HAWASSA UNIVERSITY

COLLEGE OF AGRICULTURE

SCHOOL OF NUTRITION, FOOD SCIENCE AND TECHNOLOGY

PROMOTING OFSP USING LEAFLET AND ASSESSING ITS EFFECTIVENESS TOWARDS KAP OF SWEET POTATO CONSUMERS IN HAWASSA CITY, SNNPR ETHIOPIA.

M.Sc. THESES

YIRDAN YONAS (B.Sc)

MARCH, 2020

HAWASSA, ETHIOPIA

PROMOTING OFSP USING LEAFLET AND ASSESSING ITS EFFECTIVENESS TOWARDS KAP OF SWEET POTATO CONSUMERS IN HAWASSA CITY, SNNPR ETHIOPIA.

YIRDAN YONAS

MAJOR ADVISOR: HEIDI BUSSE (PhD)

CO-ADVISOR: TONA ZEMA (MSc)

A THESIS SUBMITTED TO THE SCHOOL OF NUTRITION, FOOD SCIENCE AND TECHNOLOGY,

HAWASSA UNIVERSITY

COLLEGE OF AGRICULTURE

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN APPLIED HUMAN NUTRITION

FEBRUARY, 2020

HAWASSA, ETHIOPIA

SCHOOL OF GRADUATE STUDIES

HAWASSA UNIVERSITY

ADVISORS' APPROVAL SHEET

(Submission Sheet-1)

This is to certify that the thesis entitled **"Promoting OFSP using Leaflet and Assessing its Effectiveness towards KAP of Sweet Potato Consumers in Hawassa city, SNNPR Ethiopia."** submitted in partial fulfillment of the degree of **Master** with specialization in **Applied Human Nutrition** the Graduate program of the **Department of Human Nutrition**, and has been carried out by **Yirdan Yonas** under my/our supervision. Therefore I/we recommend that the student has fulfilled the requirements and hence hereby can submit the theses to the school

_____	_____	_____
Name of major advisor	Signature	Date
_____	_____	_____
Name of co-advisor	Signature	Date

SCHOOL OF GRADUATE STUDIES

HAWASSA UNIVERSITY

EXAMINERS' APPROVAL SHEET-1

(Submission Sheet-2)

As member of the board of examiners of the final MSc open defense, we certify that we have read and evaluated the thesis prepared by Yirdan Yonas, under the title **"Promoting OFSP using Leaflet and Assessing its Effectiveness towards KAP of Sweet Potato Consumers in Hawassa city, SNNPR Ethiopia."**, and examined the candidate. This is therefore, to certify that the thesis has been accepted in partial fulfillment of the requirement for the degree of **Master of Science** in Applied Human Nutrition.

Name of the Chairperson	Signature	Date
Name of Major Advisor	Signature	Date
Name of Internal Examiner	Signature	Date
Name of External Examiner	Signature	Date

Final approval and acceptance of the thesis is contingent upon the submission of final copy of the thesis to the school of Graduate Studies (SGS) through the School Graduate Committee (SGC) of the candidate's School.

Stamp of SGS **Date**

Remark

- Use this form to submit the theses with minor correction suggested by the examining board
- 6 copies

SCHOOL OF GRADUATE STUDIES

HAWASSA UNIVERSITY

EXAMINERS' APPROVAL SHEET-1

(Submission Sheet-2)

As member of the board of examiners of the final MSc open defense, we certify that we have read and evaluated the thesis prepared by Yirdan Yonas, under the title **"Promoting OFSP using Leaflet and Assessing its Effectiveness towards KAP of Sweet Potato Consumers in Hawassa city, SNNPR Ethiopia."**, and examined the candidate. This is therefore, to certify that the thesis has been accepted in partial fulfillment of the requirement for the degree of **Master of Science** in Applied Human Nutrition.

Name of the Chairperson	Signature	Date
Name of Major Advisor	Signature	Date
Name of Internal Examiner	Signature	Date
Name of External Examiner	Signature	Date

Final approval and acceptance of the thesis is contingent upon the submission of final copy of the thesis to the candidate's department.

Theses approved by

School Head	Signature	Date

Certification of the final Thesis

I hereby certify that all the corrections and recommendation suggested by the Board of Examiners are incorporated into the final Thesis entitled **"Promoting OFSP using Leaflet and Assessing its Effectiveness towards KAP of Sweet Potato Consumers in Hawassa city, SNNPR Ethiopia."**

Name of the Designate	Signature	Date

Stamp of SGS **Date**

Remark

- Use this form to submit the theses with major correction suggested by the examining board
- 6 copies

DEDICATION

I dedicate this work to my beloved family for their unreserved love and support for the success of this paper.

STATEMENT OF THE AUTHOR

I hereby declare that this thesis is my original work and all the resources of the materials used for the thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirement for M.Sc. degree in Applied Human Nutrition at Hawassa University and will be deposited at the university's library to be made available to borrowers under the rules of the library. I truthfully declare that this thesis has not been submitted to any other institution in a requirement of any academic degree, diploma or certificate.

Name: Yirdan Yonas Signature: _____

Place: School of Nutrition, Food Science and Technology, Hawassa University, Ethiopia

Date of Submission: _____

ACKNOWLEDGEMENT

First of all my Almighty God who provided me good people, good opportunity, good time, and good health deserve to take my best and incomparable thanks. He was and is always good for me!

I am very grateful to my advisor Dr. Heidi Busse who had given me a great help by providing valuable comments and directions starting from the proposal to final paper submission while she is in a very tight schedule. I would like to extend my sincere thanks to Mr. Tona Zema who helped me a lot by co-supervising.

My thanks also go to CIP Hawassa for financial support, all CIP project office staffs and my school teachers for their support in making this study possible. Also all of my study participants, data collectors and vendors deserve my heartfelt thanks for their kindness and willingness to participate in this study

My special thanks belong to Dr. Roland Brouwer for striving day and night for the success of this study, as a father cares for his son. His unreserved compassion, and strength made this study real.

My family's goodness and support from the beginning to final minute empowered me to stand firm.

TABLE OF CONTENTS

LIST OF TABLES

Annex

ACRONYMS AND ABBREVIATIONS

βC	Beta-carotene
CIP	International Potato Center
CSA	Central Statistics Agency
CSPro	Census and Survey Processing System
EDHS	Ethiopian Demographic and Health Survey
KAP	Knowledge, Attitude, and Practice
OFSP	Orange-fleshed Sweet potato
SPSS	Statistical Package for the Social Sciences
WFSP	White-fleshed Sweet potato
VAD	Vitamin A Deficiency
VA	Vitamin A

Development and validation of consumer-based OFSP promoting leaflets for sweet potato consumers in Hawassa town, southern Ethiopia

By: Yirdan Yonas

Major advisor: Dr. Heidi Busse

Co-advisor: Mr. Tona Zema

ABSTRACT

People often fail to understand and even forget what they have been told orally. Paper-based tools such as leaflets ensure the transfer of the same message from person to person. There is no validated orange-fleshed sweet potato promoting tool in Ethiopia. Hence, the objective of this study was to develop validated OFSP promoting leaflet and to assess its effectiveness on improving knowledge, attitude and practice of OFSP. Content Validity Ratio was used to validate the leaflet and User-response evaluation and user-opinion test were used to test the readability of the leaflet. Content Validity Ratio was 0.9. All users categorized the leaflet as good. There was an improvement of knowledge during user-testing that indicates the leaflet was readable. Quasi experimental study design was used. Total of 632 (316 for each group) participants were recruited from randomly selected 20 vegetable vendors in Hawassa town, southern Ethiopia. Intervention group, received OFSP promoting leaflet. Control group did not receive leaflets. Knowledge, attitude and practice were assessed at baseline and after two months of intervention. At baseline, the intervention and control group were statically similar regarding mean KAP scores After two months intervention the mean (SD) KAP scores of the treatment group improved significantly (P<0.01) from 31±(1.573%), 25±(0.934%), & 19±(0.720%) to 88±(0.978%), 87±(1.061%), and 73±(0.788%) respectively. Using a validated leaflet to promote OFSP is found an effective tool to change the KAP of consumers. Future studies should include associated factors that may influence the effect of leaflet on KAP change of vitamin A and OFSP.

Keywords: *development, validation, consumer-based, OFSP, promoting, leaflets*

1. INTRODUCTION

1.1. Background

Vitamin A deficiency (VAD) is one of major public health concern affecting one out of three children globally and one out of two children in Africa, which is described by having a serum retinol concentration of less than 0.7 µmol/l (WHO, 2009). Along with other African countries, this VAD problem has still remained one of major public health concern in Ethiopia since its first time recognition in Gonder town, northern Ethiopia around 1957 – 1958 in Gonder town, northern Ethiopia despite to numerous interventions (Tsegaye *et al.,* 2010).

Ethiopian government has been done and still doing a lot of works with international organizations to tackle the problem (Tsegaye et al., 2010). Vitamin A supplementation (VAS) is the main mechanism being used to tackle the problem. And according to Ethiopian National Nutrition Program II for 2016 to 2020, it has been planned to undertake twice yearly VAS of children 6 to 59 months of age as an initiative to prevent and control VAD with coverage of 90% (National Nutrition Programme II. 2016). However, according to the EDHS report of 2016, the coverage did not pass 45% which is remarkable decrease from 53% as of 2011(CSA, 2011 & 2016).

The importance of vitamin A supplementation in alleviating the incidence of diarrhea and measles and all-cause mortality in children aged six months to five years is proven (Mayo-Wilson *et al*. 2011). However, studies indicates that it is costly (Edejer *et al.*, 2005) and susceptible to failure (Tsegaye et al., 2010). Unlike supplementation, biofortification is a sustainable and cost-effective way to tackle micronutrient deficiency problems (Ruel *et al.,* 2013). Therefore, to minimize the cost of the country with vitamin A supplementation capsules and to sustain the improvement, it is recommended to invest on biofortified foods. Combating

micronutrients deficiencies with biofortified foods is cost-effective and sustainable approach to eradicate the hidden hanger of malnutrition. Acceptance of biofortified foods by consumers can be a challenge for the adoption but, it can be improved with good farming system, enough supply to markets and awareness creation to consumers (Ravindra, 2013). One of possible food item rich with vitamin A precursor but not well introduced at country level, is orange-fleshed sweet potato (OFSP) (Low et al., 2017).

Orange fleshed sweet potato is bio-fortified with beta-carotene (βC). Beta carotene is converted by the body into bioavailable form of vitamin A (retinol). Orange fleshed sweet potato has been promoted by programs aimed to sustainably combat VAD in Sub-Saharan Africa using dietary approaches, in particular to fill the gaps in vitamin A supplementation programmes across countries (Emily *et al.,* 2018). The benefit of OFSP is not limited to its high content of beta-carotene. It has also the ability to build the economy of the producers. Its capability of being used to prepare different recipes adds additional value. Moreover, OFSP is also a good source of dietary fiber (2.5–3.3 g/100 g) and it has medium glycemic index (score of 61) and glycemic load (10.7 per 100 g) when compared with other boiled roots such as potato or bread. This means it releases sugar in to blood stream more slowly when digested, which in turn is an indicator of foods with lower risk of exposing to diabetes mellitus (Low *et al.,* 2017).

Promotion of OFSP at community-level can improve the consumption trends as well as the nutritional status of the community (Hageniman *et al.,* 1999), hence it is one of strategy to bring behavioral change.

As discussed above, adoption of biofortified foods by consumers demands good farming system, and enough supply of the product to the market. International Potato Center (CIP) is working in availing such favorable environment to promote OFSP among the community. The International

Potato Center is an international agricultural research organization aiming promotion of biofortified sweet potato for improved nutrition as one of its flagship activities (Emily et al., 2018). The project at Hawassa office collaborates with different government sectors and non-government organisations to motivate farmers to produce OFSP. It also works with some vendors in Hawassa City to supply the product to the market. The success of these all effort depends on production, market supply and consumer awareness.

The awareness of the community can be raised based on the information they get. When their awareness increase their practice likely to be changed (Marías et al., 2014). Information can be transferred orally or in written form, such as leaflet (Anderson et al., 1998).

People often fail to understand and even forget what they have been told orally. This is due to misunderstanding of the message by the listener and/or the inability of the speaker to transfer the exact information he wants to be transferred (Renuka and Pushpanjali, 2013). To solve these problem of missing information through oral communication, different paper-based information transferring tools such as leaflets have been developed, for example educating patients how to follow medication (Newton et al., 1998) and how to modify one's lifestyle including dietary habit (Al-Maskari et al., 2013).

The benefit of using a paper-based tools such as leaflets is the transferring of the same information from person to person without missing any message (Meillier et al., 1999). Moreover, when the information on the leaflets is based on reliable studies and its contents and form properly validated by experts, it can be easily understood by the target group and its recommendations are more likely to be adopted. The development of a good leaflet requires the validation of its readability, legibility and content by subject experts (Kenny et al, 1998).

Research shows that using patient information leaflets results in improved levels of knowledge, attitude and practice of the patients (Adepu and Swamy, 2012). Similar studies conducted by others with patient information leaflets as an educational intervention have significant impact on the knowledge, attitude and practice among the patients suffering from chronic diseases (Mateti et al., 2015). This suggests that leaflets may also be an effective tool to promote consumption of micronutrient rich foods among the community to minimize their deficiencies. Based on the findings of those studies, researcher of current study wanted to see the impact of consumer-based OFSP promoting leaflet on behavioral change.

1.2. Statement of the problem

Promotion of OFSP among consumers through demonstration on the street and mass media has shown no significant improvement (Brouwer *et al.,* 2018). Therefore, it is crucial to develop another promotion strategy since, there is still low consumption of vitamin A rich foods in Ethiopia (CSA& ICF 2016), which is associated with lack of knowledge in the community about vitamin A rich foods and some socio-demographic factors (Dangura *et al.,* 2017, Freyermuth *et al*., 2017 & Okidi *et al.,* 2018). VAD still remained higher. Numerous interventions has been done to solve the problem mostly through supplementation but very few has done through promotion of biofortified foods.

1.3. Significance of the study

This study aims at validating of OFSP promotion leaflet and evaluating its effectiveness on adoption of OFSP. Once the tool validated and found effective, it can be used as a communication channel by CIP for promotion of OFSP. This may play an important role in tackling the vitamin A deficiency problem of the community using dietary approach by increasing consumption of vitamin A rich OFSP. In addition, there are few studies on promoting

nutrient rich foods using leaflets. Therefore, this study may pave a way to carry out more research about developing education tools to promote nutrient dense foods.

1.4. Objectives

1.4.1. General objective

- To promote OFSP using leaflet and assessing its effectiveness towards KAP of sweet potato consumers in Hawassa city, SNNPR Ethiopia.

1.4.2. Specific objectives

- To develop a validated OFSP promoting leaflet
- To evaluate the effectiveness of the OFSP promoting leaflet on improving knowledge of participants on what vitamin A and OFSP are.
- To evaluate the effectiveness of the OFSP promoting leaflet on improving attitude of participants about vitamin A and OFSP.
- To evaluate the effectiveness of the OFSP promoting leaflet on consumption practice and recipe preparation.

1.5. Research question

- Does promotion of OFSP using consumer-based leaflets bring behavioral change?

2. Literature review

2.1. Global and National Vitamin a Deficiency Trends

Vitamin A Deficiency is a major public health problem worldwide, especially in developing countries causing enormous health problems (Abebaw *et al.,* 2019). According to WHO 2007 report, globally 7.8% of pregnant women are vitamin-A deficient and 9.8 million women worldwide are at risk for VAD (WHO, 2007). African and South-East Asian are at highest burden of prenatal VAD with prevalence of 9.8% and 9.9%, respectively (WHO, 2009). A Systematic review study in four countries in Africa namely Ethiopia, Nigeria, Kenya and South African vitamin A deficiency (VAD) was ranged from 14% to 42% (Rajwinder *et al.,* 2017).

In 2010, Tsegaye indicated national prevalence rate of 1.7% for Bitot's spots, 0.8% for night-blindness, and 37.7% deficient serum retinol among children and 1.8% for night blindness among mothers. Recent report of Ethiopian public health institute indicted that an estimate of 13.9% under-5 children in Ethiopia are vitamin A deficient (Ethiopian Public Health Institute, 2016).

2.1.1. Why should vitamin A be included in the leaflet?

Studies suggested that adoption of OFSP would more effective when its health benefit is also promoted together (Emily et al., 2013). Introduction of OFSP in rural Uganda and Mozambique increased vitamin A intake and vitamin A status of young children (Hotz, *et al*., 2012 and Low *et al*., 2007). Therefore, inclusion of vitamin A on the leaflet is due to two reasons: one is to increase the awareness of the readers about vitamin A by itself and the other is to describe how OFSP is vitamin A rich food.

2.1.2. Functions of Vitamin A

Vitamin A is one of the essential micronutrient needed by human body for normal functioning of vision sharpness (Wolf, 2001; Combs, 2008) cellular differentiation and proliferation (Ertesvag *et al.*, 2002; Mora *et al.*, 2008), gene transcription (Combs, 2008; Duester, 2008), and Skin integrity (Moore, 1971; Nelson *et al.*, 2008). It also plays a great role in growth, reproduction, bone metabolism and immune system (Imdad *et al.*, 2010; WHO, 2011).

2.1.3. Risk factors of VAD

The main cause of VAD is low consumption of diet rich with vitamin A (such as: dairy products, eggs, liver, fruits and vegetables), poor nutritional status and a high rate of infections, particularly, measles and diarrhea (Guidelines on food fortification with micronutrients, 2006). And that is why children are prone for the problem since their diet are not based on those foods (Food and Nutrition Board, Institute of Medicine, 2001).

2.1.4. Consequences of VAD

Due to its manifold importance to our body, the consequences of vitamin A deficiency or so-called manifestations as Vitamin A Deficiency Disorders are not single (Tsegaye et al., 2010). When vitamin A deficiency becomes severe it can cause retardation in growth and development, night blindness and increased risk of illness and death from infections caused by weekend immune system (WHO, 2009;2011), including measles and diarrhea which are common in children and even death (Imdad et al., 2010).

2.1.5. Vitamin A rich foods and its consumption habit

Vitamin A is naturally found in animal products like egg yolks, butter, milk, liver and fish liver oil in the form of retinol. Fruits and vegetables with pigments of red, orange, yellow and dark

green leafy vegetables generally, provide carotenoids, most commonly in beta (β)-carotene form with different density of the food type (Meschino Health, 2013; DeMan, 1999). The β-carotene later on changes in to bioavailable form of vitamin A known as retinol in the liver, which is expressed in retinol activity equivalence (RAE), with conversion factor of 12μg beta-carotene into 1μg retinol (Food and Nutrition Board, Institute of Medicine. 2001).

Studies indicated that more than 80% of vitamin A intake in African households are from plant foods even though studies have shown that best sources of readily bioavailable vitamin A are animal source foods such as liver, eggs and dairy products (Codja, 2001). But continuous consumption of high amount animal source food is associated with chronic health problem (WHO, 2015). Also the accessibility of animal products for low and middle income households is questionable (Hess et al., 2015). Therefore, it is wise to consume plant source foods which constitutes large amount of bio-available beta-carotene later on to be converted into retinol in our body, for example: Orange-fleshed Sweetpotatoes (Low et al, 2017).

According to EDHS 2016 report, only 38% of children aged 6-23 months consumed foods rich in vitamin A, foods during the 24 hours before the interview (CSA & ICF 2016). Studies revealed that the low consumption of vitamin A rich food is associated with lack of knowledge in the community about vitamin A rich foods and some socio-demographic factors (Dangura et al., 2017, Freyermuth et al., 2017 & Okidi et al., 2018).

2.2. Orange Fleshed Sweet Potato (OFSP)

Orange fleshed sweet potato is one of nature rich with beta-carotene. Even one average (100-125 grams) OFSP root can supply the recommended dietary allowance (RDA) of vitamin A for young children, teenagers and for nearly every adult life stage (Emily et al., 2018). See Table *1* for recommended daily allowance of Vitamin A for different age groups. Standard conversion

rate of 12µg beta-carotene to 1RAE has assumed. (National Institutes of Health Office of Dietary Supplements, 2016).

Table 1: Recommended Dietary Allowances for vitamin A for different groups, in retinol activity equivalents (RAE)

Age	Male	Female	Pregnancy	Lactation
0-6 months	400	400		
7-12 months	500	500		
1-3 years	300	300		
4-8 years	400	400		
9-13 years	600	600		
14-18 years	900	700	750	1200
19-50 years	900	700	770	1300
51+ years	900	700		

Source: https://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/. Accessed on 03/01/2020

Some vitamin A content might be lost when food is cooked. One of the reason that made OFSP special is its ability to retain, on average, over 90% of their carotenoids after being boiled (Islam *et al.*, 2016). Studies have indicated infant foods made from OFSP are a better source of vitamin A than complementary food made from white-fleshed sweet potato or maize based commercial complementary foods (Amagloh *et al.*, 2014). Another studies conducted in South Africa, Uganda and Mozambique showed that giving OFSP to school-aged children in a controlled setting in improved their vitamin A status (van Jaarsveld *et al.*, 2005, Hotz, *et al.*, 2012 and Low *et al.*, 2007).

Similar to other varieties of sweet potatoes, OFSP is good sources of vitamin C and E as well as dietary fiber. It is also good source of energy (293 – 460 KJ/100 g) (Low *et al.,* 2007) and particularly high in β-carotene (Hotz, 2007). It is considered as a very cheap source of vitamin A. It is also rich in dietary fiber, which could have different health benefits like reducing the incidences of cardiovascular diseases, diabetes, obesity and digestive system regulation and promotion of the growth of beneficial gut micro flora (Brennan, 2005 & Dhingra *et al*, 2012). Orange fleshed sweet potato is low in fat, cholesterol and protein (Burri, 2011). Since vitamin A is a fat-soluble vitamin, adding just a teaspoon of dietary fat to an OFSP-based food can increase the vitamin A absorption and the utility of OFSP (Emily et al., 2018).

Despite to all of its importance, only 19.5% (126 out of 646) have heard about OFSP, about 7.6% of them have ate it and only 4.1% (2 out of 49) have ate it consciously for its health benefit at their households according to a survey done by CIP Hawassa office in 2018 (Brouwer, *et al.,* 2018).

2.3. KAP of participants towards vitamin A and OFSP in the study area

In 2018, Brouwer has assessed 646 sweet potato consumers profile of Hawassa town- the same area of current study (Brouwer *et al.,* 2018). There is no other study regarding KAP of sweet potato consumers in the study area. Therefore, this study heavily focuses on the finding of Brouwer's study.

Brouwer has indicated that 55.4% of study participants claimed to have heard about vitamin A. They were asked to give at least one example of vitamin A rich foods and 50.6% gave correct example. The most mentioned items are dark leaves, dairy and egg yolks but, only 3.1% participants (20 person) mentioned OFSP (Brouwer *et al.,* 2018). It was also indicated that all

participants have heard about sweet potato but, only 19.5% of them have heard about OFSP and 7.5% of them eaten it. Out of them only 0.3% of participants ate OFSP consciously for the nutritional benefit. It was also indicated that most of participants believes that OFSP is less nutritious than cereals and WFSP. But the perception of those who have heard about OFSP was more positive in general (Brouwer *et al.,* 2018). Brouwer has also assessed the way participants used to prepare sweet potato for consumption in the last six month and found that almost all of them (99.8%) used boiling and only 0.2% used other recipe form(Brouwer *et al.,* 2018).

2.4. Rationale behind using vendors to distribute the leaflet

Orange fleshed sweet potato promotion is an example of social marketing. It focuses the health benefits from vitamin A especially, for pregnant women and young children (Low *et al.,* 2007 & Mutiso *et al.,* 2018). Brouwer (2019) researched the way in which people perceive OFSP for its consumption. "The uptake of healthy food such as OFSP is shaped by the wider context and by individual decisions" Citing (Herforth *et al.,* 2015) he cited five concepts that help to understand the context or environment in which healthy dietary choices are made: availability, accessibility, convenience, affordability and acceptability. Availability, accessibility, and convenience refer to the physical existence and the proximity of food. Food retail outlets affect consumers' diet-related health and nutrition by the foods they sell and prices they charge.

Retailers are important as they ensure the proximity and accessibility of healthy food. But they are also important as a communication channel. Brouwer's (2019) study of consumers in Maputo shows that in Maputo OFSP is widely known and part of the city's food system. Vendors were the second most important source of information after relatives (mentioned by 76% of the respondents). Only 14% of the participants in the study mentioned health center as a source.

Research confirms role of vendors in disseminating recipes that make a food item more attractive to consumers (Möhring, 2008).

2.5. Development and validation of leaflet

Johnson et al (2005) indicated that transferring information through verbal is least effective in teaching strategies for patient education as they recall very few instructions spoken to them (Johnson et al., 2005). Johnson suggested that using written materials as a tool to transfer information is more effective than verbal communications. There is another meta-analysis study that support this idea (Theis et al., 1995).

Developed leaflet should be checked for its content before distributing to users. Different formals have developed in previous time to check the content validity of leaflets. Once the reading materials are checked for its content validity, it readably also have to be tested. There are different formulas to test readability of a leaflet, but almost all are prepared to be used in English language. Some studies suggest to use response evaluation (Renuka et al., 2013).

2.5.1. Content validity of the leaflet

All contents that might be raised on a leaflet should be checked how much valuable it is, usually by determined by the judgment of experts from subject matter. This process of validation is called Content validation (Lawshe, 1975). In 1975, Lawshe proposed how each of the subject matter expert raters (SMEs) on the judging panel respond to the following question for each item: "Is the skill or knowledge measured by this item 'essential,' 'useful, but not essential,' or 'not necessary' to the performance of the construct?". Then, the tool will be modified based on expert opinion. The rationale is if more than half the panelists indicate that an item is essential, that item has at least some content validity. As larger numbers of panelists agree that a particular

item is essential, the greater levels will be the content validity. Lawshe developed a formula termed the content validity ratio (CVR) based on the above concept.

CVR = (ne − N / 2) / (N / 2) where CVR = content validity ratio, ne = number of SME panelists indicating "essential", N = total number of SME panelists. This formula yields values which range from +1 to -1; positive values indicate that at least half the SMEs rated the item as essential. The mean CVR across items may be used as an indicator of overall test content validity. The minimum values of the CVR to ensure that agreement is unlikely to be due to chance can be found (see Annex IV). (Renuka *et al.,* 2013)

2.5.2. Readability test

Readability of a leaflet can be assessed based on user-testing questionnaire (Mateti *et al.,* 2015). In this process, baseline knowledge of the users should be assessed before giving prepared leaflet. Certain number of questions can be used for this assessment. After assessment of participants' knowledge, the leaflet shall be given to them. Letting participants to read the leaflet for certain minutes and asking the same question after reading the leaflet. Then their responses shall be calculated by using Response Evaluation formula.

Response Evaluation = (Total number of correct responses of users/ Total number of actual responses) x 100

Globally, different studies were conducted on preparation, validation and user-testing of leaflets, mostly for patients' drug description, with different scoring methods for the content validation (Mateti *et al.,* 2015).

Most of previously conducted studies were tested for readability of the leaflets by using the western developed formulas such as Flesch Reading Ease, Flesch–Kincaid grade level and

Simplified Measure of Gobbledygook index readability (Renuka *et al.*, 2013). But all above mentioned methods of readability testing formulas can works for leaflets prepared by English language. Hence, the validity and readability of western developed readability formulae for Amharic language cannot function. User-testing is acknowledged to be accurate method to assess the readability of the leaflets in any language (Mateti *et al*., 2015).

In addition to the user-testing, opinion of users is suggested to be assessed since it is one of important motivational reason consumers to read the leaflet (Renuka *et al.*, 2013). User shall give their opinion about the content, layout and design in a rating form containing certain amount of questions and the scores can range from 1-5 or Likert can be used. Then, the interpretation of the result can be set Good, Average or Poor. It depend on the researcher choice (Renuka *et al*., 2013).

3. MATERIALS AND METHODS

3.1. Description of the Study Area:

Hawassa is located in southern part of Ethiopia. It is the capital city of the Southern Nations, Nationalities and Peoples' Region (SNNPR). Hawassa consists of 32 kebeles (smallest unit of administrative classification) grouped into eight sub-cities. The total population of the city is estimated to be around 409,506. Out of the total population, more than 90% of the population consume sweet potato (Brouwer, *et al.*, 2018). There are three big local markets namely Addisu Gebeya, Aroge Gebeya, and Gulit Sefere Selam, where people buy sweet potato root. Roots of OFSP are not available in the marker. The number of vendors selling sweet potato are not as many as other vegetable vendors, about only 3, 5 and 2 in each market, respectively. In addition to markets, there are some supermarkets and shops that sell vegetables including sweet potato. The root sources are mostly from neighbouring woredas and zones of Hawassa such as Hawassa Zuria in Sidama and Sodo Zuria in Wolayita.

3.2. Study Design and Period

The Quasi-experimental design with pre-test and post-test with equivalent control groups was used. The baseline and endline data was collected in May, 2019 and November, 2019 respectively.

3.3. Source and Study Population

3.3.1. Source population

Selected member of household aged above 15 years and customer to the vendor, and have access to phone were source population.

3.3.2. Study population

Selected member of household aged above 15 years who were registered to phone interview by giving their phone number to vendors were study population.

3.4. Inclusion and Exclusion Criteria

Participants who were registered to phone call were included in the study. But those who were unable to be interviewed due to sickness or busy program were excluded.

3.5. Sample Size Determination and Sampling Procedure

3.5.1. Sample Size determination

The p1 value of this study has obtained from Brouwer's study on the study area titled "The profile of sweet potato consumers in Hawassa city, in 2018" (Brouwer *et al.*, 2018). It was found that p1 values for knowledge, attitude and practice were 0.195, 0.0031 and 0.075, respectively.

Based on the above mentioned values as p1 for each variables, current study expected to improvement of 10% for each variables after intervention group.

The sample size has determined by using double population which is appropriate in comparing proportions (Wang et al., 2007). The formula is presented below.

$$n = \frac{[Z\alpha/2 + Z\beta]^2 [p1(1-p1) + p2(1-p2)]}{(p1-p2)^2}$$

Where,

Z_β = Z score for the power of the study with 80% power (type II error=20%)

$Z\alpha/_2$=Z score for the type I error (conventionally Type I error is fixed at 95% CI and α/2 is used for two tailed significance.

P2=proportion of cases after treatment, i.e., received leaflets

p1=proportion of controls. i.e., not received leaflets

P1-p2 is a measure of effect size

As indicated on Table 2 below, the sample size calculated to determine improvement in knowledge of OFSP was higher than others. Hence, 316 subjects were included in intervention group. The same number of 316 subjects were used for control group. In total, sample size of this study was 632 households.

Table 2: Sample size calculation

	P_2	Expected change after intervention	P_1	Critical value 95% confidence level	Power (80%)	10% non-response rate	Final sample size
Sample size for knowledge assessment	0.295	0.1	0.195	1.96	0.8	28.6	316
Sample size for attitude assessment	0.1031	0.1	0.0031	1.96	0.8	7.5	83
Sample size for consumption practice assessment	0.175	0.1	0.075	1.96	0.8	16.5	182

3.5.2. Sampling procedure and sampling techniques

Twenty willing vegetable sellers were identified from Hawassa town. Then, ten vendors were selected randomly to receive leaflet. The other ten vendors were allocated randomly to the control group and did not receive the leaflet.

Each vendors in both groups were asked to recruit at least 40 volunteers and register their phone number to the interview. From total 920 registered volunteers, 632 respondents with active phone number participated in the study. After completing baseline survey, 10 Kg of OFSP was donated to all vendors on a weekly base for two months. If vendors sold out their 10 Kg before the end of the week they would receive additional roots to avoid the influence of consumers' knowledge, attitude and practice by the absence of sweet potato at the vendor. At the same time, the leaflets were given to the vendors to distribute to their customers. The second round interview was held after two months of leaflet distribution. The sampling procedure is presented on figure below:

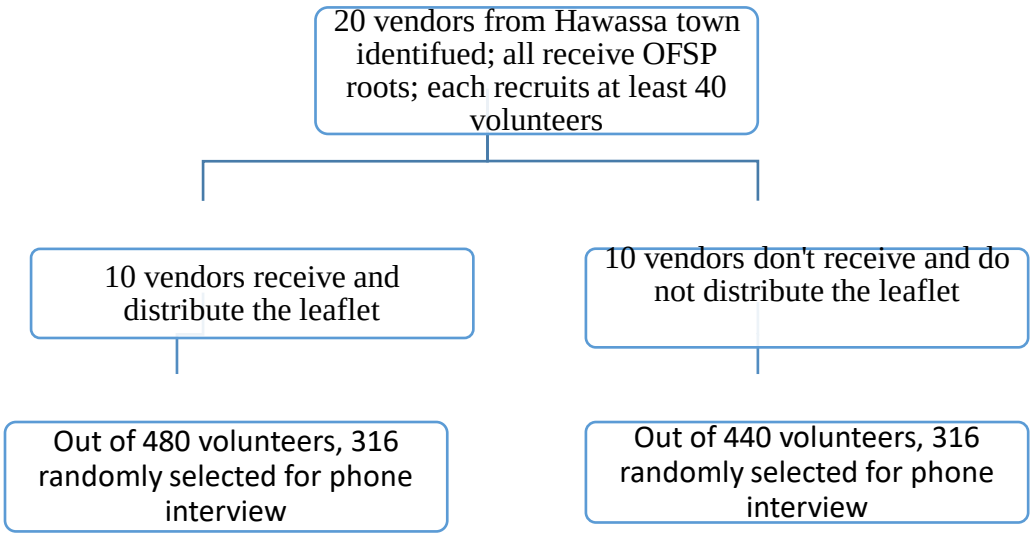

Figure 1: Sampling procedure

3.6. Variables of the study

3.6.1. Dependent variables:

- Knowledge about vitamin A and OFSP
- Attitude towards vitamin A and OFSP
- Practice on consumption of OFSP and recipe preparation

3.6.2. Independent variables:

- Receiving leaflet
- Socio-economic status of household
- Demographic data of the respondent (age, gender and occupation)

3.7. Data collection

3.7.1. Data collection instrument

The data were collected by using phone calls. Using phones to do interview is a growing and validated tool to collect data. Also it is cost effective and almost comparative with face-to-face interview (Anderson *et al.*, 1998, Lisa *et al*, 2001, & Sweet, 2002). Data regarding to demographic and socio-economic status variables such as Age, Gender, Position in the households, Occupation, Car ownership, Type of telephone and KAP regarding vitamin A and OFSP were collected. The interviews were carried out by five female enumerators who were trained at the beginning of the study. During the training minor changes in the draft questionnaire were made to resolve ambivalences and misunderstandings and to facilitate the flow of the interviews.

3.7.2. Data collectors

Five female enumerators were recruited and trained in data collection with supervision of the researcher. They were pursuing a master's degree in human nutrition, or food science field and who are fluent in Amharic, and either the local language of Sidama or Oromifa. All five enumerators completed a one day training, which included orientation to the CIP project; an objectives of research; research ethics training; an introduction to the research tools; and translation of informed consent.

3.7.3. Data quality control measures

The questionnaires has been pre-tested during training of enumerators, in order to keep its accuracy and consistency and modified as necessary for clarity and sensitiveness. Furthermore, any necessary corrections on daily basis of the data collection has been done. Completion of the collected data has been checked carefully on a regularly basis.

3.8. Operational Definition of Terms

Attitude: - perception of subjects towards benefit of OFSP

Knowledge: - understanding about vitamin A, OFSP, and recipe preparation from OFSP.

Practice: - consumption and preparation of at least one recipe from OFSP rather than boiling

Readability test: - clearness of words in the leaflet for the readers which is tested by correct responses of evaluation of participants for the questions provided to them based on the content.

Wealth ranking: - is how the participants ranks the wealth status of their neighborhood.

Vendors: - vegetable sellers participated in this study to sell OFSP.

Leaflet: - a paper with information about vitamin A and OFSP.

3.9. Leaflet preparation

An in-depth literature review and discussions have been done with experts from CIP organization and school teachers of Hawassa University to formulate the content of leaflet. The leaflet consisted of different messages with few and selected words in Amharic language. And the words have been made bold enough to be read and decorated by expert of graphics to attract the reader. Initial framework of the leaflet consisted introduction that OFSP is rich with vitamin A. In addition, the framework explains what vitamin A is, why it is important, how its deficiency would occur and what foods are good sources to it. The second part of the leaflet describes additional nutrients we obtain from OFSP other than vitamin A, mentioning its function of giving heat and energy, vitamin C, E and B complex and magnesium and potassium, which is common for others sweet potatoes varieties, too. Thirdly the leaflet discusses the importance of OFSP leaves in addition to its root, mentioning the health benefit of lutein that found in the leaves of OFSP in prevention of degenerative eye disease and its ability to be utilized as a vegetable which is uncommon among the community. Forth part of the leaflet describes the ability of OFSP to be prepared as different recipes other than just boiling and what proportion should be used when it is wanted to blend with other floor. The leaflet is attached on Annex XI.

Leaflet was prepared by following the European Commission Guidelines for patient information leaflet and information packages (2009). Key aspects are type size and font, design and layout of the information, headings, print colour, syntax, style, paper, use of symbols and pictograms Font size was chosen to be easy to read. The leaflet avoided using stylized fonts to minimize its difficulty to read. The type size has been made as large as possible to aid readers. Different text sizes were used to enable key information to stand out and to facilitate navigation in the text (for example, for headings). Our brain recognizes words in written documents by the word shape.

Therefore, large and bold letters were used for emphasis. As italics and underlining make it more difficult for the reader to recognize the word-shape, they are not used in the text.

Line space has been clear to both left hand and right hand margins as well as between lines hence it is an important factor influencing the clarity of the text. Since the contrast between the text and the background is important to the accessibility of the information, clear contrast between the text and the background has been used with the aid of experts of graphics.

Headings are important to information stand out and can help readers to navigate the text, bold type face with a different colour were used in this leaflet. The spacing above and below the headings were consistent throughout the leaflet. Same level headings has appeared consistently (numbering, bulleting, colour, indentation, font and size) to aid the reader. In addition to different type size, the leaflet was colour printed to make headings and other important information to be clearly recognized and legible. Simple words have been used as much as possible by considering participant's poor reading skills, and poor literacy. Couple of short sentences were used, especially for new information to avoid confusion of readers that may occur from long paragraph. When there are lists of points, bullets were used but no more than four bullets. An active style has used while writing, instead of passive. Reasons were provided when the readers were suggested to do something. No abbreviations and scientific symbols were used for they would not be well understood. Medical terms were translated into language which readers can easily understand.

The leaflet was prepared from 150 gram/m^2, which is thick enough to avoid transparency which makes reading difficult, particularly where the text size is small. A great care was taken to make sure that when the leaflet is folded the creases do not interfere with the readability of the information. Amharic language alphabets have been used since the targets could be addressed

easily. Different pictures were used as evidence for what the text states about, but not necessarily to replace the texts.

3.10. Evaluation of Prepared leaflet

The leaflet was evaluated for its content and readability before delivering to the users. Number of authors described methods for content validation of tool (Renuka et al., 2013). Among which content validity by Lowshe method (Lawshe, 1975) is widely used. The readability of the leaflet has checked by user-testing method, which is appropriate method to check readability for languages other than English (Mateti *et al*., 2015).

3.10.1. Content Validation of the leaflet

The leaflet has been validated for its content by experts from Hawassa University and CIP organisation using paper-based questionnaires. Six questions where presented to experts with the leaflet for the evaluation. All major points mentioned on the leaflet where evaluated for its essentiality. Validators were asked to evaluate the leaflet based on the points mentioned on the questions choosing either as ‘essential’, ‘useful, but not essential’ or ‘not necessary’. Also space has given to them to comment or give any suggestion it seems to be corrected. Then the responses were evaluated using Lawshe developed a formula termed the content validity ratio: CVR = (ne − N / 2) / (N / 2) where CVR = content validity ratio, ne= number of SME panelists indicating "essential", N = total number of SME panelists. They were also asked to give their comment on overall content and preparation of the leaflet.

3.10.2. Readability test of the leaflet

Readability was assessed based on user-testing questionnaire (Mateti *et al.,* 2015). For this user-testing, four multiple-choice questions were prepared based on the content of the leaflet. During the user-testing, questionnaire was administered to 10 randomly selected users. Researcher

waited to them standing in certain vegetable shop and asked whether they know or not about vitamin A and OFSP before asking the questions. After assessing baseline knowledge of participants, they were allowed to read the leaflet for 10 min. After ten minutes, the respondents were asked the same questionnaire to assess the knowledge that they got after reading the leaflet. At the end of the study, the response was evaluated using the following formula.

Response Evaluation = (Total number of correct responses of users/ Total number of actual responses) x 100

After knowledge assessment, opinion of the participants was elicited about the content, layout and design. In a rating form containing 4 questions and the scores were ranged on 5–1 scale. Those scores were based on Linkert ordinal scales arranged in descending order of excellent, very good, good, average, and poor.

3.11. Data collection, processing and analysis

For the study a structured questionnaire was designed that covers four aspects: knowledge about vitamin A and sweet potato, the attitude towards vitamin A and sweet potato, sweet potato consumption practices and socio-economic data regarding the respondent and his or her household. The questionnaire was elaborated in English language and subsequently translated in Amharic language and retranslated again to English language.

For data collection five female enumerators were contracted and trained. Data collection was by phone, using SIM cards specifically acquired for this activity to protect the enumerators' identities.

The information from the questionnaires was introduced in a database using data entry software (CSPro 7.3). Data were checked for inconsistencies and mistakes corrected. The entered and corrected data were analyzed by using SPSS software version 22.0. Chi²-test has been used to evaluate the difference between groups and T-test has been used to analyze continuous variables.

3.12. Ethical consideration

Ethical approval was obtained from Hawassa University Institute Review Board. The objective of the study was clearly explained to the participants before registering them to the study and informed consent was obtained from each participant. For the sake of informed decision and for easy comprehension during the interviews, questionnaires were translated to Amharic.

3.13. Plan for dissemination of results

After approval by the university, the paper will be published and available online so that the finding may be used to support any sectors in charge and being an input for further studies.

4. RESULTS AND DISCUSSION

4.1. Participants' socio-economic and demographic characteristics

A total of 632 participants (316 in each group) were recruited in the beginning of the study. Some socio-economic and demographic characteristics were asked at the beginning of the study. The socio-economic and demographic characteristics of the respondents are presented in the Table 3. There was no any significant difference between groups.

There was 100% response rate of the study participants in both groups at the baseline. There were no significant difference of mean KAP scores between both groups. But the end-line data were summarized from only 113 participants of the intervention group and 303 from the control group. The rest of the study participants were either not willing to continue the end-line assessment or their phone was not working at the data collection period. Participants from intervention group but doesn't did not received the leaflet has are also considered as non-respondent rate.

Table 3: Socio-economic and demographic characteristics of the respondent (n1=n2=316)

		Intervention (n=316)		Control (n=316)		Chi^2	p-value
Questions		N	%	N	%		
Gender of respondent	Male	143	45	131	41	0.928	0.335
	Female	173	55	185	59		
Mean age(SD) of respondent		30.6 (8.785)		30.5(9.271)		0.163[a]	0.871
Respondent is head of the household	Yes	170	54	188	69	2.088	0.149
	No	146	46	128	31		

Respondent is the one who usually buy vegetables	Yes	172	54	178	56	0.231	0.631
	No	144	46	138	44		
Household employed servant	Yes	148	47	142	50	0.229	0.632
	No	168	53	174	50		
Respondent using smart phone	Yes	215	68	225	71	0.748	0.387
	No	101	32	91	29		
The household owned car	Yes	77	24	65	21	1.308	0.253
	No	239	76	251	79		
Respondents categorized their neighborhood	Poor	48	15	43	14	0.519	0.771
	Middle class	237	75	238	75		
	Rich	31	10	35	11		

[a] t-value of two independent samples

4.2. Result for Evaluation of prepared leaflet

The prepared leaflet was evaluated for its content and tested for its readability. This study is the first of its kind in Ethiopia conducted on preparation, validation and user-testing of consumer based leaflets for sweet potato consumers. Globally, different studies were conducted on preparation, validation and user-testing of leaflets, mostly for patients' drug description, with different scoring methods for the content validation (Mateti *et al.,* 2015).

Most of previously conducted studies were tested for readability of the leaflets by using the western developed formulas such as Flesch Reading Ease, Flesch–Kincaid grade level and

Simplified Measure of Gobbledygook index readability (Renuka *et al*., 2013). But all above mentioned methods of readability testing formulas can works for leaflets prepared by English. Hence, the validity and readability of western developed readability formulae for Amharic language cannot function, since the symbols of words are different. In the present study, user-testing was used to assess the readability of the leaflets. User-testing is acknowledged to be accurate method to assess the readability of the leaflets in any language (Mateti et al., 2015).

4.2.1. Content Validation Ratio of the leaflet

Experts' result on content validation ratio is presented on the table 4 below. Total number of experts is 10. Six questions were administered for each of them. The rank for each questions were summed up and divided for total number of questions to the mean CVR. The minimum rank expected to accept the points is +0.62 when the number of experts is 10.

Table 4: The mean CVR across items on the leaflet

Question number	Total number of essential (ne)	CVR =(ne − N / 2) / (N / 2) (Hence, N=10)
Q1	10	(10-10/2) / (10/2) = +1
Q2	10	(10-10/2) / (10/2) = +1
Q3	10	(10-10/2) / (10/2) = +1
Q4	9	(9-10/2) / (10/2) = +0.8
Q5	9	(9-10/2) / (10/2) = +0.8
Q6	9	(9-10/2) / (10/2) = +0.8
Overall CVR		5.4/6= 0.9

4.2.2. Readability testing of the leaflet

Readability of the leaflet was assessed by Correct Response Evaluation and User-opinion test. This study indicated that during user-testing, knowledge score at the baseline significantly improved from 46.4 to 100 with p value <0.001. Similarly, study conducted by Gibbs et al., (1990) have improved knowledge levels in recognizing the uses and side effects of medications from 40% to 67% (Gibbs et al., 1990). Table 5 describes the findings of correct response evaluation of participants.

Table 5: Correct response evaluation of participants before and after reading the leaflet

	Expected mean score	Outcome Mean	Mean score in %	N	Std. Deviation	T-test	P-Value
Before reading the leaflet	4	1.855	46.4	10	0.445	-15.243	0.000
After reading the leaflet	4	4.000	100	10	0.000		

The result of this study revealed that all of participants rated the leaflets content, legibility and design as good. Table 6 below illustrates the opinion test result of users.

Table 6: Opinion test result of users on the content, layout and design of leaflet

	User opinion scores			Total
	Good (%)	Average (%)	Poor (%)	
Opinion of users	10(100)	0	0	10

4.3. Knowledge, attitude and practice assessment of the participants

The KAP of this study participants were analyzed by using mean KAP scores of the variables using Chi-squared test ($\chi 2$). As shown by table 7 below, baseline mean (SD) KAP scores for the treatment and control groups are 1.557±1.573, 0.997±0.934and 0.581±0.720, and 1.700± 1.426, 1.041±0.855 and 0.519±0.654, respectively. There was no significant difference of mean score between the two groups.

Table 7: Mean KAP scores of intervention and control group together at the baseline (N=316)

	Intervention		Control		$\chi 2$	p-value
Knowledge	N	%	N	%		
Knows about vitamin A	153	48.4	175	55.4	3.068	0.080
Knows example of Vit.A rich foods	124	81.0	162	92.6	9.712	0.0018
Provides correct example	102	82.3	120	74.1	2.708	0.100
Has heard about OFSP	68	21.5	56	17.7	1.445	0.230
Knows different recipes preparation	43	13.6	27	8.5	4.113	0.043

Mean (SD) knowledge score	**1.557 (1.573)**		**1.700 (1.426)**		**3.976**	**0.553**
Attitude						
Think that Vit.A is important for health	146	95.4	169	96.6	0.282	0.595
Ranks sweet potato among top three most preferred vegetables.	130	41.1	123	38.9	0.323	0.570
Ranks OFSP among top three most preferred vegetables.	24	7.6	22	7	0.094	0.760
Thinks OFSP contains Vit.A	15	22.0	15	26.7	1.714	0.424
Mean (SD) attitude score	**0.997 (0.934)**		**1.041 (0.855)**		**8.473**	**0.076**
Practice						
Eat vitamin A rich food, intentionally.	116	79.4	113	66.8	1.730	0.188
Bought OFSP for own consumption	35	94.6	32	86.5	1.420	0.233
Says know different recipe preparation than boiling	43	13.6	27	8.5	4.113	0.043
Applied different recipe with OFSP	31	72.1	19	70.4	0.024	0.877

Mean (SD) practice score	**0.581 (0.720)**	**0.519 (0.654)**	**3.595**	**0.309**

As shown on table 8 below, endline mean KAP scores for the treatment and control groups are 4.398±(0.978), 3.478±1.061 and 2.177±0.788, and 2.274±1.674, 1.224±1.146 and 0.997±0.995, respectively. There is significant improvement of mean KAP scores of the treatment groups ($p<0.05$) over the control group.

Table 8: Mean KAP scores of intervention and control group together at the endline

	Intervention (N=113)		**Control (N=303)**		**$\chi 2$**	**p-value**
Knowledge	**n**	**%**	**N**	**%**		
Know about vitamin A.	109	96.4%	200	66.0%	39.953	0.000
Know example of Vit.A rich foods	90	82.6%	176	88.0%	1.737	0.187
Provided correct example.	85	94.4%	114	64.8%	27.822	0.000
Heard about OFSP.	111	98.2%	128	42.2%	105.536	0.000
Know different recipes preparation	103	91.1%	70	23.1%	156.890	0.000
Mean (SD) Knowledge score	**4.398 (0.978)**		**2.274 (1.674)**		**156.61**	**0.000**
Attitude						
Think that Vit. A is important for health.	108	99.1%	188	94.0%	4.522	0.033

	Intervention (N=113)		Control (N=303)		$\chi 2$	p-value
Knowledge	**n**	**%**	**N**	**%**		
Ranks sweet potato among top three most preferred vegetables.	94	83.9%	92	34.7%	76.277	0.000
Ranks OFSP among top three most preferred vegetables.	95	95.9%	38	40%	64.583	0.000
Thinks OFSP contains Vit. A.	96	86.5%	53	41.4%	71.702	0.000
Mean (SD) Attitude score	**3.478 (1.061)**		**1.224 1.146)**		**210.384**	**0.000**
Practice						
Eat vitamin A rich food, intentionally.	99	90.8%	152	76%	6.224	0.0126
Bought OFSP for own consumption	99	98.0%	94	100%	1.881	0.1702
Says know different recipe preparation than boiling	103	91.1%	70	23.1%	156.890	0.000
Applied different recipe with OFSP	48	47.5%	54	57.4%	16.065	0.000
Mean (SD) practice score	**2.177 (0.788)**		**0.997 (0.995)**		**113.426**	**0.000**

4.4. Changes in mean KAP scores for both groups at base and endline

Independent T-test has been used to see the change of mean KAP scores at baseline and endline for both groups. The results in Table 9 and Table 10 shows mean KAP scores at baseline and

endline for the intervention, control, and the composite of both, respectively with its significance and standard deviations.

Baseline means KAP score for the intervention and control groups were 0.557, 0.997, and 0.581 and 1.700, 1.041 & 0.519, respectively. Endline means KAP score for the intervention and control groups are 4.398, 3.478, and 2.177 and 2.274, 1.224, and 0.990, respectively. There was no significant difference between the two groups at the baseline. But at the endline there is significant difference ($p<0.05$) between the two groups at the endline and within the same group at baseline and endline.

Table 9: Comparison of means of KAP scores of intervention group at the baseline and endline

	Base and Endline	N	Mean	Std. Deviation	p-value	t-value
Composite knowledge score	Baseline	316	1.557	1.573	0.000	-22.257
	Endline	113	4.398	0.978		
Composite attitude score	Baseline	316	0.997	0.934	0.000	-23.352
	Endline	113	3.478	1.061		
Composite practice score	Baseline	315	0.581	0.720	0.000	-19.760
	Endline	113	2.177	0.781		

In this study, supply OFSP root to all vendors seems to have changed behavior. Research confirms the role of availability in consumer behavior (Herforth et al., 2015). Studies also confirms role of vendors as information carriers about food/OFSP (Brouwer 2019). Another research also confirmed the role of vendors in disseminating recipes that make a food item more attractive to consumers (Möhring, 2008). Table 10 presented changes in KAP of control group comparing the baseline and endline.

Table 10: Comparison of means of KAP scores of control group at the baseline and endline

	Base and Endline	N	Mean	Std. Deviation	p-value	t-value
Composite knowledge score	Baseline	316	1.700	1.426	0.000	-4.588
	Endline	303	2.274	1.674		
Composite attitude score	Baseline	316	1.041	0.855	0.000	-2.247
	Endline	303	1.224	1.146		
Composite practice score	Baseline	316	0.519	0.654	0.000	-6.929
	Endline	303	0.990	0.995		

Table 11 below compares the composite means of KAP scores of both groups as a whole at the baseline and endline. As it can be seen the difference is significant ($p<0.05$).

Table 11: Comparison of composite means of KAP scores of intervention and control group together at the baseline and endline

	Base and Endline	N	Mean	Std. Deviation	p-value	t-value
Composite knowledge score	Baseline	632	1.628	1.502	0.000	-11.532
	Endline	416	2.851	1.786		
Composite attitude score	Baseline	632	1.020	0.895	0.000	-9.974
	Endline	416	1.836	1.506		
Composite practice score	Baseline	631	0.550	0.688	0.000	-12.799
	Endline	416	1.313	1.080		

At the endline those who received the leaflet were asked what their perception looks like toward OFSP after reading the leaflet. From total 113 participants, 106(93.8%) responded they became more positive, while 7(6.2%) responded remained the same for the first question. They were also asked if the amount of OFSP they eat is changed. Of them, 92 (81.4%) responded that the amount they eat has increased, while the rest 21(18.6%) responded it has remained the same. None of them responded their perception has become more negative and the amount they consume decreased.

In current study, the endline survey indicated that 96% participants at the intervention group were claimed that they have heard about vitamin A. This is much higher than the 66.0% of the control group endline response and pre-intervention 48%. This is also higher than previous study conducted by Brouwer on which 55.4% of participants claimed to have heard about vitamin A (Brouwer *et al.,* 2018).

Out of those claimed to have heard about vitamin A were asked to give two examples of vitamin A rich foods. From the intervention group, 83% were given correct example of vitamin A rich. In Brouwer's study it was only 50.6% who mentioned correct examples of vitamin A rich foods (Brouwer *et al.,* 2018). Examples mentioned as vitamin A rich were evaluated based on WHO/FAO paper on vitamin and mineral requirements in human nutrition (WHO/FAO, 2004).

From the mentioned examples of vitamin A rich foods at the intervention group, OFSP has mentioned by 32% which is higher than control group 5%. This is better improvement when compared with no one mentioned OFSP as an example of vitamin A rich food at the baseline. On Brouwer's study on 3.1% of participants mentioned OFSP as an example of vitamin A rich food (Brouwer *et al.,* 2018).

They were asked if their intention to eat vitamin A rich food is its health benefit. Of them, 91% from intervention responded yes. This result is higher than pre-intervention78% and 76% of the endline control group.

From total participants 99% from intervention and 88% from control group consumes sweet potato. And out of total participants, 98% from intervention and 42% from control group have heard about OFSP. They were 22% and 18%, respectively at the baseline. Receiving the leaflet has clearly high impact on hearing about OFSP.

The finding of current study showed that out of those who have heard about OFSP, 91% from intervention and 73% from control group had consumed it. This shows that the consumption of current study is higher than the previous study. Meanwhile, it is also higher than the control group. This proportion of consumption is much higher than only 7.5% in Brouwer's study (Brouwer *et al.*, 2018)

Out of total sweet potato consumers 84%, from intervention and 38% control ranks sweet potato among top three vegetable food they prefer to eat. Those who have bought OFSP were asked if they rank OFSP among top three vegetable food they prefer. Of them, 96% of the treatment group responded yes. The same question were asked to the control group and result were 40% which is smaller than the intervention group.

Those who have heard about OFSP and at the same time claimed to know about vitamin A were asked if they think that OFSP is rich with vitamin A. Out of them, 86% from intervention and 41% from control responded yes, 14% from intervention and 45% from control responded they does not know and 14% from control responded no.

All the participants were asked if they knew other recipe preparation by sweet potato other than boiling. Of them, 91% from the treatment group responded yes, which is higher than 23% from control group, even much higher than 17% pre-intervention of the same group. Out of them 47% from treatment group applied other recipes, which smaller than 57% of control group. It is smaller than from the baseline 72% of the same group. This variation is assumed to be happened due to decrease in number of participants from baseline.

Cheeps, Bombolino, Stew with different vegetables, Enjera, Porridge, Bread, Ambasha, Cake, Biscuit, Areke/Caticala/, Kita, Cookies, and Fosase are recipes prepared by the participants. Out of them, porridge and cheeps have been mentioned more frequently than others. Porridge has been mentioned 19 times for intervention group while cheeps is 16 times for the control group.

4.5. Challenges

The unavailability of the root due to late maturity on expected time extended the study period. Also searching for willing vendors to recruit participants and distribute the leaflet was challenge since the study type is not common for it is related to registering phone number. In addition, instability of political situation had its own impact on extending study period and created more than expected demand of explanation about the research to get their trust. The newness of phone interview in our country enforced to interview period to lake longer than expected. This might have biased the result. High number of participant in the intervention group does not received the leaflet, this is might be shortness of study period or the mechanism used to the distribution of the leaflet to the participants was weak.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Based on the findings of this study, it can be conclude that the knowledge, attitude and practice on vitamin A and OFSP are improved in both groups compared to baseline survey which has held four months before. Availability of the root to all vendors has impact by itself. Leaflet has significant impact on KAP. The answer to the research question "Does promotion about vitamin A and OFSP using consumer-based leaflets improve KAP of the subjects about vitamin A and OFSP?" is clearly "Yes". During validation, all participants rated the leaflet content, legibility and design as good. Using leaflet in promoting OFSP found to be an effective tool in sweet potato consumers. Using validated leaflets for the promotion of healthy food is effective, as they have the capacity transfer the desired information consistently. In addition to production and supplying of biofortified foods, promotion of the benefit to the consumers has great role to increase the demand

5.2. Recommendation

Using validated leaflets for the promotion of healthy food is important, as they have the capacity transfer the desired information consistently. In addition to production and supplying of biofortified foods, promotion of the benefit to the consumers has great role to increase the demand. Since current study does not assessed factors that may affect the utilization of the leaflet, future study should assess associated factors that may affect the impact of the leaflet on promotion and adoption of OFSP. Organizations engaged in biofortification of essential nutrients may need to further study on the impact of leaflet on the promotion and adoption of new foods.

REFERENCES

Abdulmalek, L. J., & Benkhaial, F. S. 2018. Knowledge, attitude, and practice of parents regarding Vitamin A supplementation to children in Benghazi, Libya. *Ibnosina Journal of Medicine and Biomedical Sciences*, 10(5), 174.

Abebaw Baytekus, Amare Tariku and Ayal Debie, 2019. Clinical vitamin-A deficiency and associated factors among pregnant and lactating women in Northwest Ethiopia: a community-based cross-sectional study

Adepu, R., & Swamy, M. K. 2012. Development and evaluation of patient information leaflets (PIL) usefulness. *Indian journal of pharmaceutical sciences*, 74(2), 174.

Al-Maskari, F., El-Sadig, M., Al-Kaabi, J. M., Afandi, B., Nagelkerke, N., & Yeatts, K. B. 2013. Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. PloS one, 8(1).

Amagloh, F. K., & Coad, J. 2014. Orange-fleshed sweet potato-based infant food is a better source of dietary vitamin A than a maize—Legume blend as complementary food. Food and nutrition bulletin, 35(1), 51-59.

Anderson, A. S., Cox, D. N., McKellar, S., Reynolds, J., Lean, M. E. J., & Mela, D. J. 1998. Take Five, a nutrition education intervention to increase fruit and vegetable intakes: impact on attitudes towards dietary change. *British Journal of Nutrition*, 80(2), 133-140.

Brennan, C. S. 2005. Dietary fibre, glycaemic response, and diabetes. Molecular nutrition & food research, 49(6), 560-570.

Brouwer R. (2019). Consumers' motivations for OFSP adoption in Maputo city Mozambique and the implications for future marketing strategies. International Potato Center

Brouwer R., Birhanu B., Mikias Y. 2018. Sweet potato consumers in Hawassa City – a profile. (Unpublished).

Burri, B. J. 2011. Evaluating sweet potato as an intervention food to prevent vitamin A deficiency. Comprehensive Reviews in Food Science and Food Safety, 10(2), 118-130.

Codjia, G. 2001. Food sources of vitamin A and provitamin A specific to Africa: an FAO perspective. Food and Nutrition Bulletin, 22(4), 357-360.

Combs Jr, G. F., & McClung, J. P. 2016. The vitamins: fundamental aspects in nutrition and health. Academic press.

Dangura, D., & Gebremedhin, S. 2017. Dietary diversity and associated factors among children 6-23 months of age in Gorche district, Southern Ethiopia: Cross-sectional study. BMC pediatrics, 17(1), 6.

DeMan, J. M., Finley, J. W., Hurst, W. J., & Lee, C. Y. 1999. Principles of food chemistry (pp. 111-162). Gaithersburg, MD: Aspen Publishers.

Demographic, E. 2011. Health survey: Addis Ababa. Ethiopia and Calverton, Maryland, USA: central statistics agency and ORC macro, 2011.

Demographic, E. 2016. Health survey: Addis Ababa. Ethiopia and Calverton, Maryland, USA: central statistics agency and ORC macro, 2016.

Dhingra, D., Michael, M., Rajput, H., & Patil, R. T. 2012. Dietary fibre in foods: a review. *Journal of food science and technology*, 49(3), 255-266.

Duester, G. 2008. Retinoic acid synthesis and signaling during early organogenesis. Cell, 134(6), 921-931.

Edejer, T. T. T., Aikins, M., Black, R., Wolfson, L., Hutubessy, R., & Evans, D. B. 2005. Cost effectiveness analysis of strategies for child health in developing countries. Bmj, 331(7526), 1177.

Emily Faerber, Emma Waugh, & Amy Webb Girard. 2018. Assessment of Infant and Young Child Feeding in Southern Nations, Nationalities, and Peoples' Region, Ethiopia. Quality Diets for Better Health: Formative Nutrition Report

Ertesvag, A., Engedal, N., Naderi, S., & Blomhoff, H. K. 2002. Retinoic acid stimulates the cell cycle machinery in normal T cells: involvement of retinoic acid receptor-mediated IL-2 secretion. *Journal of Immunology*, 169(10), 5555-5563.

European Commission. Guideline on the readability of the labelling and package leaflet of medicinal products for human use, Revision 1, 12 January 2009.

Ethiopia, G.o.t.F.D.R.o., 2016. National Nutrition Programme II, January 2016-December 2020.

Ethiopian Public Health Institute, 2016. Ethiopian National Micronutrient Survey Report

Fana Broadcasting Corporation (FBC): Television report. Posted on October 22, 2019. Available on: http://www.youtube.com/watch?v=0iXO5gsKQ5E

Fana Broadcasting Corporation (FBC): Television report. Posted on December 3, 2019. Available on: http://www.youtube.com/walch?v=ZXkm2ZpG2M0

Food and Nutrition Board, Institute of Medicine. Dietary reference intakes: vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium and zinc. Washington, DC: National Academy Press, 2001

Freyermuth, M. G., Muños, J. A., & del Pilar Ochoa, M. 2017. From therapeutic to elective cesarean deliveries: factors associated with the increase in cesarean deliveries in Chiapas. *International journal for equity in health*, 16(1), 88.

Gibbs, S., Waters, W. E., & George, C. F. 1990. Prescription information leaflets: a national survey.

Grimshaw, J., Campbell, M., Eccles, M., & Steen, N. 2000. Experimental and quasi-experimental designs for evaluating guideline implementation strategies. Family practice, 17(suppl_1), S11-S16.

Guideline, W. H. O. 2011. Vitamin A supplementation in infants and children 6–59 months of age. Geneva: World Health Organization, 269, 16.

Guidelines on food fortification with micronutrients. 2006. Edited by Lindsay Allen, Bruno de Benoist, Omar Dary and Richard Hurrell.

HAGENIMANA, V., OYUNGA, M., LOW, J., NJOROGE, S., GICHUKI, S., & KABIRA, J. 1999. The effect of women farmers' adoption of orange-fleshed sweet potatoes: Raising vitamin A intake in Kenya. 24 pp. In: ICRW/OMNI Research Program, Research, Washington DC. Series 3.

Herforth, A., & Ahmed, S. (2015). The food environment, its effects on dietary consumption, and potential for measurement within agriculture-nutrition interventions. Food Security, 7(3), 505-520.

Hess, S. Y., Thurnham, D. I., & Hurrell, R. F. 2005. Influence of provitamin A carotenoids on iron, zinc, and vitamin A status. Washington DC, *International Food Policy Research Institute* (IFPRI) and the *International Center for Tropical Agriculture* (CIAT).

Hotz, C., & McClafferty, B. 2007. From harvest to health: challenges for developing biofortified staple foods and determining their impact on micronutrient status. Food and Nutrition Bulletin, 28(2_suppl2), S271-S279.

Hotz, C., Loechl, C., Lubowa, A., Tumwine, J. K., Ndeezi, G., Nandutu Masawi, A., ... & Gilligan, D. O. 2012. Introduction of β-carotene–rich orange sweet potato in rural Uganda resulted in increased vitamin A intakes among children and women and improved vitamin A status among children. *Journal of nutrition*, 142(10), 1871-1880.

Imdad, A., Mayo-Wilson, E., Herzer, K., & Bhutta, Z. A. 2017. Vitamin A supplementation for preventing morbidity and mortality in children from six months to five years of age. Cochrane Database of Systematic Reviews, (3).

Islam, S. N., Nusrat, T., Begum, P., & Ahsan, M. 2016. Carotenoids and β-carotene in orange fleshed sweet potato: A possible solution to vitamin A deficiency. *Journal of Food chemistry*, 199, 628-631.

Johnson A, Sandford J. 2005. Written and verbal information versus verbal information only for patients being discharged from acute hospital settings to home: systematic review. Health Educ Res. 20(4):423–29.

Kenny, T., Wilson, R. G., Purves, I. N., Clark Sr, J., Newton, L. D., Newton, D. P., & Moseley, D. V. 1998. A PIL for every ill? Patient information leaflets (PILs): a review of past, present and future use. Family Practice, 15(5), 471-479.

Khaliq, R., Rahman, M. U., & Rizvi, F. 2008. Knowledge, Attitude and Practices among Mothers of Children under Five Years Regarding Vitamin-A Intake. Ann. Pak. Inst. Med. Sci, 4(2), 121-124.

Lawshe, C. H. 1975. A quantitative approach to content validity 1. Personnel psychology, 28(4), 563-575.

Loechl, C., Lubowa, A., Cole, C., Prain, G., & Low, J. 2010. School-based nutrition education and promotion of orange-fleshed sweet potato in urban and peri-urban areas of Kampala: Impacts and lessons learnt. *International Potato Center*.

Low, J. W., Arimond, M., Osman, N., Cunguara, B., Zano, F., & Tschirley, D. 2007. Ensuring the supply of and creating demand for a biofortified crop with a visible trait: lessons learned from the introduction of orange-fleshed sweet potato in drought-prone areas of Mozambique. Food and Nutrition Bulletin, 28(2_suppl2), S258-S270.

Low, J., Ball, A., Magezi, S., Njoku, J., Mwanga, R., Andrade, M., & Van Mourik, T. 2017. Sweet potato development and delivery in sub-Saharan Africa. *African Journal of Food, Agriculture, Nutrition and Development*, 17(2), 11955-11972.

Marías, Y. F., & Glasauer, P. (2014). Guidelines for assessing nutrition-related knowledge, attitudes and practices. Food and Agriculture Organization of the United Nations (FAO).

Mateti, U. V., Nagappa, A. N., Attur, R. P., Bairy, M., Nagaraju, S. P., Mallayasamy, S., ... & Balkrishnan, R. 2015. Preparation, validation and user-testing of pictogram-

based patient information leaflets for hemodialysis patients. *Journal of Saudi Pharmaceutical*, 23(6), 621-625.

Mayo-Wilson, E., Imdad, A., Herzer, K., Yakoob, M. Y., & Bhutta, Z. A. 2011. Vitamin A supplements for preventing mortality, illness, and blindness in children aged under 5: systematic review and meta-analysis. Bmj, 343, d5094.

Meillier, L., Osler, M., Sabroe, S., Christensen, B., Elsass, P., & Meyer, L.1999. Health education pamphlets about smoking—their benefit to smokers and non-smokers. *Journal of Public Health and nutrition*, 113(1), 19-25.

Möhring, M. 2008. Transnational food migration and the internalization of food consumption: ethnic cuisine in West Germany. Food and globalization: consumption, markets and politics in the modern world, 1(1).

Moore, T., & Holmes, P. D. 1971. The production of experimental vitamin A deficiency in rats and mice. Laboratory animals, 5(2), 239-250.

Mora, J. R., Iwata, M., & Von Andrian, U. H. 2008. Vitamin effects on the immune system: vitamins A and D take centre stage. Nature Reviews Immunology, 8(9), 685-698.

Mutiso, J. M., Okello, J. J., Lagerkvist, C. J., Muoki, P., Kosura, W. O., & Heck, S. 2018. Effect of nutrition education and psychosocial factors on child feeding practices: findings of a field experiment with biofortified foods and different women categories. Ecology of food and nutrition, 57(4), 346-371.

National Institutes of Health. 2016. Office of Dietary Supplements. Vitamin D.

Nelson, A. M., Zhao, W., Gilliland, K. L., Zaenglein, A. L., Liu, W., & Thiboutot, D. M. 2008. Neutrophil gelatinase–associated lipocalin mediates 13-cis retinoic acid–induced apoptosis of human sebaceous gland cells. The *Journal of clinical investigation*, 118(4), 1468-1478.

Newton, L., Newton, D., Clark, J., Kenny, T., Moseley, D., Purves, I., & Wilson, R. 1998. Patient information leaflets: producing understandable PILs. *Journal of information science*, 24(3), 167-181.

Okidi, L., Odongo, W., & Ongeng, D. 2018. The mix of good nutritional attitude and poor nutritional knowledge is associated with adequate intake of vitamin A and iron from wild fruits and vegetables among rural households in Acholi subregion of Northern Uganda. *Journal of Food Science & Nutrition*, 6(8), 2273-2284.

Postumus S. Report on nutritional needs of children in Ethiopia. 1958. Food and Agriculture Organization. Rome.

Ravindra Babu, V. 2013. Importance and advantages of rice biofortification with iron and zinc. *Journal of SAT*.

Rajwinder Harika, Folake Samuel, Judith Kimiywe, 2017. Are Low Intakes and Deficiencies in Iron, Vitamin A, Zinc, and Iodine of Public Health Concern in Ethiopian, Kenyan, Nigerian, and South African Children and Adolescents?

Renuka, P., & Pushpanjali, K. 2013. leaflet preparation and Validation procedures. *Univers J Public Health,* 1(3), 110-4.

Ruel, M. T., Alderman, H., & Maternal and Child Nutrition Study Group. 2013. Nutrition-sensitive interventions and programs: how can they help to accelerate progress in improving maternal and child nutrition? The lancet, 382(9891), 536-551.

Sweet, L. 2002. Telephone interviewing: is it compatible with interpretive phenomenological research Contemporary Nurse, 12(1), 58-63.

Theis, S. L., & Johnson, J. H. 1995. Strategies for teaching patients: a meta-analysis.

Tsegaye, D., Ali, A., Mekonen, Y., Haider, J., & Umeta, M. 2010. Magnitude and distribution of vitamin A deficiency in Ethiopia. Food and nutrition bulletin, 31(2), 234-241.

Van Jaarsveld, P. J., Faber, M., Tanumihardjo, S. A., Nestel, P., Lombard, C. J., & Benadé, A. J. S. 2005. β-Carotene–rich orange-fleshed sweet potato improves the vitamin A

status of primary school children assessed with the modified-relative-dose-response test. The *American journal of clinical nutrition*, 81(5), 1080-1087.

Wang, H., & Chow, S. C. 2004. Sample size calculation for comparing proportions. Encyclopedia of Statistical Sciences, 1-14.

WHO/FAO (World Health Organization/Food and Agriculture Organization of the United Nations). 2004. Vitamin and mineral requirements in human nutrition: report of a joint FAO/WHO expert consultation, Bangkok, Thailand, 21–30 September 1998.

Wolf, G. 2001. The discovery of the visual function of vitamin A. The *Journal of nutrition*, 131(6), 1647-1650.

World Health Organization. 2004. Vitamin and mineral requirements in human nutrition. World Health Organization.

World Health Organization. 2009. Global prevalence of vitamin A deficiency in populations at risk 1995-2005: WHO global database on vitamin A deficiency.

World Health Organization., Global health risks: mortality and burden of disease attributable to selected major risks. 2009, Geneva, Switzerland: World Health Organization. vi, 62 p.

World Health Organization. 2015. The selection and use of essential medicines: report of the WHO expert committee, (including the 19th WHO model list of essential medicines and the 5th WHO model list of essential medicines for children) (Vol. 994). World Health Organization.

ANNEXES

Annex I: Study's objective explanation and consent request sheet

የጥናቱን አላማ መግለጫ ቅጽ

ጤና ይስጥልኝ፡፡ እኔ በሀዋሳ ዩኒቨርሲቲ የሰዎች ስነ-ምግብ (Applied Human Nutrition) ት/ት ዘርፍ የሁለተኛ ድግሪ /masters/ ተመራቅ ተማሪ ነኝ፡፡ ይህም የማደርገዉ ጥናት ለመመረቅያ ከሚያስፈልጉ መስፈርቶች አንዱና ወሳኙ ነዉ፡፡

ጥናቱ በዋናነት የሚያተኩረው በሕብረተሰቡ ውስጥ ስላለዉ የአትክልት አመጋገብና ስለ ቫይታሚን ኤ ንጥሬ ነገር በሕብረተሰቡ ዘንድ ያለው እዉቀትና አመለካከት ምን ይመስላል የሚለውን ነው፡፡ ከዚህ ጥናት የሚሰበሰበዉ ማንኛዉም መረጃ ለጥናቱ ዓላማ ብቻ የሚውል ነው፡፡ ይህም ሆኖ ሳለ ግን በቃሌ-ምልልሱ ወቅት የሚጠየቁትን ጥያቄዎች ሙሉ ለሙሉ መተውም ሆነ በከፍል የመመለስ መብትዎ የተጠበቀ ነዉ፡፡ በአጠቃላይ መጠየቁ ከ5-6 ደቅቃ ይፈጃል፡፡ በጥናቱ ላይ ማንኛዉንም ያልተረዱትን ጥያቄ የመጠየቅ መብት አልዎት፡፡

የጥናቱን ባለቤት የሆንኩትን እኔን ይርዳን ዮናስን ማግኘት ከፈለጉ ደግሞ በ **0900494249** መደወል ይችላሉ፡፡

ስለ ፈቃደኝነትዎ በቅድሚያ እናመሰግናለን!

ለጥናቱ ጥያቄ ተሳተፊዎች የስምምነት ቅፅ

የጥናቱ አላማ በተገለጸልኝ መሠረት ደህንነተን የማይጎዳና ከዚህም ባለፈ የሚሰጠዉ መረጃ ሚስጥራዊነቱ የተጠበቀ መሆኑን ተረድቻለሁ፡፡ የሚጠየቀዉን ጥያቄ ለመመለስ ፍቃደኛ በመሆነ ለቃሌ-መጠይቁ ስልክ ቁጥሬን እሰጣለዉ::

ተ.ቁ	ስም	ስልክ ቁጥር
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

16.		
17.		
18.		
19.		
20.		
21.		
22.		
23.		
24.		
25.		
26.		
27.		
28.		
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		

Annex II: Consumers Interview Questionnaires - English Version

Interviewer:

Hello! My name is_____. I'm one of participant data collector for the data that Hawassa University is working in collaboration with CIP to study the vegetable consumption habit of people living in Hawassa town. You had been left your phone number with one of vendor working with us. First I would like to appreciate your willingness to participate in our study. I would like to assure that your name and phone number will only be used for the study purpose and will not be mentioned by any means else. Therefore, for the truthfulness of the study is based on the information that you gave me, please give me only the real answer. The interview may take 5-7 minutes.

Now I am going to ask you some questions about vitamin A and foods rich in vitamin A, like OFSP. Please let me know if you need me to clarify any of my questions.

	Question	Choice	Reponses	Go to question
	Can we start the interview?	1. Yes 2. No		If yes go to 01 If no stop question

Interviewer name	Date (EC)	Name of vendor
Name of participant's		Participant's phone number

No.	Cat	Question	Answer	Go to
		Vitamin A		
01	K	Have you heard about vitamin A?	1. Yes 2. No	If yes, 02 If no, 08
02	K	Where did you hear about vitamin A (read all; more than one option possible)?	1. Demonstration by CIP 2. Market 3. School 4. Health center 5. Other_____	03
03	K	Do you know an example of vitamin A rich food?	1. Yes 2.No	If yes, 04 If no, 05
04	K	Please provide an example:		05
05	P	When was the last time you ate a vitamin A rich food?	1. Today 2. Yesterday 3. This week 4. Long time ago 5. Don't remember	06
06	A	Do you think that vitamin A is important for your health?	1. Yes 2. No	If yes, 07 If no, 08
07	P	If so, is that for your a reason to eat vitamin A rich food?	1. Yes 2. No	08
		Sweet potato		
08	P	Do you eat sweet potato?	1. Yes 2. No	09
09	K	Have you heard about orange-fleshed sweet potato?	1. Yes 2. No	If yes, 10 If no, 14
10	P	Have you ever bought OFSP?	1. Yes 2. No	If yes, 11 If no, 17
11		If you bought OFSP, was this for your own consumption	1. Yes 2. No	If yes, 13 If no, 12
12	P	If not but bought, for whom do you buy?		
13	P	If it was for your own consumption, when was the last time you ate OFSP?	1. Within this week 2. Last week 3. Within this month	14

			4. Before a month 5. I don't remember	
14	A	Would you rank sweet potato among your top three most preferred vegetables?	1. Yes 2. No	If 09 is yes, go to 15 If 09 is no, go to 17
15	A	Would you rank orange-fleshed sweet potato among your top three most preferred vegetables?	1. Yes 2. No	16
16	K	Do you think OFSP contains vitamin A?	1. Yes 2. No 3. Don't know	17
17	K	Do you know sweet potato roots can be prepared different recipes other than just boiling?	1. Yes 2. No	If yes, 18 If no, 20
18	P	Have you applied any other recipe than boiling SP/OFSP roots?	1. Yes 2. No	If yes, 19 If no, 20
19	P	If you had prepared recipe, what was that?		20
		Socio-economic status		
20	SES	What is your gender?	1. Male 2. Female	21
21	SES	What is your age (years)?		22
22	SES	Are you the head of the household?	1. Yes 2. No	23
23	SES	If you are not the head of the household, what is your position in the household?	1. Spouse 2. Child 3. Relative 4. Servant 5. Other_____	24
24		Are you the household's main provider?	1. Yes 2. No	25
25	SES	Are you the one in the household who normally buys vegetables?	1. Yes 2. No	26
26	SES	What is your profession	1. Student 2. Self-employed 3. Civil servant 4. Employed 5. Unemployed/ housewife 6. Other_____	27

27	SES	How do you classify the neighborhood you are living in?	1. Rich 2. Middle class 3. Poor	28
28		Does your household employ a servant?	1. Yes 2. No	29
29	SES	What is the phone you are using?	1. Non smart mobile phone 2. Smart phone 3. Landline	25
30	SES	Does someone in your household own a car?	1. Yes 2. No	
31	Con	Where did you usually hear or like about food, nutrition or recipe?	1. Demonstrations 2. Street promotions 3. TV/Radio 4. Broachers/Leaflet 5. Other _____	
32	Con	What do you think is more important media/promotion strategy to hear about food, nutrition or recipes?	1. Demonstrations 2. Street promotions 3. TV/Radio 4. Broachers/Leaflet 5. Other_____	
		Endline Question		
33		Did you receive a leaflet with information about OFSP?	1. Yes 2. No	34
34		Did your leaflet contain recipes?	1. Yes 2. No 3. Don't remember	35
35		Do you think that the leaflet contained useful information?	1. Yes 2. No 3. Don't know	36
36		How is your perception of OFSP after reading the leaflet?	1. Become more positive 2. Remained the same 3. Become more negative	37
37		How is the amount of OFSP you eat?	1. Increased 2. Remained the same 3. Decreased	

Annex III: Consumers Interview Questionnaires - Amharic Version

ጠያቂዉ:

ጤና ይስጥልኝ፡፡ ስሜ ተመሪ_____ እባላለሁ፡፡ የሀዋሳ ዩኒቨርሲቲ CIP ከሚባል አለም አቀፍ የስኳር ድንች ምርምር ተቋም ጋር በመተባበር በሀዋሳ ከተማ ያለዉ ሕብረተሰብ የአትክልት አመጋገብ ምን ይመስለል በሚል እያደረገ ባለዉ ጥናት ተሳታፊ ተማሪ ነኝ፡፡ እርስዎም ከዚህ በፊት በስልክ በሚደረገዉ ቃሌ-ምልልስ ላይ ለመሳተፍ ፈቃደኛ በመሆን ስልክ ቁጥርዎን አብሮን ከሚሰራ ባለሱቅ አስመዝግበዉ ነበር፡፡ በጥናቱ ለመሳተፍ ፈቃደኛ ስለመሆንዎ በቅድሚያ አመሰግናለሁ፡፡ ስምዎም ሆነ ስልክ ቁጥርዎ ለዚህ ቃሌ-ምልልስ ብቻ የሚዉል እንጂ በጥናቱ ላይ በማንኛዉም መንገድ የማይጠቀስ መሆኑን አሳስቦታለሁ፡፡ በመሆኑም የጥናቱ ታማኝነትና እዉነተኝነት እርስዎ በሚሰጡን ምላሽ ላይ የተመሰረተ በመሆኑ እባክዎ ቀጥሎ ለሚጠይቅዎ ጥያቄ እዉነተኛ ምላሽ በመስጠት ይተባበሩኝ፡፡ ቃሌ-ምልልሱ በአጠቃላይ ከ5-10 ደቂቃ ይፈጃል፡፡ ቃሌ-መጠይቁን ከመጀመሬ በፊት ጥያቄ አለዎት? በቃሌ-መጠይቁ ወቅት ልመልሱት ፈቃደኛ ያልሆኑትን ጥያቄ አለመመለስ ይችላሉ፡፡

	ጥያቄ	ምርጫ	መልስ	ቀጥሎ
	ቃሌ-መጠይቁን መጀመሪ እንችላለን?	3. አዎ 4. አይደለም		አይደለም ከሆነ አቁም አዎ ከሆነ ወደ 01

የጠያቂዉ ስም	ቀን (EC)	የባለሱቁ ስም
የተሳታፊዉ ሙሉ ስም		የተሳታፊዉ ስልክ ቁጥር

አሁን ስለ ቫይታሚን ኤ ፣ በቫይታሚን ኤ ስለበለጸጉ ምግቦችና ስለ ብርቱካናማ ስኳር ድንች ልጠይቆት ነዉ፡፡ ማንኛዉም ግልጽ ያልሆነ ጥያቄ ካልዎት መጠየቅ ይችላሉ፡፡

Code:				
ተ.ቁ	**Cat**	**ጥያቄ**	**መልስ**	**ቀጣዩ ጥያቄ**
		ስለ ቫይታሚን ኤ		
01	K	ስለ ቫይታሚን ኤ ያውቃሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 02 አይደለም ከሆነ 08
02	K	ስለ ቫይታሚን ኤ ከማን ነው የተማሩት?	1. ከ CIP ድርጅት ሰርቶ ማሳያ 2. ከገበያ 3. ከት/ት ቤት 4. ከጤና ጣቢያ 5. ሌላ_____	03
03	K	በቫይታሚን ኤ የበለጸጉ ከሚባሉት ምግቦች ምሳሌ ሊሰጡኝ ይችላሉ?	1. አዎ 2.አይደለም	አዎ ከሆነ 04 አይደለም ከሆነ 05
04	K	እባክዎ ምሳሌ ይጥቀሱልኝ		05
05	P	በቅርቡ በቫይታሚን ኤ የበለጸጉ ከሚባሉት ምግቦች ውስጥ የተመገቡት መች ነው?	1. ዛሬ 2. በዚህ ሳምንት 3. በዚህ ወር 4. ከረዥም ጊዜ በፊት 5. አላስተውስም	06
06	A	ቫይታሚን ኤ ለጤናዎ ይጠቅማል ብለው ያስባሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 07 አይደለም ከሆነ 08
07	P	ቫይታሚን ኤ ለጤና ጠቃሚ ነው ብለዉ ስለሚያስቡ ነዉ በቫይታሚን ኤ የበለጸጉ ምግቦችን የሚመገቡት?	1. አዎ 2. አይደለም	08
		ስለ ስኳር ድንች		
08	P	ስኳር ድንች ይመገባሉ?	1. አዎ 2. አይደለም	09
09	K	ብርቱካናማ ስኳር ድንች ሰምተው ያውቃሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 10 አይደለም ከሆነ 14
10	P	ብርቱካናማ ስኳር ድንች ገዝተው ያውቃሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 11 አይደለም ከሆነ 17
11		የገዙት እርስዎ ሊመገቡት ነው?	1. አዎ 2. አይደለም	አዎ ከሆነ 13 አይደለም ከሆነ 12
12	P	የገዙት እርስዎ ሊመገቡ ካልሆነ ለማን ነበር?		

13	P	የገዙት እርስዎ ሊመገቡት ከሆነ በቅርቡ የተመገቡት መች ነው	1. ዛሬ 2. በዚህ ሳምንት 3. በዚህ ወር 4. ከረዥም ጊዜ በፊት 5. አላስተውስም	14
14	A	ስኳር ድንችን በጣም ከሚወዱት ሶስት የአትክልት ምግቦች እንደ አንዱ ይመድቡታል ?	1. አዎ 2. አይደለም	09 አዎ ከሆነ 15 09 አይደለም ከሆነ 17
15	A	ብርቱካናማ ስኳር ድንችን በጣም ከሚወዱት ሶስት የአትክልት ምግቦች እንደ አንዱ ይመድቡታል	1. አዎ 2. አይደለም	16
16	K	ብርቱካናማ ስኳር ድንች በቫየታሚን ኤ የበለጸገ ነዉ ብለው ይገምታሉ?	1. አዎ 2. አይደለም 3. አላዉቅም	17
17	K	ስኳር ድንችን ከመቀቀል በስተቀር በሌላ መንገድ ተሰርቶ መመገብ እንደሚችል ያውቃሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 18 አይደለም ከሆነ 20
18	P	ስኳር ድንችን ከመቀቀል በስተቀር በሌላ አይነት መንገድ ሰርተው ተመግበው ያውቃሉ?	1. አዎ 2. አይደለም	አዎ ከሆነ 19 አይደለም ከሆነ 20
19	P	በሌላ አይነት መንገድ ሰርተው ተመግበው የሚያውቁ ከሆነ ምን ሰርተው ነበር የተመገቡት?		20
20	SES	ፆታ?	1. ወንድ 2. ሴት	21
21	SES	ዕድሜዎ ስንት ነው?		22
22	SES	እርስዎ የቤቱ አስተዳደሪ /ራስ/ ነዎት ?	1. አዎ 2. አይደለም	አይደለም ከሆነ 23 አዎ ከሆነ 24
23	SES	እርስዎ የቤቱ አስተዳደር /ራስ/ ካልሆኑ ለዚህ ቤት ምንድንዎት?	1. የትዳር አጋር 2. ልጅ 3. ዘመድ 4. ሰራተኛ 5. ሌላ_____	24
24		የቤተሰቡ የገቢ ምንጭ እርስዎ ነዎት ?	1. አዎ 2. አይደለም	25
25	SES	ለቤተሰቡ አትክልት ምገዙት እርስዎ ነዎት ?	1. አዎ 2. አይደለም	26
26	SES	ሥራዎ ምንድን ነው?	1. ተማሪ 2. በግል ተዳዳሪ 3. የመንግሥት ሰራተኛ 4. ተቀጣሪ ሰራተኛ 5. የቤት እመቤት	27

			6. ሌላ_____ _____	
27	SES	በአከባቢዎ የሚገኙትን ሰዎች በየትኛው የኑሮ ደረጃ ይመድቡአቸዋል?	1. በሀብታም 2. በመካከለኛ 3. በዝቅተኛ	28
28		ለቤትዎ ስራ ሰርቶ ሚያግዝ ሰራተኛ አልዎት?	1. አዎ 2. አይደለም	29
29	SES	ምን አይነት ስልክ ይጠቀማሉ?	1. ትንሽዋ/ጠጠር 2. ስክርን ታች /ስማርት 3. የቤት/ባለገመድ/ ስልክ	30
30	SES	በቤታችሁ ዉስጥ መኪና አላችሁ?	1. አዎ 2. አይደለም	31
31	Con	በአብዛኛዉ ጊዜ ስለ ምግብ ማስታዎቂያ ከየት ነዉ የሚሰሙት?	1. ሰርቶ ማሳያ 2. በጎዳን/በመንገድ ላይ ማስታዎቂያ 3. ተሌቪዥን/ራድዮ 4. በራሪ ወረቀት 5. ሌላ_____ _____	32
32	Con	የትኛዉን የምግብ ማስተዋዎቂያ መንገድ ጥሩ ነዉ ብለዉ ያስባሉ ?	1. ሰርቶ ማሳያ 2. በጎዳን/በመንገድ ላይ ማስታዎቂያ 3. ተሌቪዥን/ራድዮ 4. በራሪ ወረቀት 5. ሌላ_____ _____	33
		Endline		
33	Con	ከዚህ በፊት ስለ ብርቱካናማ ስኳር ድንች የሚናገር በራሪ ወረቀት ደርስዎታል	1. አዎ 2. አይደለም	አዎ ከሆነ 34 አይደለም ከሆነ 36
34	Con	ከደረስዎት ወረቀት በስተጀርባ ምን ነበረበት	1. የምግብ ስዕል ብቻ 2. የምግብ ስዕል ከነአሰራሩ 3. አላስተዉስም	35
35	Con	ያነበቡት ወረቀት ጠቃሚ መረጃ ይዟል ቢለዉ ያስባሉ	1. አዎ 2. አይደለም 3. አላዉቅም	36

36	Con	ለብርቱካናማ ስኳር ድንች ያልዎት አመለካከት እንዴት ሆነ?	1. በጣም ወድጀዋለዉ 2. ምንም የተቀየረ ነገር የለም 3. ጠልቸዋለዉ	37
37	Con	የሚመገቡት የብርቱካናማ ስኳር ድንች መጠን ከበፊቱ?	1. ጨምሯል 2. ያው ነዉ 3. ቀንሷል	Stop

Annex IV: Minimum values of the CVR to ensure agreement

Number of Panelists	Minimum Value
5	.99
6	.99
7	.99
8	.85
9	.78
10	.62
11	.59
12	.56
13	.54
14	.51
15	.49
20	.42
25	.37
30	.33
35	.31
40	.29

Annex V: Leaflet validating questionnaires for experts of CIP and University

Hello! My name is Yirdan Yonas. I am MSc student of Applied Human Nutrition in Hawassa University. Now I am working my theses on "Promoting OFSP using leaflet and assessing its effectiveness towards KAP of sweet potato consumers in Hawassa city, SNNPR Ethiopia". Before, going to user-testing, it is must to validate the tool by subject matter experts about its completeness of information, understandability, legibility and clarity of message, utility and so on. Therefore, for you are one of nutrition expert in the study area, I request you to help me in ranking the following points about mentioned questions. Please leave on the box provided any question or suggestion if you have so that I may correct it before printing to the whole consumers.

No.	**Questions**	Ranks	Any Suggestion
1.	The way how the leaflet explained what Vitamin A is	+1=Essential 0=Useful, but not essential -1=not necessary	
2.	The way how the leaflet explained about importance of vitamin A	+1=Essential 0=Useful, but not essential -1=not necessary	
3.	The way how the leaflet explained about what vitamin A reach foods are	+1=Essential 0=Useful, but not essential -1=not necessary	
4.	The way how the leaflet explained about relationship between vitamin A and OFSP	+1=Essential 0=Useful, but not essential -1=not necessary	

5.	The way how the leaflet explained how OFSP can be utilized	+1=Essential 0=Useful, but not essential -1=not necessary	
6.	The way how the leaflet explained what proportion of OFSP should be used to blend with other floors	+1=Essential 0=Useful, but not essential -1=not necessary	

Annex VI: Readability test questions to users of the leaflet - English version

1.	Which one of the following is the function of vitamin A in our body?	a)immunity(0.25) b) skin integrity(0.25) c)visual health(0.25) d) growth(0.25) e)all(1) f)none(0)
2.	Which one of the following is vitamin A rich food?	a)pumpkin(0.1) b)mango(0.1) c)OFSP(0.1) d)papaya(0.1) e)carrot(0.1) f)kale(0.1) g)egg(0.1) h)fish(0.1) i)liver(0.1) j)butter(0.1) k)all(1) l)none(0)
3.	How is vitamin A deficiency caused?	a) not consuming vitamin A rich food (0.5) b) being exposed to continual diarrhea (0.5) c) all(1) f) non(0)
4.	Which one is characteristics of OFSP?	a)good source of vitamin A(0.25) b)contain other important nutrients in addition to Vitamin A(0.25) c) it can be used to prepare different recipes than just boiling (0.25) d)its leave also contain important nutrients and can be utilized to prepare different dishes(0.25) e)all(1) f)non(0)

Annex VII: Readability test questions to users of the leaflet - Amharic version

1.	ከሚከተሉት መካከል የቫይታሚን ኤ ጥቅም የትኛዉ ነው?	a)በሽታን መከላከል(0.25) b)የቆዳ ጠንነትና ውበት(0.25) c)የዓይን ጤንነት(0.25) d)የሰውነት ዕድገት(0.25) e)ሁሉም መልስ ነው(1) f)መልስ አልተሰጠም(0)
2.	ከሚከተሉት መሃል በቫይታሚን ኤ የበለጸጌ ምግብ የትኛው ነዉ?	a)ዱባ(0.1) b)ማንጎ (0.1) c)ብርትኳናማ ስኳር ድንች(0.1) d)ፓፓያ(0.1) e)ካሮት(0.1) f) ጎመን(0.1) g)እንቁላል(0.1) h)የአሳ(0.1) i)ጉበት(0.1) j)ቅቤ(0.1) k)ሁሉም(1) l)መልስ አልተሰጠም(0)
3.	የቫይታሚን ኤ እጥረት በሽታ እንዴት ልከሰት ይችላል?	a)በቫይታሚን ኤ የበለጸጌ ምግብ ባለመመገብ (0.5) b)በተከታታይ ለተቅማጥ በሽታ በመጋለጥ (0.5) c)ሁሉም መልስ ነው (1) d)መልስ አልተሰጠም (0)
4.	ከሚከተሉት ውስጥ የብርትኳናማ ስኳር ድንች ባህሪይ ያልሆነው የትኛው ነው?	a)የቫይታሚን ኤ የበለጸጌ መሆኑ(0.25) b)ከቫይታሚን ኤ በተጨማሪ በብዙ ንጥሬ ነገሮች የበለጸጌ መሆኑ(0.25) c)ከመቀቀል በተጨማሪ የተለያዬ ዓይነት ምግቦችን መዘጋጀት መቻሉ(0.25) d)ቅጠሉም የተለያዩ ንጥሬ ነገሮችን መያዙና የተለያዬ ወጥ መዘጋጀት መቻሉ (0.25) e)ሁሉም መልስ ነው (1) f)መልስ አልተሰጠም(0)

Annex VIII: Opinion test questions to users of the leaflet - English version

	Questions	Ranks	Any Suggestion
1.	How do you rank the simplicity of the idea mentioned on the leaflets to understand	5. Excellent 4. Very good 3. Good 2. Fair 1. Poor	
2.	How do you rank the legibility of words on the leaflet	5. Excellent 4. Very good 3. Good 2. Fair 1. Poor	
3.	How do you rank the attractiveness of design of the leaflet	5. Excellent 4. Very good 3. Good 2. Fair 1. Poor	
4.	How do you rank the content of ideas mentioned on the leaflet are important?	5. Excellent 4. Very good 3. Good 2. Fair 1. Poor	

Annex IX: Opinion test questions to users of the leaflet - Amharic version

	Questions	Ranks	Any Suggestion
1.	ይህን በራሪ ወረቀት አንብቦ ለመረዳት ምን ያህል ቀላል ነው ብለው ይመድባሉ?	5. እጅግ በጣም ጥሩ 4. በጣም ጥሩ 3. ጥሩ 2.መካከለኛ 1. ዝቅተኛ	
2.	የተጻፉት ቃላት ለማንበብ ምን ያህል ግልጽ ናቸው ብለው ይመድባሉ?	5. እጅግ በጣም ጥሩ 4. በጣም ጥሩ 3. ጥሩ 2.መካከለኛ 1. ዝቅተኛ	
3.	ወረቀቱ ለማንበብ ምን ያህል ሳቢ ነው ብለው ይመድባሉ?	5. እጅግ በጣም ጥሩ 4. በጣም ጥሩ 3. ጥሩ 2.መካከለኛ 1. ዝቅተኛ	
4.	በወረቀቱ ላይ የተነሱ ሀሳቦች ምን ያህል አስፈላጊ ናቸዉ ብለው ይመድባሉ ?	5. እጅግ በጣም ጥሩ 4. በጣም ጥሩ 3. ጥሩ 2.መካከለኛ 1. ዝቅተኛ	

Annex X: Different recipes applied by respondents at baseline and endline by both group

	Baseline		Endline	
	leaflet	Control	leaflet	control
Cheeps	11	12	17	16
Sup/atimit/	1	2	0	0
Stew with different vegetables	5	4	21	15
Injera	6	2	18	15
Porridge	2	1	24	9
Bread	2	1	24	14
Ambasha	2	0	1	0
Kita	1	0	0	0
Cake	2	0	3	0
Biscuit	0	1	1	2
Areke/Caticala/			0	1
Bombolino			1	1

Annex XI: Leaflet

Annex XII: Biography of author

The author Yirdan Yonas was born on July 1997 in Durame town Southern, Ethiopia. He had attended his primary school in Isaac Elementary and Primary School, Durame and his secondary school in Durame Secondary & Preparatory School, Durame town. He joined Bahir Dar University in 2014 and graduated with Bachelor of Science in Applied Human Nutrition in 2016. He joined postgraduate studies in the same field in 2017.

Yirdan Yonas: mobile: 0916574169 Email – yirdanyonas@gmail.com