 2020. Sun-dried vegetables were mostly consumed once in a month, indicating low consumption among the study participants. Most of the sun-dried vegetables were sourced from the farms, with cowpea leaves, jute mallow and amaranth being the most preferred.

6.4 Factors Influencing Consumption of Sun-dried Vegetables

The study showed that demographic and socio-economic factors did not influence consumption of sun-dried vegetables in Teso South. However, participation in the TIPs process significantly influenced consumption of sun-dried vegetables as most participants who reported to have consumed sun-dried vegetables in the year 2020 were from TIPs households. Other factors that significantly influenced consumption of sun-dried vegetables included the color, taste, ease of sun-drying, and the ease of preparing sun-dried vegetables.

6.5 Recommendation for Consumption Patterns of Sun-dried Vegetables

Low consumption of sun-dried vegetables, as evidenced by the study results, implies that there is need to create more awareness on sun-drying of vegetables in Teso South Sub-County. Participants should be sensitized on appropriate vegetable sun-drying techniques, storage as well as preparation. Awareness creation should be done by stakeholders, including the existing NGOs that support agricultural production in the sub-county, MoA and MoH. Suggested channels for awareness creation include women groups, chiefs' barazas, places of worship and local radio stations.

6.6 Recommendations for policy

The Ministry of Agriculture in collaboration with the Ministry of Health should put mechanisms in place to promote and support the consumption of sun-dried vegetables as a way of closing seasonal gaps associated with vegetable scarcity. They should also establish programs at grassroot level that provide the community with opportunities to gain knowledge and practical skills associated with sun-drying of vegetables.

6.8 Recommendations for further research

Paucity of literature focusing on sun-drying and consumption of sun-dried vegetables in Teso South Sub-County calls for more studies to be conducted in the area. This will add onto the existing literature, creating room for a rich literature review and comparisons to be done.

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APPENDICES

APPENDIX I: CONSENT FORM

Good morning/afternoon, my name is Annet Itaru. I am student persuing a Master's Degree in Public Health Nutrition at Masinde Muliro University of Science and Technology. I am requesting you to participate in my study that concerns consumption of dried vegetables in Teso South Sub-County. Before agreeing to participate in the study, I request you read the information below. This consent statement describes the purpose, procedures, benefits, risks, discomforts and precautions of the study. Also described is your right to withdraw from the study at any time, Feel free to ask any questions you might be having.

- A. Purpose of the study:** The purpose of this study is to assess factors influencing consumption of sun-dried vegetables among households in Teso South Sub-County.
- B. Study description:** In this study you will be asked a few questions regarding socio-demographic characteristics as well as your experiences and perceptions concerning consumption of dried vegetables.
- C. Duration:** the estimated end time to the interview is approximately 40 minutes. However, you may leave the study at any time. If you decide not to participate, there will be no penalty to you.
- D. Risks, discomforts and benefits:** You will not be subjected to any physical or emotional risks beyond the risks of normal daily life. You will receive no direct

benefits from participating in this research beyond; however, your participation will help the researcher to get an insight of the possible factors influencing consumption of dried vegetables.

E. Confidentiality: To secure the confidentiality of our data, your name and other identifying information will not be attached to your answers. All data will be kept in a locked drawer or in a password protected computer. Data access will be limited to the researcher. Your privacy will also be maintained in all published and written data resulting from this study. Your name or other identifying information will not be used in our reports or published papers.

F. Compensation/Incentive: There will be no compensation in the study.

G. Contact information and questions: If you have any questions or complaints about your rights as a participant in this research, please feel free to contact any of the numbers below;

Researcher: Annet Itaru (0714341113)

Do you have any questions about the above information? Do you wish to participate in this study?

YES ☐ NO ☐

Participant consent:

I have read the consent/the consent has been explained to me and I have understood the above information. I agree to participate in the research study.

Participant name: Date:

Participant signature: or thumb print

Documentation of consent:

Printed name of person obtaining consent (RA):

Signature of person obtaining consent (RA): Date:

.....

APPENDIX II: QUESTIONNAIRE

Household ID _____ Village _____ Date

Instruction: Please introduce yourself to the respondent and explain the survey and ask the respondent whether he/she consents to be interviewed, if yes ask her/him to sign the consent form. If the respondent does not agree, thank her/him for the time and finish the interview.

SECTION 1: DEMOGRAPHIC AND SOCIO-ECONOMIC INFORMATION

1. What is the sex of the respondent?

☐ Male

☐ Female

2. How old are you? Record age in years

3. What is your marital status?

☐ Currently Married – monogamous

☐ Currently Married – polygamous

☐ Widowed

☐ Divorced

☐ Separated

☐ Single

4. Are you the household head?

☐ Yes

☐ No

5. What is the sex of the household head?

☐ Male

☐ Female

6. What is your main occupation?

☐ Farming (crops)

- ☐ Farming (livestock)
- ☐ Farming (mixed)
- ☐ Business
- ☐ Sale of own produced craft goods
- ☐ Casual labour
- ☐ Wage employment
- ☐ None
- ☐ Other (specify)

7. What is the main occupation of the household head?

- ☐ Farming (crops)
- ☐ Farming (livestock)
- ☐ Farming (mixed)
- ☐ Business
- ☐ Sale of own produced craft goods
- ☐ Casual labour
- ☐ Wage employment
- ☐ None
- ☐ Other (specify)

8. What is the highest level of school you completed?

☐ Primary (incomplete)

☐ Primary (complete)

☐ Secondary (incomplete)

☐ Secondary (complete)

☐ Tertiary

☐ Others (specify)

9. What is your primary source of income?

☐ Farming

☐ Casual labor

☐ Wage employment

☐ Business

☐ Other

10. What is the main source of vegetables consumed by your household during the dry season?

☐ Own farm

☐ Market

☐ Forest

☐ Gift/donation

☐ Do not eat vegetables

SECTION TWO: SUN-DRYING OF VEGETABLES

11. Have you ever heard, learnt about or seen sun-dried vegetables?

☐ Never heard, learned or seen it

☐ Heard about it

☐ Attended a training about it

☐ Heard, learned and observed it

☐ Don't know

12. From whom/where did you hear or learn about or observed sun-drying of vegetables?

☐ My mother

☐ My father

☐ Other family members apart from parents

☐ In-laws

☐ Friends

☐ Neighbours

☐ Women's group

☐ An agriculture based organization

☐ Research project

☐ On TV

☐ On phone

☐ At school

☐ EaTSANE project

☐ Agricultural extension officers

☐ Attended a training somewhere

☐ I observed someone doing it

☐ I ate sun-dried vegetables somewhere

☐ Other (Specify)

13. Now we would like to ask you some details about what you have heard, learnt or seen about sun-drying of vegetables. We are also interested to know whether the information was useful to you. What did you hear, learn or see?

☐ How to sun-dry vegetables

☐ How to sun-dry fruits

☐ How to construct a protected sun-drier

☐ How to sun-dry using a black polythene

☐ How to store sun-dried vegetables

☐ How to cook sun-dried vegetables

☐ How to blanch vegetables

☐ Other (specify)

14. Have you sun-dried any vegetables in the last 4 months, December 2020 -
September 2020?

☐ Yes

☐ No

15. How often did you sun dry in the last 4 months, December 2020 - September
2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per months

☐ More than once a months

☐ Don't know

☐ Others (specify)

16. Have you sun-dried any vegetables in the previous August 2020 to June 2020?

☐ Yes

☐ No

17. How often did you sun dry in the previous August 2020 to June 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per months

☐ More than once a months

☐ Don't know

☐ Others (specify)

18. Have you sun-dried any vegetables in the previous May 2020 to April 2020?

(Eastertime)?

☐ Yes

☐ No

19. How often did you sun dry in the previous May 2020 to April 2020? (Eastertime)?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per months

☐ More than once a months

☐ Don't know

☐ Others (specify)

20. Have you sun-dried any vegetables in the previous March 2020 to January 2020?

☐ Yes

☐ No

21. How often did you sun dry in the previous March 2020 to January 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per months

☐ More than once a months

☐ Don't know

☐ Others (specify)

22. Which vegetables did you sun-dry

In the last four months, December-September 2020?	Previous August 2020 to June 2020?	Previous May 2020 to April 2020? (Eastertime)?	Previous March 2020 to January 2020?
Cowpea leaves	☐	☐	☐
Amaranth leaves	☐	☐	☐
African night shade	☐	☐	☐

Spider plant	☐	☐	☐
Pumpkin leaves	☐	☐	☐
Jute mallow	☐	☐	☐
Sun hemp	☐	☐	☐
Cabbage	☐	☐	☐
Kales	☐	☐	☐
Pumpkin fruit	☐	☐	☐
Tomatoes	☐	☐	☐
Eggplants	☐	☐	☐
Mushrooms	☐	☐	☐
Others	☐	☐	☐

23. Are you currently sun-drying any vegetables?

☐ Yes

☐ No

24. During the rainy season, what is the situation at your household in regard to the availability of vegetables?

☐ Do not have a surplus and I do not purchase any vegetables

☐ I do not have a surplus and i do not purchase any vegetables in bulk at the market

☐ I do not have a surplus, but i purchase vegetables at the market

☐ I do not have a surplus, but i purchase vegetables in bulk at the market and
preserve it through sun-drying

☐ I do not have a surplus, but it is enough to serve my family

☐ I have a surplus and i preserve it through sun-drying

☐ I have a surplus on the farm but do not harvest it

☐ I have a surplus which i throw away

☐ I have a surplus which i offer to my neighbours for free

☐ I have a surplus which i sell

☐ Other (specify) _____

25. What is the main use(s) of the vegetables that you sun-dry?

☐ For own consumption at any time

☐ For own consumption in times of vegetable shortage

☐ For sale

☐ Both for own consumption and sale

☐ Other (specify) _____

26. You have mentioned at some point in the interview that you dry vegetables. Now
we would like to know: How do you sun-dry your vegetables?

☐ On a tray

☐ On the roof top

☐ On the rock

☐ On the ground

☐ On a polythene

☐ In an open carton box

☐ In a protected sun dryer

☐ Others

27. How long do your vegetables take on average to completely dry up?

☐ Less than 12 hours

☐ A day

☐ 2-3 Days

☐ More than three days

☐ Don't know

28. Did/do you experience any challenges in as far as sun-drying of vegetables is concerned?

☐ Yes

☐ No

29. Which challenges did/do you encounter during sun-drying?

☐ Not being able to construct the sun-dryer

☐ Unfavourable weather condition e.g too rainy, chilly, windy etc

☐ Time constraints (takes a lot of time to sun-dry)

☐ Effort constraints – sun-drying involves a lot of work

☐ Interruption from domestic animals

☐ Cultural constraints

☐ Others, specify

SECTION THREE: CONSUMPTION OF SUN-DRIED VEGETABLES

30. Have you consumed any sun-dried vegetables in the last 4 months, December
2020 – September 2020?

☐ Yes

☐ No

☐ Don't know

☐ Refused

31. How often did you consume sun-dried vegetables in the last 4 months, December
2020 - September 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per month

☐ More than once a month

☐ Don't know

☐ Others

32. Have you consumed any sun-dried vegetables in the previous August-June 2020?

☐ Yes

☐ No

☐ Don't know

☐ Refused

33. How often did you consume sun-dried vegetables in the previous August-June 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per month

☐ More than once a month

☐ Don't know

☐ Others

34. Have you consumed any sun-dried vegetables in the previous May-April
(Eastertime) 2020?

☐ Yes

☐ No

☐ Don't know

☐ Refused

35. How often did you consume sun-dried vegetables in the previous May-April
(Eastertime) 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per month

☐ More than once a month

☐ Don't know

☐ Others

36. Have you consumed any sun-dried vegetables in the previous March – January
2020?

☐ Yes

☐ No

☐ Don't know

☐ Refused

37. How often did you consume sun-dried vegetables in the previous March – January 2020?

☐ Never

☐ Once over the whole period

☐ Three times in the whole period

☐ Once per month

☐ More than once a month

☐ Don't know

☐ Others

38. Mention 3 types of sun-dried vegetables that you would prefer most for consumption

.....

.....

.....

39. Mention 3 types of sun-dried vegetables that you prefer not to eat

.....

.....

.....

40. How confident do you feel in preparing a meal of sun-dried vegetables for your family?

☐ Extremely not confident

☐ Slightly not confident

☐ Neither confident nor not confident

☐ Slightly confident

☐ Extremely confident

41. How important do you think it is to have sun-dried vegetables as part of your family's diet?

☐ Extremely not important

☐ Slightly not important

☐ Neither important nor not important

☐ Slightly important

☐ Extremely important

42. How likely do you think you will recommend consumption of sun-dried vegetables to those who are not doing it?

☐ Very unlikely

☐ Unlikely

☐ Neither likely nor unlikely

☐ Likely

☐ Very likely

43. Do you have any sun-dried vegetables at home at the moment? Can you show it to us?

☐ Yes

☐ No

44. How do/ would you store sun- dried vegetables?

☐ In a tin/bucket/bottle with lid

☐ In a tin/bucket/bottle without lid

☐ In a polythene bag

☐ In a sack

☐ In dried banana fiber

☐ In a clay pot

☐ Other (specify)

45. To what extent would the color of the sun-dried vegetables influence your willingness to make a meal out of it?

☐ Extremely not influence

☐ Slightly not influence

☐ Neither influences nor not influence

☐ Slightly influence

☐ Extremely influence

46. To what extent would the taste of the sun-dried vegetables influence your willingness to make a meal out of it?

☐ Extremely not influence

☐ Slightly not influence

☐ Neither influences nor not influence

☐ Slightly influence

☐ Extremely influence

47. To what extent would the nutritive value of the sun-dried vegetables influence your willingness to make a meal out of it?

☐ Extremely not influence

☐ Slightly not influence

☐ Neither influences nor not influence

☐ Slightly influence

☐ Extremely influence

48. To what extent would the origin of the sun-dried vegetables influence your willingness to make a meal out of it?

☐ Extremely not influence

☐ Slightly not influence

☐ Neither influences nor not influence

☐ Slightly influence

☐ Extremely influence

49. What do you think about the preparation effort required to sun-dry vegetables?

☐ Extremely not easy

☐ Slightly not easy

☐ Neither easy nor not easy

☐ Slightly easy

☐ Extremely easy

50. What do you think about the preparation effort required for making a meal
consisting of sun-dried vegetables?

☐ Extremely not easy

☐ Slightly not easy

☐ Neither easy nor not easy

☐ Slightly easy

☐ Extremely easy

APPENDIX III: FOCUS GROUP DISCUSSION GUIDE

A. INTRODUCTION

Greetings, welcome remarks and introduction

Good morning/afternoon and welcome to this session. Thank you for accepting our request to converge here for the focus group discussion. My name is Annet Itaru and assisting me is _____. Let us have a brief session for introduction so that we get to know each other before we proceed.

You were selected to participate in this discussion because you participated in the EaTSANE endline survey which was conducted in January this year. During the survey, we asked a series of questions about yourself, your household characteristics, agricultural production, market access, food and nutrition situation, food preservation and child feeding practices. However, today we will dwell more on sun-drying of vegetables and their consumption within our locality. The main aim of conducting this focus group discussion is to get indepth information on vegetable sun-drying practices, consumption behaviours, and also to assess our perceptions and attitude towards consumption of the sun-dried vegetables.

Consent process

We shall go through the informed consent form as a group before we start our discussion, to be sure that we understand why we are having this focus group discussion and also to ensure that your participation is voluntary. Each participant will receive two copies of the

consent form and only those who will accept to voluntarily participate in this FGD will sign both copies and return a copy to us.

FGD ground rules

- We encourage active participation and only one person talks at a time
- There are no right or wrong answers to questions, please feel free to express your ideas, experiences and opinions which are relevant to the discussion
- Let us have one discussion by avoiding side conversations
- Phones should be on silent mode

DATE: _____

NAME OF THE VILLAGE: _____

NO. OF PARTICIPANTS: _____

START TIME: _____

END TIME: _____

Draw the sitting plan of participants

Turn on the audio recorder

Focus Group Discussion Questions

1. From the survey conducted in January 2021, we found out that the months of March, April, May and June 2020 were greatly associated with hunger. In that regard, we would like to know if they are the same months you experience difficulties in accessing vegetables. So, which months do you find it very difficult to access vegetables? *(For each mentioned month, record the number of people mentioning)*

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

2. Now that we know which months are associated with difficulties in accessing vegetables, we would also like to know, what makes it difficult to access vegetables in those stated months?

Month	Cause

3. You have mentioned that you experience vegetable shortage in *(fill in the months)*
_____ . What do you do to fill in the gap
during these months? *(probe for sun-drying if it has not been mentioned)*
4. Also from the survey, we found out that for households who had surplus vegetables during the rainy season, 10% said they would sun-dry the surplus while 45% said they would sell the surplus. It seems that you **prefer** selling over sun-drying. Is this correct? If yes, why do you prefer selling over sun-drying of the surplus vegetables? (If the responses are no: please probe for reasons what hinders participants to sun-dry if they actually prefer it.)

5. Having mentioned sun-drying of vegetables, which months do you think vegetables can/should be sun-dried? What are your reasons for the mentioned months? *(For each mentioned month, record the number of people mentioning)*

Months	No. Of participants	Reasons
January		
February		
March		
April		
May		
June		
July		

Aug		
Sept		
Oct		
Nov		
Dec		

6. From the survey in January, we also found out that sun-drying was majorly done between June and August 2020 among TIPs households. Now we would like to know, what motivated/would motivate you to sun-dry vegetables?

7. Still from the same survey, we also found out that none of you were sun-drying vegetables during the data collection period. What hindered/would hinder you from sun-drying vegetables?

8. We are also interested in assessing gender roles in as far as sun-drying of vegetables is concerned.
- a) What roles did/do women play in sun-drying and also preparation of sun-dried vegetables?
 - b) What roles did/do men play in sun-drying and also preparation of sun-dried vegetables?
 - c) How did/do men perceive sun-drying of vegetables?
9. We are about to come to the end of our discussion, thank you so much for your patience and the active participation. In addition to the survey findings that we have shared, we also found out that most of you who sun-dried vegetables in the year 2020 used them mainly for your own consumption. In that regard, we would like to know, what are your thoughts about the possibilities of selling sun-dried vegetables within local markets in Teso South? Would you consider selling sun-dried vegetables at the local market?
- a) Yes

b) No

10. Lastly, we would like you to suggest possible ways through which we can promote sun-drying as well as consumption of sun-dried vegetables here in Teso South.

Turn of the audio recorder

Closing remarks

We have come to the end of our focus group discussion. Thank you so much for your active participation and also for staying until the end. Refreshments are served and participants leave.

APPENDIX IV: BUDGET FOR THE STUDY

ITEM	QUANTITY	COST (Ksh)	TOTAL COST (Ksh)
<u>Research Instruments</u>			
Consent forms	120 copies (2 pages each)	@ 20/-	2,400
Questionnaires	120 copies (8 pages each)	@ 80/-	9,600
FGD templates	12 copies (2 pages each)	@ 20/-	240
<u>Stationery</u>			
Flip charts	1 roll	@ 700 /-	700
Marker pens	1 packet	@300/-	300
Notebooks	A dozen	@ 50/-	600
Pens	A dozen	@ 10/-	120
<u>Daily subsistence allowance (DSA)</u>			
Enumerators	4 enumerators for 10 days	@ 1000/-	40,000
Community health volunteers (CHVs)	8 CHVs	@ 500/-	4,000
Transport to the villages	5 people for 10 days	@ 500/-	25,000
Data analysis		15,000/-	15,000/-
Thesis	6 copies at 150 pages	@ 10/- a page	9,000/-
Publication		10,000/-	10,000/-
Miscellaneous		20,000	20,000
Grand total			136,960

APPENDIX V: MAP FOR TESO SOUTH

226_IEBC REVISED TESO SOUTH CONSTITUENCY COUNTY ASSEMBLY WARDS

