

***UTILIZATION OF IODIZED SALT AT HOUSEHOLD LEVEL AND ITS ASSOCIATED FACTORS IN GIMBI TOWN, WESTERN WOLLEGA ZONE, OROMIA REGION***



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**RESEARCH PAPER SUBMITTED TO JIMMA UNIVERSITY COLLEGE OF PUBLIC HEALTH AND MEDICAL SCIENCES, DEPARTMENT OF EPIDIMIOLOGY FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH IN GENERAL MPH.**

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## ABSTRACT

**Background:** *Iodine is essential for normal growth, development, and functioning of the body. Since only minute amounts are required each day, it is known as a micronutrient. Iodine deficiency is the most common cause of preventable mental impairment worldwide. According to 2011 Ethiopia Demographic and health survey only 15 percent of households were utilizing iodized salt in Ethiopia.*

**Objectives:** *To assess level of iodized salt utilization and its factors at household level in Gimbi town, west Ethiopia, 2014*

**Methodology:** *A community based cross-sectional study design was conducted from March 31 to April 4, 2014 to assess level of iodized salt utilization and its associated factors in Gimbi town. A simple random sampling technique was employed to select households to take salt samples and to select a respondent. A total of 349 respondents were participated in the study. Data were analyzed using SPSS window version 20.0. Bivariate logistic regressions analysis was used to select independent candidate variables at p-value of 0.25 for multivariable logistic regression. All variables with p value less than 0.05 were used to declare statistical significance association.*

**Result:** *Inadequate utilization of iodized salt (<15 parts per million) in the study area was 218 (62.5%). Having poor knowledge (AOR=5.76, 95% CI :1.86, 17.82), exposing salt to sunlight (AOR=6.65, 95% CI):2.36, 18.73), household with lower income (AOR=10.45 , 95% CI:2.05, 23.27), perceived susceptibility to goiter (AOR=0.22, 95% CI:0.05, 0.89) and having exposure to mass media about iodized salt (AOR=4.6, 95% CI: 1.76, 12.18) were independent predictors of inadequate utilization of iodized salt at household level.*

**Conclusion:** *Inadequate utilization of iodized salt at household level was high when compared with WHO recommendation. The utilization of iodized salt was influenced by Knowledge, exposing salt to sunlight status, household income, perceived susceptibility to goiter and having exposure to mass media about iodized salt. Hence, there is a need to undertake electronic mass media in order to aware the importance of iodized salt and its proper handling at the household level*

**Key words:** *Iodized salt, utilization, associated factors*

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## ACRONYMS AND ABBREVIATIONS

EDHS: Ethiopian Demographic and Health Survey.

IDD: Iodine deficiency disorder

UN: united Nations

WHO: World Health Organization.

UNICEF: United Nations International Children Emergency Fund.

PPM: Parts per million

SAC: Schools age children

HH: Household

NGO: Nongovernmental organization

BSC: Bachelor of Science.

ICCIDD: International council for control of iodine deficiency disorders.

USI: Universal salt iodization

IS: Iodized salt

# CHAPTER ONE: INTRODUCTION

## 1.1 Background

Iodine is essential for normal growth, development, and functioning of the body. Since only minute amounts are required each day, it is known as a micronutrient. Iodine is required for synthesis of the thyroid hormones, thyroxin (T4) and triiodothyronine (T3), which optimize physical and mental development, aid with cellular metabolism and allow cells to manufacture proteins[1,2].

Two billion individuals worldwide have insufficient iodine intake, with those in south Asia and sub-Saharan Africa particularly affected. [3- 5]

Iodine deficiency has many adverse effects on growth and development. These effects are due to inadequate production of thyroid hormone and are termed iodine deficiency disorders. Iodine deficiency is the most common cause of preventable mental impairment worldwide [1, 5-7]

In 1990s the World Health Assembly adopted universal salt iodization, the iodization of salt for both human and livestock consumption, as the method of choice to eliminate IDD. In 2002, the Special Session on Children of the United Nations (UN) General Assembly set goal to eliminate IDD by the year 2005. [7]

After almost achieving Universal Salt Iodization in the early 1990s, after Eritria seceded from Ethiopia, iodized salt consumption in Ethiopia dropped to as low as 5% and much of the country's salt was being imported. In response to this, government began to explore the indigenous sources for salt production, including the salt deposits at Lake Afdera in Afar Regional State. Today, Ethiopia has successfully developed new sites in this part of the country to meet the salt needs of the country. [8]

According to 2011 EDHS from Ninety-four percent of households had salt tested for iodine at the time of the interview only 15 percent of households were utilizing iodized salt(13). Similarly, study conducted in Gondor town revealed that only 28.9% the utilization of iodized salt at household levels were only 28.9 percent at the recommended level [9]

Keeping in view the above facts this study will assess utilization of adequately iodized salt among households and associated factors in Gimbi town, west Wollega.

## **1.2 Statement of problem**

When iodized salt is adequately utilized, it is likely that a population's iodine status will improve and the thyroid function of that population will normalize. Assessing the population's iodine utilization is nevertheless necessary since dietary habits may change the iodine level of salt may not be sufficient to meet the requirements of some groups. [7]

In developing countries, 72% of households were consuming iodized salt, while in the least developed countries; the rate was only 57%. Worldwide, UNICEF estimates that just over two-thirds (71%) of households are using iodized salt, and percentage of households utilizing iodized salt (2003-2009) in Africa is 62 %, in sub Saharan is 61%, and in Ethiopia is only 20% [10].

In the 2011 EDHS, households' cooking salt was tested for iodine content. Salt that contains at least 15 PPM of iodine is considered to be adequately iodized. In this way only 15% of households consumed adequately iodized salt. This percentage is higher in urban areas than in rural areas (24 percent compared with 14 percent) [11]

Iodine deficiency occurs when iodine intake falls below recommended levels and it is a natural ecological phenomenon that occurs in many parts of the world. The erosion of soils due to loss of vegetation from clearing for agricultural production, overgrazing by livestock, and tree cutting for fire wood results in a continued and increasing loss of iodine from the soil.[12]

Iodine deficiency is a major public health problem for populations worldwide, particularly for pregnant women and young children. They are a threat to the social and economic development of countries. The most devastating outcomes of iodine deficiency are increased neonatal and infant mortality with cretinism. In addition, mild iodine deficiency is associated with thyroid enlargement and learning disabilities in children. Iodine deficiency is the greatest cause of preventable brain damage in childhood [7, 13]

People living in areas affected by severe iodine deficiency may have an intelligence quotient (IQ) of up to 13.5 points below that of those from comparable communities in areas where there is no iodine deficiency. This mental deficiency has an immediate effect on child learning capacity [1, 14]

In Ethiopia, one out of every 1,000 people is affected and about 50,000 prenatal deaths occur yearly due to iodine deficiency disorder. Twenty-six out of every 100 Ethiopians have goiter and 62% are at risk of IDD according to the national survey conducted by the previous Ethiopian Nutrition Institute. [15]

For many individuals, iodine-deficiency goiter is only a cosmetic problem. In some, however, particularly older adults, the goiter may be large enough to cause compression of the trachea or esophagus, or delay recognition of coexisting thyroid cancer. [16]

Between 2003 and 2013, the total number of countries with adequate iodine utilization increased from 67 to 111 [17]. In spite of this progress, iodine deficiency remains the world's most prevalent thyroid disease. The prevalence of iodine deficiency in Europe was reduced by 30 percent from 2003 to 2010, but 44 percent of school-age children still have insufficient iodine intake [18].

The prevalence of iodine deficiency disorder among school children in Ethiopia was 53.3%. The prevalence was higher in females (56.1%) than in males (50.8) [19]

In addition goiter prevalence in four regional states of Ethiopia namely Oromia which is study area, Southern Nation Nationalities and People (SNNP), Benshangul-Gumuz and Tigray was greater than 30%, and this indicate severe iodine deficiency. In the rest of the regions except Gambella, the IDD situation was mild to moderate. According to WHO/UNICEF/ICCIDD, this shows iodine deficiency disorder is a major public health problem in Ethiopia. [20-21]

The actual availability of iodine from iodized salt at the consumer level can vary widely due to a number of factors: variability in the amount of iodine added during iodization, poor mixing resulting in uneven distribution within the batches or bags produced and instability of iodine in the salt. These factors affect how much iodine is finally available for consumption. Various factors, such as predisposing factor (knowledge and practice on salt washing, impurities in salt, salt packaging, storage, education, and long term exposure to moisture, light, heat, and contaminants[7], Enabling and need factors, affect iodine utilization at household level.[22]

Since Iodine deficiency is a global public health problem and, in combating it, emphasis should be placed on diagnosis and correction at the level of the community rather than the individual. Iodization of salt is the preferred method of increasing iodine intake in a community. Salt iodination is legally mandated in many countries. Salt is a dietary necessity and often the only one that communities cannot provide for

themselves. Adding iodine during the packaging or processing of salt is an efficient means for distributing iodine on a mass basis. It is technically easy (and can even be done manually) and the cost is low. [23]

Despite government adopted regulation on iodized salt utilization at household level and shopkeeper, still Iodine deficiency is public health problem in Ethiopia. It is not known whether the households under utilizing iodized salt, extent to which they are utilizing iodized salt and associated with this.

In Ethiopia, not many studies focus on utilization of iodized salt, specifically in Gimbi town I never a crossed any research done so far on utilization of iodized salt at house level and associated factors.

This study therefore seeks to assess the utilization of iodized salt at household level and its associated factors in Gimbi town, southwest, Ethiopia. This information will guide the health office and decision maker in creating strategies such as community sensitization to create awareness in order to improve the utilization of iodized salt at household level in Gimbi town, west Wollega.

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Overview

Tackling the problem of IDD is among the most affordable and feasible propositions, requiring already existing and proven technology, and minimal financial investment. The solution, as we all know, is to ensure universal access and consumption of small quantities of iodized salt. If properly implemented, with the investment of only about 10 cents one dime – per year per person for adequately iodized salt, we can help prevent cretinism, stillbirth, miscarriage and infant mortality due to iodine deficiency and save future generations from loss of learning ability.[24]

### 2.2 Level of Utilization of iodized salt

The level of utilization of iodized salt is the degree to which preventing iodine deficiency disorder are used by a specific group of household.

Although IDD is, the most common conditions affecting children, showing a declining tendency from 54% in 2003 to 47% in 2007 and 37% in 2011, still only 44% of population of European Union lives in iodine sufficient areas[24]

Study to assess utilization of iodized salt at household by UNICEF in republic of Kazakhstan pointed out that, 77.3% of household salt was found upon rapid field testing to be adequately iodized ( $\geq 15$ ppm). In contrast, 13.1% of all household salt tested in the survey had not been iodized (0ppm). In urban households this percentage was 9.9% while in rural households it was almost twice as big [25]

In similar way another study in Rural Areas of Meerut District(Uttar Pradesh) show that 96% of the households from the rural area were consuming iodized salt but all the household samples were not having recommended level of iodine for the consumers by WHO/UNICEF/ICCIDD. Around 42% of the household samples from the rural area collected were having iodine content less than 15 ppm while 4 % household were using salt that contains no iodine.[26]

A cross sectional study at District of Lucknow, India in 2010, revealed that 64.2% households were using salt of iodine content of  $>15$ ppm, 31.8% were using salt with inadequate iodine content and 4% households were consuming salt with no iodine.[27]

WHO/ICCIDD study on same selected targeted countries in 2011, shown that one fourth of school-age children (241 million) have insufficient iodine intake even if there were sharp differences among regional. In this study Southeast Asia has the largest number of SAC with low iodine intakes (76 million) and there has been little progress in Africa, where 39% (58 million) have inadequate iodine intakes. [28]

According to assessment of UNICEF in Eastern and Southern Africa, 54 percent of households utilizing adequately iodized salt. In this region, Burundi, Kenya Lesotho, Uganda and Zimbabwe are considered to have achieved the universal salt iodization goal sated by World health organization. [24]

In Sudan, utilization of population with iodized salt is remains very low. There was no strong political support for Universal salt iodization programme and awareness. [29]

As 2011 National survey in Ethiopia, only 15 percent were utilizing iodized salt from 94 percent of households had salt tested for iodine at the time of the interview. [11]

Across sectional study in Shebe town (Ethiopia) in 2003, revealed that only 18 percent of households have iodine levels above the minimum standard set by the Quality and Standard Authority of Ethiopia from 81 percent of household salt samples were collected. [30]

Study assessed availability of adequately iodized salt at household level and associated factors in Gondar town by using community based cross-sectional during August 15-25, 2012, revealed that only 28.9% of households had adequately iodized salt at household level [9]

## **2.3 Factors influencing Utilization of iodized salt**

### ***2.3.1 Socio demographic and Economic Factors***

These are personal characteristics that influence household's decision to be able to use iodized salt. As reflected in findings of a cross sectional study at Basra city (south Iraq) in April 2011, significantly, more of the household respondents with higher education level used adequately iodized salt than those with lower education levels (82.0% of those with university education versus 57.7% of those where were illiterate [31]

Study conducted in Indonesia revealed that Lower maternal education, lower paternal education, and low monthly per capita household expenditure were associated with the respondent's report that they were not using iodized salt [32]

Study conducted in India show that, there was significant difference in utilization of iodine in different income group. Those improved practices of handling of salt were observed in high come group due to more exposes to media than low income group. [33]

According to cross sectional study conducted in South Africa, Peoples at the lower end of the socioeconomic spectrum are more likely to suffer the consequences of using under-iodized salt because more of them used agricultural or coarse salt than did people in the higher socioeconomic categories.[34]

Similarly, study conducted in Sudan, revealed that utilization of adequately iodized salt is high when head of household is male, more educated and comparatively wealthy in urban setting. [29]

As indicated in 2011 EDHS, utilization of iodized salt is positively correlated with the mother's education level; about 30 percent of children of mothers who are educated at the secondary or higher level live in households using iodized salt, compared with 15 percent of children whose mothers have no education [11]

### ***2.3.2 Predisposing Factors***

These are several factors that influence an individual directly or indirectly to utilizing adequacy of iodized salt at household. These include: poor storage methods, daily and over-exposure of iodized salt to sunlight by retailers and selling of unpackaged salt. According to study, four samples of salt with iodine have clearly demonstrated for long run effect of sunlight exposure on storage period. All samples were exposed to sunlight on the sill of a south window in open crystallizing dishes. The iodide salts lost, respectively, 73%, 90%, and 24% of their iodine during a storage period of 36 weeks [35, 36]

A study conducted in London showed that duration of salt storage had an impact on the level of iodine. Iodized salt will lose 24% of iodine when stored for 10 weeks [36]

A similar study conducted in Colombia showed that the effect of longer storage beyond 8 weeks aggravated losses of iodine from the salt due to different environmental conditions during storage and distribution, preferably in a cool place and away from strong light [37].

Another study done in Iraq showed that packed salt was mostly adequately iodized compared with non packed salt [31]



A study conducted in Canada showed that iodine content of the salt remained constant and its distribution remained uniform for many months when the salt is packed and kept dry, preferably in a cool place and away from strong light. According to this study, the researcher supports this conclusion by experimental showing that samples of iodized salt stored for six months in sealed and also in loosely covered wide mouthed glass jars exhibited no loss and no uneven distribution of the iodide. Similarly, salt spread very thinly over bottom of a flat porcelain basin –thus exposing it to a larger surface – and left open for room’s atmosphere for six months lost no iodine [36]

A study conducted in Delhi documented that there was about 31% iodine loss from iodized salt when exposed to sunlight [38]

As indicated on community cross-sectional study in Parganas (India), a greater proportion of the households with the practice of keeping salt on the shelf and in covered pots were consuming adequately-iodized salt. As well as families whose respondents knew about the ban on selling non iodized salt were consuming adequately-iodized salt in a higher proportion. [41]

According to assessment of UNICEF in Kazakhstan, almost half of the households in Kazakhstan were found to either purchase or store their salt without packaging [25]

A study conducted in Bia District (Ghana), indicated that the radio was the major medium by which respondents were informed about the importance of iodized salt and iodine deficiency diseases. [40]

A study conducted in Ghana showed that effect of sunlight is a result of the high volatility of iodine as temperature increases the rate at which iodine sublimates. [48]

A study conducted in India showed that exposed to mass media had impact on consuming adequately iodized salt [27]

A similar study in Turkey showed that the use of local mass media is effective in raising the prevalence of iodized salt use [47]

According to cross sectional study in 2005 in Ethiopia only 10% of women know the importance of iodized salt in all the regional states except in Addis Ababa. Similarly apart few in Tigray and Addis Ababa, majority (> 90%) had no understanding about the causes of iodine deficiency. [20]

### ***2.3.3 Enabling factors***

Enabling factors refer to attributes specific to the individual or the community such ability to pay for services and individual access to regular source of care. [22]

As reflected in study conduct in schools of children in South Tajikistan, potential risk factors for goiter were buying salt from a wholesale shop compared to buying salt from a local shop in the village or a nearby town, buying salt every 2–3 months compared to buying salt every 1-2 weeks and buying quantities of salt more than 5 KG compared to buying quantities of salt less than 1 KG. [42]

Study conducted in Thailand suggest that there were external constraints, including limited availability of iodized salt and its high cost, that constrain households' abilities to purchase and use this salt.[43]

In India, coarse salt was generally less likely to contain iodine than refined salt and, because the price in markets of courses salt was cheaper, it was more likely to be purchased by poorer households. Iodized salt consumption in the poorest 50% of households of households was 16% lower than in the wealthiest by salt type, this wealth effect disappeared in coarse salts users and was reduced to almost insignificants levels in refined salt users [44]

Regarding reasons of occasional or never use of iodized salt, majority of the respondents mentioned its High price (31.4% and 31%) and unavailability (42.7% and 25.4%) in the area [45]

The radio was the major medium by which respondents were informed about the importance of iodized salt and iodine deficiency diseases. [40]

According to cross sectional study in Gondor town, the main reasons given for not having adequately iodized salt next to lack of knowledge about the benefit of iodized salt (73.1%), is being expensive compared with common salt (24.4%), shortage of iodized salt in the market at certain times (14.8%), being less salty (11.8%),and not giving attention to it (9.7%) [9]

### ***2.3.4 Need factors***

According to study conducted on pregnant women registered in health stations at less than 20 weeks of gestation in northern Viet Nam in 2011 reasons out for not using iodized salt was that, iodized salt made food taste bitter and because they did not know that it was important or necessary to use it during pregnancy.[39]

Study conducted in Bia District (Ghana), indicated that 90.4% of the respondents had heard about iodized salt. Nearly a third (32.9%) of the respondents perceived intake of iodized salt is important because it cures goiter whereas 31.4% indicated that the intake of iodized salt enables individuals to remain healthy. [40]

## **2.4 Significance of the study**

While traditionally associated with cretinism and goiter, iodine deficiency has broad effects on central nervous system development that can occur in the absence of either condition. Any maternal iodine deficiency results in a range of intellectual, motor, and hearing deficits in offspring. This loss in intellectual capacity limits educational achievement of populations and the economic prowess of nations.

One of the goal for monitoring progress towards sustainable elimination of IDD as a public health problem determined by a Joint WHO/ UNICEF/ICCIDD Working Group on assessment and monitoring of IDD is percentage of households consuming effectively iodized salt should be greater than 90 percent .

Therefore, this study aims at providing scientifically sound data on utilization of iodized salt and its associated factors in the town household level so that appropriate initiative can be taken by the local government bodies and relevant local stakeholders to respond to specific factors to improve utilization of iodized salt of the household in the Town.

The study findings can also be utilized by town, zonal and regional policy makers and planners who are interested in the study area and other similar settings.

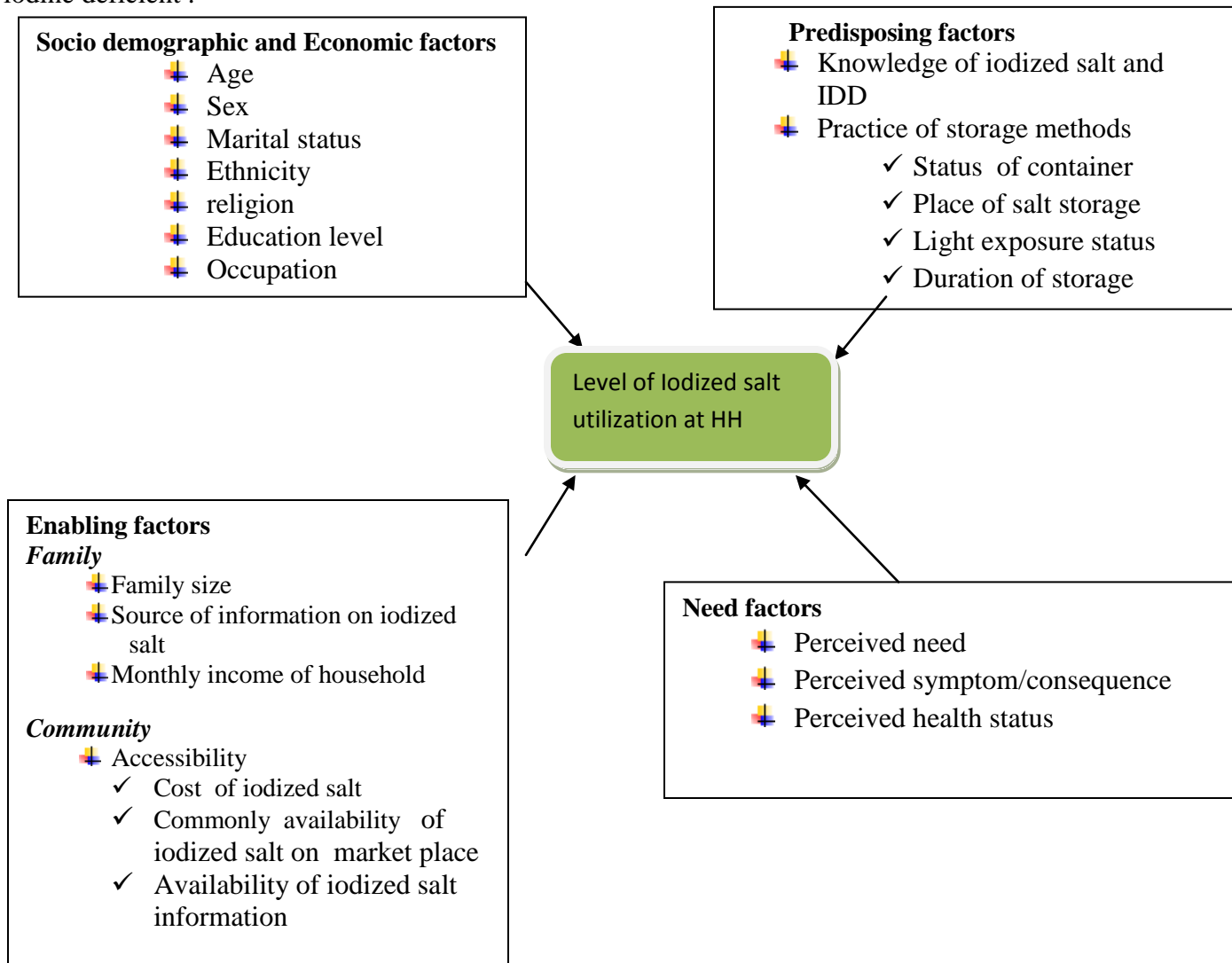
Academics and researchers can use the findings for expansion of knowledge and further studies in the field of public health.

Generally understanding the key factors of utilization of iodized salt in the town household level have positive impact on designing effective planning and intervention to improve health outcomes which lead to achieving better health and development in the area

## 2.5 Conceptual Framework

The conceptual framework proposed assumes that the use of iodized salt is a function of individual factors. Individual factors include Socio demographic, predisposing, and enabling and need factors as proposed by Andersen, 1973. Predisposing characteristics include gender, marital status, educational level and occupation. [22]

Enabling factors such as income, employment and access to regular source of iodized salt and need variables such as perceived health status, disease severity and limitation of activity caused by iodine deficient .



**Figure 1: A conceptual frame work for assessing determinants of utilization of Iodized salt in Gimbi town, modified from Anderson and Newman, societal and individual determinants of medical care [32]**

## CHAPTER THREE: OBJECTIVES OF STUDY

### 3.1 General Objectives

- ✚ To assess level of iodized salt utilization and its associated factors at household level in Gimbi town, west Ethiopia, 2014.

### 3.2 Specific Objectives

- ✚ To determine level of iodized salt utilization among households in Gimbi town.
- ✚ To identify associated factors influencing utilization of iodized salt at household level in Gimbi town.

## **CHAPTER FOUR: METHODS AND SUBJECTS**

### **4.1 Study area and period**

The study was conducted in Gimbi town, which is located in West Wollega Zone of Oromia National Regional State, is the biggest town of west Wollega zone. Gimbi is located 441 km western of Addis Ababa at an altitude range of 2300-3200 meters above sea level and has a total four administrative kebele. According to the 2007 Ethiopian census report, Gimbi has a total population of 30,981 composed of about equal ratio of males and females (i.e. 15,716: 15,265) respectively. 15,513 of the population is Protestants, 10,944 are orthodox Christians, 4,023 are Muslim and 54 are practice traditional religions. [46]

The Data were collected during March 31 to April 4, 2014 at household level.

### **4.2 Study design**

A community- based cross sectional study design was employed.

### **4.3 Population**

#### ***4.3.1 Source population***

All households residing in Gimbi town were considered as source population for this study.

#### ***4.3.2 Study population***

All selected households residing in Gimbi town in the period of data collection were considered as study population.

#### ***4.3.3 Study unit***

Household included in the sample from households in 4 kebeles.

## **4.4 Inclusion and exclusion criteria**

### ***4.4.1 Inclusion criteria***

All households, in which house members have been living in at least for about six and above months in Gimbi town as permanent resident.

### ***4.4.2 Exclusion criteria***

Households, which is acting as commercial center during data collection period was excluded from the study.

## **4.5 Study variables**

### ***4.5.1 Dependent variable***

✚ levels of iodized salt utilization at household

- ✓ Adequately utilization( >15ppm)
- ✓ Inadequately utilization(<15ppm and/or no iodine)

### ***4.5.2 Independent variable***

#### ***Socio demographic and Economic factors***

Age, Sex, marital status, ethnicity, religion, Education level and occupation status

#### ***Predisposing factors:***

✚ Knowledge of iodized salt and IDD

✚ Practice of storage methods

- ✓ Status of container,
- ✓ Place of storage,
- ✓ Status of light exposure and
- ✓ Duration of storage

## ***Enabling Factors***

### *Family:*

- + Family size of household
- + Source of information on iodized salt
- + Monthly Income of Household

### *Community:*

- + Accessibly of Iodized salt
  - ✓ Cost of iodized salt,
  - ✓ Commonly availability of iodized salt on markets
  - ✓ Availability of information of iodized salt

### ***Need factor:***

- + Needs as perceived by the individual (e.g. perceived health status, symptoms/disease severity, and limitation of activity and self assessment of health status).

## **4.6 Sample size determination and sampling technique**

### ***4.6.1 Sample size determination***

The sample size was determined by using single population proportion formula with 95% confidence interval which indicate, the probability that an estimate of a population parameter is within certain specified limits of the true value and assuming the proportion (p) of iodinated salt is 17.4% [11] as well as a margin of error (d) of 4% which show that the error introduced due to sampling procedure is only tolerable as much as four percent of the total sample size. A z-value of 1.96 was used at 95% CI and d of 4%. (n= sample size, p= prevalence, d= margin of error).

$$n = \frac{(z^2 p(1-p))}{d^2} = \frac{(1.96)^2 * (0.174)(0.826)}{0.04^2} = 345$$

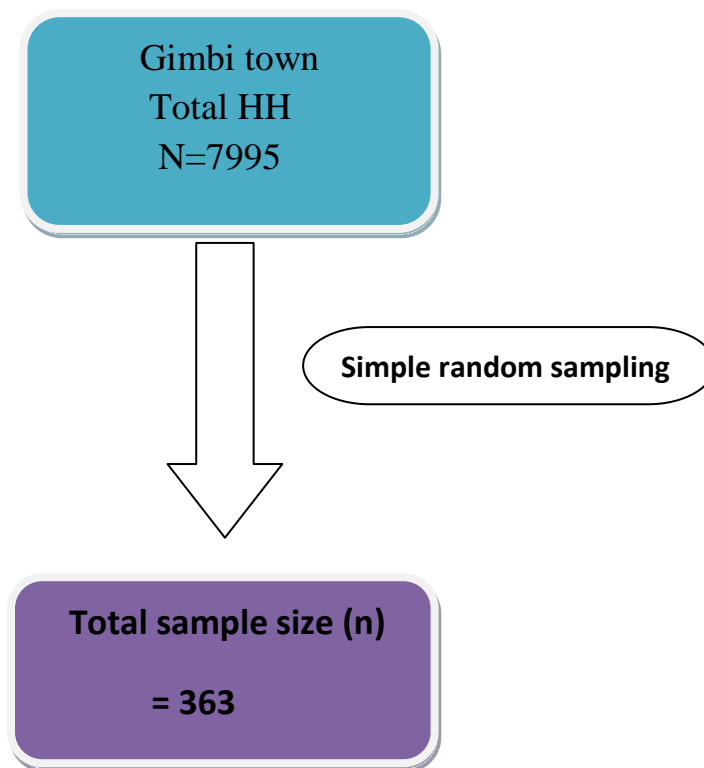


Therefore the minimum sample size was 345. Since the number of total household in Gimbi town are less than 10,000 ( $N=7995$ ), correction formula was considered  $= \frac{n}{1 + \frac{n}{N}}$ . So with adjustment for 10% non-response, incomplete responses and refusals,  $n = (330+33)$ , the minimal final sample size was **363**.

#### 4.6.2 Sampling techniques and procedure

First, all four kebeles found in Gimbi town were included in the study. Then, computer based simple random sampling technique was applied to identify 363 samples from lists of a total 7995 households.

The members of the household who is principally responsible for food cooking and purchasing food items were identified and interviewed for questions. Lottery method was applied to select one respondent in the case of there were more than two respondents in household.



**Figure 2: Schematic presentation of sampling procedures**

## **4.7 Data Collection methods**

In this survey data were collected using structured questionnaire by a face-to-face interviewing technique. Firstly, the questionnaire was developed in English and then translated into Afan Oromo, and finally, it was retranslated into English by another language translator for checking consistency.

In data collection procedures, the person mostly responsible for food cooking and purchasing food in the household was asked on socio demographic and economic, predisposing, enabling and need factors questions.

To assess the use of iodized salt at the household level, interviewers asked households to provide a teaspoon of salt used for cooking. The salt was tested for iodine using the iodine rapid test kit (MBI Kits International). The kit tests salt with drops of stabilized starch based solution, which causes chemical reaction manifested by color change. The salt sample was taken in a teaspoon, and after shaking the reagent (test solution) bottle well, a drop of the test solution is poured on the salt. Then the salt will turn light blue to dark violet depending on the iodine content of the salt. To assess the iodine content, the color of the salt was compared with chart (0, 15, 25, 50 and 75 parts per million, ppm). The cut-off proportion of 15 PPM and above was considered as adequately iodized salt using the WHO/UNICEF reference indicators for monitoring of iodized salt.

Data were collected by 4 female diploma nurses. Two B.Sc. nurses were recruited as supervisors. Data collectors and supervisors were trained for two days prior to the data collection.

## **4.8 Data processing and analysis**

After coding the data were entered Epi Data version 3.1. Then it was checked for completeness, inconsistency and outliers by looking at their distribution. Incomplete and inconsistent data were excluded from the analysis. Data were analyzed using SPSS for Windows version 20. Descriptive statistics was used to describe the variables, and then the results were expressed as mean, frequency and percentage.

Crude associations between the independent and dependent variables were analyzed first using bivariate logistic regressions analysis and then multivariable logistic regressions analysis was done for the variables with p-value below 0.25 in the bivariate analysis. Odds ratio (OR) was generated for each variable and the independence of any association was initially controlled for all variables, then additionally by entering all variables into the model in step. P value below 0.05 was considered to determine the actual predictors

for the level of iodized salt utilization. In addition, multicollinearity and interaction were checked among independent variables. Goodness of model fit was checked by the Likelihood Ratio Test and the Omnibus Tests of Model.

#### **4.9 Data quality control issues**

The collected data were checked out for the completeness, accuracy and clarity by the principal Investigator and Supervisors. This quality checking was being done daily after data collection and amendments were made before the next data collection measure. Data clean up and cross-checking was done before analysis.

Training was given to data collectors and supervisors for two days on how to approach study participants, on how to use the questionnaire and the guidelines. Supervision was also being done at the spot by principal investigator and supervisors.

#### **4.10 Pre test**

To ensure quality of data, pre-test of data collection tools was done with questionnaire translated to Afan Oromo on households respondents by taking 5% respondents of the total sample size. Then necessary correction was done after the pretest and the questionnaire was tested and appropriate measure was taken on time for completeness before data entry. The pre-test was conducted in Nekemte town since it is located near to Gimbi town. The purpose of the pre-testing is to ensure that the respondents were able to understand the questions and to check the wording, logic and other unclear of the questions in a sensible way to the respondents. Amendments were made accordingly after pre-testing on wording and the result of pretesting were not included in main finding.

#### **4.11 Ethical considerations**

Ethical clearance was obtained from Jimma University Health Research and Post Graduate Coordinating Office of School of public health and Medical Sciences, research ethics committee. Official letters was submitted to the Zonal Health Department and Gimbi town health office. The purposes and the importance of the study were clearly explained by data collectors. The data collectors were again clearly explained the purposes and importance of the study and inform that the study was conducted by other body than health office.

Written informed consent was secured from each study participant by data collectors based on the information and consent form prepared for this particular study after explaining the expected research benefits and risks. Participant's involvement in the study was on voluntary basis; participants who were unwilling to participate in the study and those who wish to quit their participation at any stage were informed to do so without any restriction. After informed consent was approved the interview was continued by data collectors starting from socio- demographic characteristics to all other variables for those have iodine in their household.

#### **4.12 Dissemination and utilization of results**

The results of the study will be presented to Jimma University School of Public Health and Medical Sciences, as part of MPH thesis, distributed to Western Wollega Health Department, Gimbi health office and other organization concerned about iodized salt utilization. The findings may also present in different seminars, meetings, workshops and published in scientific journals.

#### **4.13 Operational definition**

1. **Utilization of iodized salt:** refers to the use of iodized salt that can be greater than or equal to 15ppm, less than to 15ppm and no use of iodine salt based result of test on salt sample at household level. This is combination of adequately and inadequately utilization of iodized salt and/or not utilizing iodized salt.
2. **Adequately utilizing iodized salt:** refers as a salt sample which has  $\geq 15$  parts per million (PPM) of iodine at household level.
3. **Inadequately utilizing iodized salt:** refers as a salt sample which has  $< 15$  parts per million (PPM) of iodine at household level.

4. **Not utilizing iodized salt:** refers as a salt sample which has 0 parts per million (PPM) of iodine at household level.
5. **Iodized salt:** is table salt mixed with a minute amount of various salts of the element iodine.
6. **Good knowledge:** Participants who scored above 50% for knowledge questions will be considered as having good knowledge about iodized salt and IDD.
7. **Poor storage practice:** Any single storage practice (storage in container without lid, storage in moist place, and expose to sun light and storage for more than two months) that might result in the reduction of salt iodine content will be labeled as poor storage practice.
8. **Good storage practice:** Those without such practices will be labeled as good practices.
9. **Access of iodized salt:** refer when there is source of information on availability of iodized salt, always availability of iodized salt on market and affordable to buy 1kg of packed iodized salt in 10Ethiopian birr, 1kg of unpacked iodized salt in 7 Ethiopian birr than 1KG of common salt in Ethiopian birr.
10. **Not access:** - When there is no a source of information on availability of iodized salt and/or, not always availability of iodized salt on market and/or unaffordable to buy 1kg of packed iodized salt in 10 Ethiopian birr, 1kg of unpacked iodized salt 7 Ethiopian birr than 1KG of common salt in Ethiopian birr is considered as not access.

## CHAPTER FIVE: RESULTS

### *5.1 Socio-demographic characteristics of the respondents*

A total of 363 respondents between ages of 18-49 were included in the study with response rate of 96.14%. The mean age was 31( $\pm$ 6.9) years and almost all (98 %) of them were females.

Of 349 participants, 136 (39%) and 90(25.8%) were followers of protestant and orthodox respectively in religion. Two hundred eighty six (81.9%) of the study participants were Oromo by ethnicity followed by Amhara 46(13.2%).

One hundred ninety seven (56.4%) were housewives while 73(20.9%) were governmental employees. Two seventy four (78.5%) were married. One hundred fourty five (41.5%) and 50(14.3%) of the respondents attended primary schools and illiterate respectively. (Table 1)

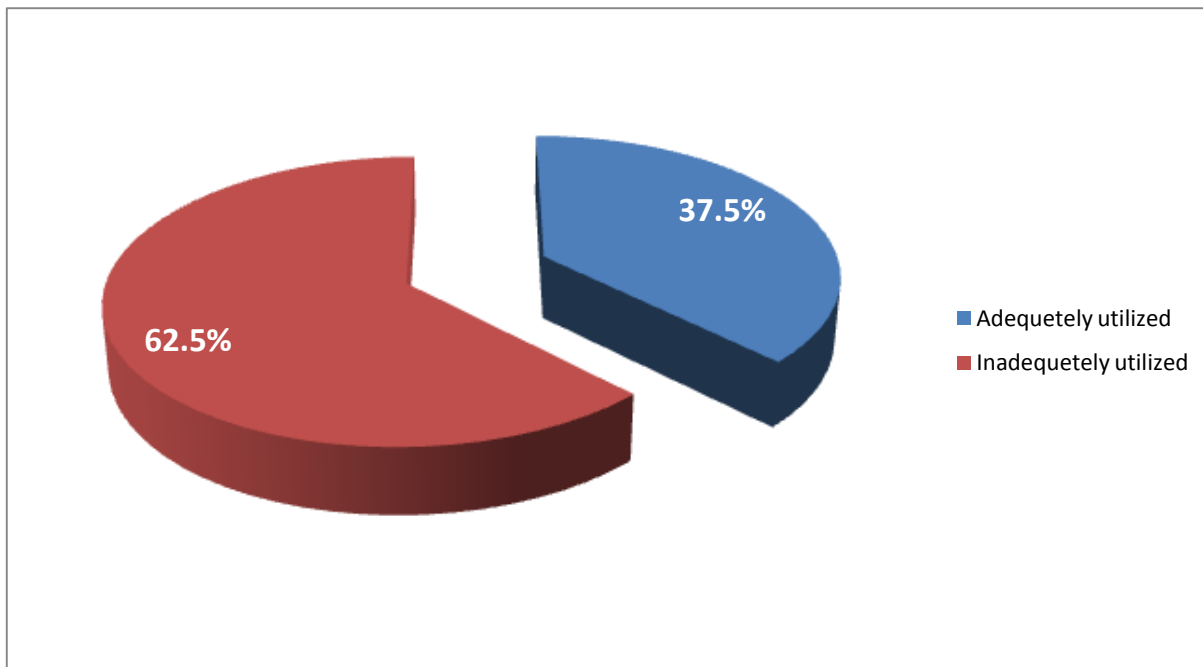
**Table 1: Socio-demographic characteristics of participants, West Wollega zone, Gimbi town, April 2014(n=349)**

Variable	Characteristics	Frequency	Percentage
Sex	Male	7	2
	Female	342	98
Age	15-20	24	6.9
	21-25	66	18.9
	26-30	130	37.2
	31-35	51	14.6
	36-40	44	12.6
	41-45	32	9.2
	46-50	2	0.6
		<i>Mean age (SD)</i>	
Religion	Protestant	136	39.0
	Adventist	63	18.1
	Orthodox	90	25.8
	Muslim	52	14.9
	Others	8	2.3
Ethnicity	Oromo	286	81.9
	Amhara	46	13.2
	Tigrie	6	1.7
	Gurage	11	3.2
Marital status	Single	32	9.2
	Married	274	78.5
	Divorced	24	6.9
	Widowed	19	5.4
Occupation	Governmental Employee	73	20.9
	Merchant	52	14.9
	Housewife	197	56.5
	Daily laborer	27	7.7
Education status	Illiterate	50	14.3
	Read and Write	27	7.7
	Primary	145	41.5
	Secondary	79	22.6
	Tertiary	48	13.8

### 5.2 Level of iodized salt utilization

Inadequate utilization of iodized salt (<15 ppm) was found in 218(62.5%) of the 349 tested salt samples of households. Based on respondents reporting, 202 (57.9%) of households said that they did not utilize iodized salt, and 147 (42.1%) participants said that they have adequately utilized iodized salt for cooking food in their home.

However, following testing of household salt samples using rapid test kits, from those who said that they did not have iodized salt, the salt sample was found 18 (8.9%), 116(57.4%), and 68(33.7%)  $\geq 15$ ppm, <15 ppm, and 0 ppm respectively, but the actual utilization of iodized salt among those who said that they had iodized salt was found to be 113 (76.9%). (Figure 3)



**Figure 3: The level of iodized salt utilization in the household of west wollega, Gimbi town, April 2014**



### 5.3 Predisposing factors

When asked if they have ever heard of iodized salt, 208(59.6%) of them said that they have heard about iodized salt from different sources.

One hundred eight four (52.7%) knew that lack of daily consumption of iodized salt could bring iodine deficiency disorders. One hundred eight four (52.7%) knew iodine deficiency results in goiter.

Regarding knowledge about the usefulness of iodized salt and consequence of IDD, 179(51.3%) had poor knowledge about iodized salt and the rest 170(48.7%) had good knowledge.

The study funding revealed that 249 (71.3 %) indicated that they had been storing iodized salt for less than and eight weeks whereas only 100(28.7%) reported that they had stored iodized salt more than eight.

**Table 2: Knowledge and practice of participants about iodized salt in Gimbi town, April, 2014**

Variables	Characteristics	Frequency	Percentage
Knowledge	Good	170	48.7
	Poor	179	51.3
Sunlight exposure of salt	Yes	152	43.6
	No	197	56.4
Salt container	Container with lid	272	77.9
	Container without lid	77	22.1
Salt storage place	In dry	190	54.5
	In moisture	117	33.5
	At fire	42	12
Duration of salt storage	≤8weeks	249	71.3
	>8weeks	100	28.7

Seventy eight percent, 272, of them stored their salt in the recommended way in closed containers, but the rest 22.1% in containers without a lid.

More than half of them (190) 54.4% stored salt in a dry place away from humidity and 197(56.4%) were not exposed salt to sunlight.

Logistic regression model was used to identify factors that influence the utilization of iodized salt. In the binary logistic regression analyses Sex, educational status, marital status, occupation, religion, practice of storage methods and knowledge about iodized salt were some of the predisposing factors that showed a statistically significant association with iodized salt utilization.

**Table 3: Binary logistic regressions analysis for predisposing factors associated with iodized salt utilization at household level, West Wollega, Gimbi town, April 2014 (n=349)**

Variable	Level of IS utilization		Crude OR(95% CI)	P value
	≥15PPM Number(percentage)	<15 & 0 PPM Number(percentage)		
<b>Sex</b>				
Male	1(0.3)	6(1.7)	3.67(0.43-30.90)	0.230
Female	130(37.2)	212(60.7)	1	
<b>Religion</b>				
Protestant	63(18.1)	73(20.9)	1	
Adventist	26(7.4)	37(10.6)	1.22(0.67-2.24)	0.505
Orthodox	23(6.6)	63(19.2)	2.51(1.40-4.49)	0.002
Muslim	19(5.4)	33(9.5)	1.49(0.77-2.89)	0.228
Others	0	8(2.3)		
<b>Marital status</b>				
Single	17(4.9)	15(4.3)	0.165(0.04-0.68)	0.013
Married	104(29.8)	170(48.7)	0.306(0.087-1.072)	0.065
Divorced	10(2)	33(4.9)	0.455(0.10-2.07)	0.309
Widowed	3(0.9)	16(4.6)	1	
<b>Education status</b>				
Illiterate	6(1.7)	44(12.6)	22.00(7.51-64.42)	0.001
Read and Write	5(1.4)	22(6.3)	13.20(4.09-42.54)	0.001
Primary	48(13)	97(27.3)	6.06(2.89-12.69)	0.001
Secondary	36(10.3)	43(12.3)	3.58(1.62-7.88)	0.002
Tertiary	36(10.3)	12(3.4)	1	
<b>Occupation</b>				
Governmental employee	55(15.8)	18(5.2)	1	
Merchant	25(7.2)	27(7.7)	3.30(1.54-7.06)	0.002
Housewife	48(13.8)	149(42.7)	9.48(5.08-17.69)	0.001
Daily labor	3(0.9)	24(6.9)	24.44(6.57-90.86)	0.001
<b>Salt storage place</b>				
In dry place	119(34.1)	71(20.3)	1	
In moisture	7(2.0)	110(31.5)	12.40(4.65-33.01)	0.001
At fire	5(1.4)	37(10.6)	26.33(11.61-59.71)	0.001
<b>Expose to sunlight</b>				
yes	12(3.4)	140(40.1)	17.79(9.24-34.26)	0.001
No	119(34.1)	78(22.3)	1	0.001

<b>Salt container</b>				
Container with lid	123(35.2)	149(42.7)	1	
Container without lid	8(2.3)	69(19.8)	7.12(3.29-15.37)	0.001
<b>Duration of storage</b>				
≤8weeks	120(34.4)	129(37.0)	1	
>8weeks	8(3.2)	89(25.5)	7.52(3.83-14.76)	0.001
<b>Knowledge</b>				
Good	121(34.7)	49(14)	1	
poor	10(2.9)	169(48.4)	41.73(20.33-85.65)	0.001

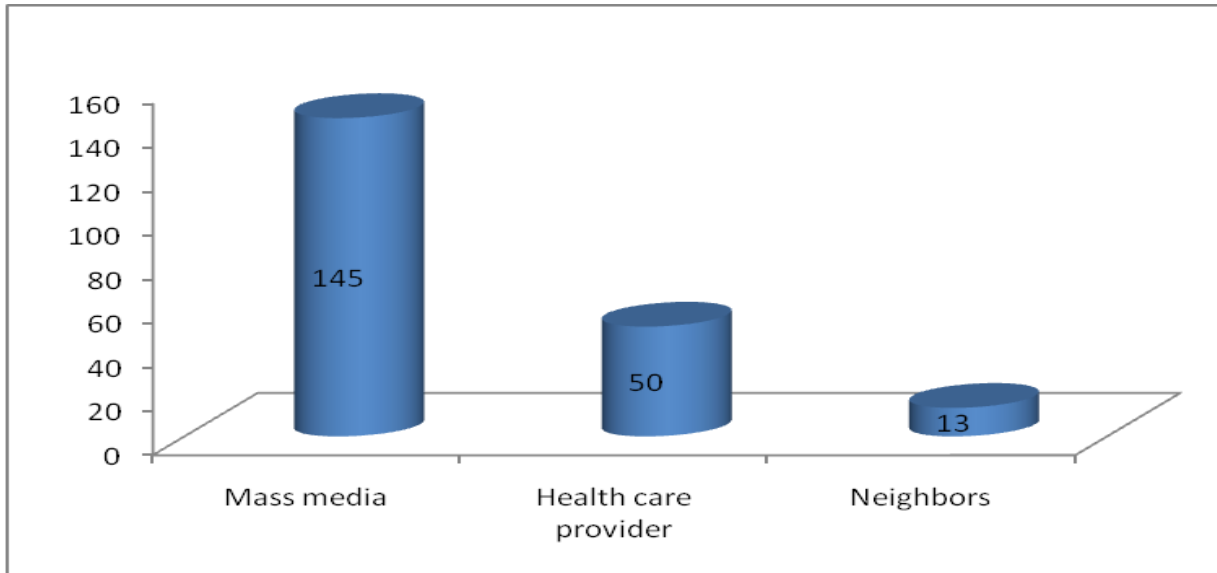
#### **5.4 Enabling factors**

Two hundred fifty two (72.2%) of them had family size ≤5, but the remaining 97(27.8%) of them had family size >5.

Thirty six percents, 126, were found in income group <500 birr, 72(20.6%) in income group 501-1000birr, 69(19.8%) in income group 1001-1500birr, 38(10.9%) income group 1501-2000birr and 44 (12.6%) belonged to income group >2001 birr.

Out of 208 respondents who have heard about iodized salt, 145(69.7%) have heard it through mass media (TV and radio) and 50(24%) through healthcare providers. (Figure 4)

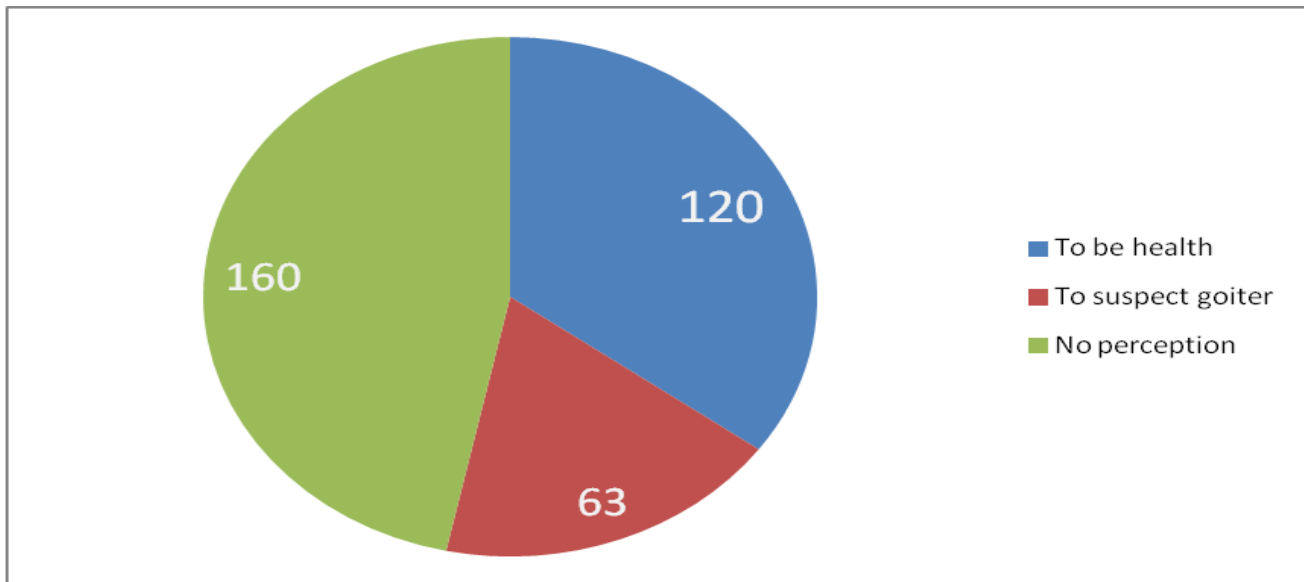
Out of 223 respondents who had information on availability of iodized salt, 104(46.6%) were said that iodized salt is sometimes available but the remaining 59(26.5%) were said it is always available. Regarding procurement of the iodized salt, 30.1% were procuring iodized salt from a local shop situated nearby their residence. More than half 187(53.6) % were said that iodized salt was unaffordable compared with common salt and this influenced their decision to use common salt.



**Figure 4: Frequency distributions of sources of information about iodized salt, West wollega zone, Gimbi town, April, 2014**

**5.5 Perceived need factors.**

Nearly a one third, 34.4%, perceived that the intake of iodized salt is important to be health where as 18.1% perceived that the intake of iodized salt enables individuals to cures goiter but the remaining 47.6% had no perceived need on iodized salt.



**Figure 5: Frequency distribution of respondents according to perceived needs variables, April, 2014**

Fifty nine percents perceived that the taste of iodized salt is not different from that of common salt and one hundred sixty eight percents were perceived cost of iodized as affordable cost.

perceived susceptibility to goiter and perception of cost were some of the need factors that showed a statistically significant association with iodized salt utilization on binary logistic regression.

Among the enabling and perceived need factors, monthly income, having exposure to media and accessibility of iodized, perceived need and perception of test showed a statistically significant association with iodized salt utilization on binary logistic regression.

**Table 4: Binary logistic regressions analysis for enabling and perceived need factors associated with iodized salt utilization at household level, West Wollega, Gimbi town, April 2014 (n=349)**

Variable	Level of IS utilization		Crude OR(95% CI)	P value
	≥15PPM Number(percentage)	<15 & 0 PPM Number(percentage)		
<b>Monthly income</b>				
≤500	13(3.7)	113(32.4)	20.55(11.90-53.36)	0.001
501-1000	13(3.7)	59(16.9)	15.43(6.11-38.95)	0.001
1001-1500	47(13.5)	22(6.3)	1.59(0.66-3.79)	0.294
1501-2000	24(6.9)	14(4.0)	1.98(0.75-5.20)	0.164
≥2001	34(9.7)	10(2.9)	1	
<b>Exposed to mass- media</b>				
Yes	99(28.4)	50(14.3)	1	
No	32(9.2)	168(48.1)	10.39(6.25-17.28)	0.002
<b>Accessibility</b>				
Yes	41(11.7)	14(4.0)	1	
No	90(25.8)	204(58.5)	6.63(3.44-12.78)	0.001
<b>Perceived need</b>				
To be health	61(17.5)	59(16.9)	0.14(0.07-0.25)	0.01
To suspect goiter	49(14.0)	14(4.0)	0.04(0.02-0.08)	0.01
No perception need	21(6.0)	145(41.5)	1	
<b>Perception of test</b>				
Yes	76(21.8)	67(19.2)	0.32(0.20-0.50)	0.01
No	55(15.8)	151(43.3)	1	

### ***5.6 Independent predictors of iodized salt utilization at household level, west Wollega, Gimbi town.***

Out of independent variables, Sex, religion, education, marital status, occupation, expose salt to sunlight, duration of salt storage, storage place at home, knowledge, monthly income, having exposure to mass media, accessibility, perceived need and perception of cost were significantly associated with level of iodized salt utilization by bivariate analysis. But the multivariate logistic regression analysis identified only, exposing salt to sunlight at home, knowledge, monthly income, having exposure to mass media and perceived need of the participants about iodized salt were significantly associated with level of iodized salt utilization.

Those had poor knowledge about iodized salt were 5.76 (AOR=5.76, 95%CI: 1.86-17.82) times more likely to inadequate utilized iodized salt when compared with who do have good knowledge.

Those had poor practice of storage method, expose of salt to sunlight on storage place were 6.65 (AOR=6.65, 95%CI: 2.36-18.73) times more likely to inadequate utilized iodized salt when compared with who had good practice, not expose salt to sunlight.

Household respondents who their monthly income is <500.00Ethiopian birr were 10.45 (AOR=10.45, 95% CI: 2.05-23.27) times more likely to inadequate utilized iodized salt as compare to household respondents who their monthly income is  $\geq$ 2001.00 Ethiopian birr.

Respondents who had no exposure to mass-media were 4.64 (AOR=4.64 95%CI: 1.76-12.18) times more likely to inadequate utilized iodized salt when compared with respondents who had exposed to mass-media.

Perceived need to ward importance of iodized salt was identified as one of the associated factors for utilization of iodized salt. Respondents who perceived susceptibility to goiter were 78% (AOR=0.22, 95%CI: 0.05-0.89) less likely to inadequate utilized iodized salt when compared with respondents who had no need perception to iodized salt.

**Table 5: Multiple logistic regressions analysis of factors independently associated with iodized salt utilization at household level, west Wollega, Gimbi town, April 2014 (n=349)**

variable	Level of IS utilization		Crude OR(95% CI)	Adjusted OR(95%CI)
	≥15PPM Number(percentage)	<15 & 0 PPM Number(percentage)		
<b>Occupation</b>				
Governmental employee	55(15.8)	18(5.2)	1	1
Merchant	25(7.2)	27(7.7)	3.30(1.54-7.06)	1.01(0.22-4.68)
Housewife	48(13.8)	149(42.7)	9.48(5.08-17.69)	2.91(0.90-9.37)
Daily labor	3(0.9)	24(6.9)	24.44(6.57-90.86)	0.13(0.01-1.47)
<b>Salt storage place</b>				
In dry place	119(34.1)	71(20.3)	1	1
In moisture	7(2.0)	110(31.5)	12.40(4.65-33.01)	0.65(0.12-3.36)
At fire	5(1.4)	37(10.6)	26.33(11.61-59.71)	3.56(0.95-13.30)
<b>Expose to sunlight</b>				
Yes	12(3.4)	140(40.1)	17.79(9.24-34.26)	6.65(2.36-18.73)
No	119(34.1)	78(22.3)	1	1
<b>Monthly income of Household</b>				
≤500	13(3.7)	113(32.4)	20.55(11.90-53.36)	10.45(2.05-23.27)
501-1000	13(3.7)	59(16.9)	15.43(6.11-38.95)	4.31(0.83-22.32)
1001-1500	47(13.5)	22(6.3)	1.59(0.66-3.79)	1.94(0.43-8.69)
1501-2000	24(6.9)	14(4.0)	1.98(0.75-5.20)	1.09(0.20-5.70)
≥2001	34(9.7)	10(2.9)	1	1
<b>Exposed to mass-media</b>				
Yes	99(28.4)	50(14.3)	1	1
No	32(9.2)	168(48.1)	10.39(6.25-17.28)	4.64(1.76-12.18)
<b>Perceived need</b>				
To be health	61(17.5)	59(16.9)	0.14(0.07-0.25)	1.76(0.54-5.68)
To suspect goiter	49(14.0)	14(4.0)	0.04(0.02-0.08)	0.22(0.05-0.89)
No perception	21(6.0)	145(41.5)	1	1
<b>Knowledge</b>				
Good	121(34.7)	49(14)	1	1
poor	10(2.9)	169(48.4)	41.73(20.33-85.65)	5.76(1.86-17.82)

Variables with P-value <0.25 on binary logistic regression

## CHAPTER SIX: DISCUSSIONS

Adequate utilization of iodized salt daily is that needed for sustainable elimination of IDD. According to WHO and International Council for Control of Iodine Deficiency Disorders standard, elimination of IDD will be possible if more than 90% of the households consume adequately iodized salt [7]. National guideline for control and prevention of micronutrient deficiencies has set a goal to virtually eliminate IDD by the year 2005 through universal salt iodization (USI) and an objective to increase access to iodized salt among households up to 80%. But according to the EDHS 2011 report, national inadequately iodized salt iodization was 84.6.4% and 82.6% for Oromia regional state. [11, 15]

This study indicated that 218(62.5%) of household was inadequate utilized iodized salt at household level. This iodized salt utilization level is far different from health Sector Development Program IV target that up to 95% of households should adequate utilize iodized salt until 2014/2015[49]. The possible reasons for this high in inadequate iodized salt utilization at household level might be due to the loss of iodine from salt due to improper storage practice, and, or they are buying the non-iodized salt from non legal suppliers.

This is high as compared to a study conducted in India which showed that 35.8% of households inadequate utilized iodized salt [27]. According to report of UNICEF, in Burundi, Kenya Lesotho, Uganda and Zimbabwe adequate iodized salt consumption at household level are considered to have achieved the universal salt iodization goal stated by World health organization [24]. This might be due to availability and accessibility of iodized salt in the market, legislation and policies to fortify salt with iodine, and regular follow up and monitoring regarding utilization of iodized salt in these countries.

This Finding is low as compared to EDHS 2011 report; the national inadequate utilization of iodized salt in Ethiopia was 84.6% and 82.6% for Oromia region [11]. This difference might be due to study area differences. EDHS was conducted both in urban and rural areas but the present study was conducted entirely in urban setting. Urban dwellers use iodized salt more as compared to rural dwellers as evidenced from EDHS 2011(EDHS). The other possible reason may be the improvement has occurred as a result of council of ministers regulation N<sup>o</sup>204/2011on salt iodization and the propagation of health education by the Ministry of Health creating awareness about the importance of iodized salt.



Knowledge of participants about iodized salt was significantly associated with adequate utilization of iodized salt. A study conducted in Ghana showed the result of increased knowledge regarding the importance of using iodized salt and the effects of its deficiency in the diet of an individual; there has also been a decrement in inadequate utilization of iodized salt [40]. This might be due to the fact that exposure to mass media increases awareness about iodized salt and its benefits. This knowledge was found directly proportional to the mass-media and statistically significant.

Those had poor practice of storage method, expose of salt to sunlight on storage place were 6.65 (AOR (95%CI) =6.65(2.36-18.73)) times more likely to inadequate utilized iodized salt when compared with who had good practice, not expose salt to sunlight. A study conducted in Delhi documented that there was about 31% iodine loss from iodized salt when exposed to sunlight [38]. A similar study done in London also indicated that exposure to sunlight was associated with loss of iodine level in salt. [36].This might be due to the effect of heat on the iodine content. A similar study conducted in Ghana showed that effect of sunlight in particular showed highest losses of added iodine as a result of the high volatility of iodine as temperature increases the rate at which iodine sublimates. [48]

This study indicated that, lack exposure of respondents to mass media was significantly associated with inadequate utilizing iodized salt. A study conducted in India showed that exposed to mass media had impact on consuming adequately iodized salt [27].

A similar study in Turkey showed that the use of local mass media is effective in raising the prevalence of iodized salt use. [47].This may be due to the fact that mass media can achieve improvement in both knowledge and behavioral change about the benefits of iodized salt and utilization of iodized salt.

Income of household is one of factors significantly associated with level of iodized salt utilization. Study in India showed that there was significant difference in utilization of iodized salt in different income group. A similar study done in South Africa also indicated that households in low socioeconomic categories comprised a vulnerable subset of the population at risk of being exposed to under-iodized salt [27, 34].The people in such households consume less iodized salt than those in higher socioeconomic groups, thus limiting their potential iodine intake via salt.

Perceived susceptibility to goiter was significantly associated with utilizing iodized salt. This is parallel to the study conducted in Ghana showed perception of susceptibility to development of goiter had impact on adequate utilization of iodized salt. [40] This shows that tendency to seek iodized salt utilization is influenced by goiter related morbidity.

This study has the following limitation: Iodine level was determined by taking sample only from the salt, which did not include titration level of iodine in the salt and urinary testing of iodine to determine body iodine level and Lack of adequate literatures in Ethiopian situation, which prevents further elaboration of the discussion

## **CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATION**

### **7.1 Conclusions**

Based on the finding of this study, I can conclude that:

- Inadequately utilization of iodized salt at household level was high in Gimbi town.
- Poor knowledge of participants about iodized salt was identified as factors associated with inadequately utilization of iodized salt at household level.
- Not using of mass media such as Television and radios were contributing factors for inadequately utilization of iodized salt at household level.
- Poor practice of exposing salt to sunlight had statistically significant association with inadequately utilization of iodized salt at household level.
- Household with lower income had significant association with inadequately utilization of iodized salt at household level.
- Perceived susceptibility to illnesses (goiter) in future life was also among the factors significantly associated with utilization of iodized salt at household level.

### **7.2 Recommendations**

Based on the findings of this study, the following recommendations were forwarded.

- Households should be sensitized to importance of iodized salt and its proper handling at the household level by Gimbi town health office.
- Gimbi town health office should be effectively use of electronic media in addition to house-to-house visits by urban health extension workers to sustain and improve the utilization of iodized salt in town, by involving different NGOs.
- Gimbi town health office should be improved awareness and knowledge about iodide, its deficiency disorders and acceptance and use of iodized salt at household level.
- Collaborative efforts between public and private sectors are strongly recommended to increase the availability of iodized salt on market in low cost for vulnerable income group.
- Gimbi town health office should have to Implementing the existing law and effective monitoring system would necessary to ensure the supply and sale of the iodized salt in the community.

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## APPENDIX I

### Consent form(In English)

Hello! My name is \_\_\_\_\_ . I come from the Gimbi town and up on the permission of the town administration, we are conducting a survey about utilization of iodized salt and its factors in Gimbi town. The purpose of the study is twofold. .

1. The study is required for Gudisa's fulfillment of the requirement of degree of masters in GMPH from Jimma University in year 2006 E.C.
2. The result and information obtained will be utilized by local governmental and non governmental bodies for improvement of health status of the population and planning of health services in this Town. Your household was randomly selected for the survey and you are selected to provide information about your utilization of iodized salt. I would like to ask you some questions about yourself and your household. The questions usually take about 15 to 20 minutes. All of the answers you give will be confidential and will not be shared with anyone other than members of our survey team.

There is no any physical and other form of harm in the survey/ interview except for minor time consumption. We hope you will agree to answer the questions since your views are important for the success of our goal. You have full right to decide on whether you take part in the survey or not. In case if you want to quit interview in the middle of the way after starting interview you can do it at any time.

If you need more information about the survey, you may ask investigators (**Phone 0912495722**)

Do you have any questions?

May I begin the interview now?      Yes: continue!      No: quit!

Name of the interviewer: \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_

Name of the principal investigator: \_\_\_\_\_ signature \_\_\_\_\_ date \_\_\_\_\_



## Consent form (In Afaan Oromo)

Akkam jirtu! Maqaan koo \_\_\_\_\_n Jedhama. Kanan dhufe asuma magaalaa Gimbii ta'ee Eyyama bulchiinsa magaalatiin Fayyadama ashaboo Ayodiini fi rakkowwaan isaa irratti qorannoo geggessaan jira.

Faayidaan Qorannoo kanaa:-

1) Jimmaa Universitiiti irraa bara 2006 A.L.H barnoota fayyaa hawwasatnin mastersii isaa kan barachaa jiru obbo Guddisaatiif oola.

2) Bu'aan qorannoo kanaa fayyaan hawasaa akkataa itti foyyessuu qabaniif qaama mootumma fi miti mootummaf ni dhiyaata.

Manni kessaan immoo carraan filatameera akkasumas isiin gaffilee wa'ee fayyadama ashaboo ayodinii akka deebii nuuf laattaniif isiin fillanneera. Sababa kanaaf gaffilee wa'ee kessaan akkasumaas waa'ee mana keessanii nuuf deebiftu. Gaaffiin kun Daqiqaa 15-20min fudhata. Deebiin keessaan iccitiidhaan kan isiniif eegamu ta'ee, nama biraati isiin jalaa hin himamu.

Qorannoo kana kessatti yeroo keessan xiqqoo fayyadamuu irraa kan hafe wanti cimaa isiin hojjechiifnu hin jiru. Akka itti walii galtan abdiin qaba. Akkasumaas yeroo gaaffilee isiin gaafannutti yeroo kamittiyyuu hin barbadu jettanii jalqaba irrattis ta'e gara gidduutti gaaffileef deebii kennuu dhiisuu ni dandessu.

Yoo qorannoo kana irratti yaada qabattan qorataa waa'ee kana gaafachuu ni dandessuu.  
(Phone 0912495722)

Gaaffii qabdu?

Jalqabuu nan danda'a?

1. Eyee, itti fufi

2. Lakki, dhaabi

Maqaa nama gafaatamuu \_\_\_\_\_ Mallattoo \_\_\_\_\_ Guyyaa \_\_\_\_\_

Maqaa Qorataa/gargaaraa qorataa \_\_\_\_\_ Mallattoo \_\_\_\_\_ Guyyaa \_\_\_\_\_

## APPENDIX II

### Data collection tools( In English)

Code\_\_\_\_\_

Interviewer \_\_\_\_\_

### Section one: Socio demographic and economic factors (Tick the most appropriate response)

1. Sex:      1. Male    2. Female

2. Age \_\_\_\_\_

3. Religion

1. Protestant. 2. Adventist. 3. Orthodox. 4. Muslim. 5. Catholic. 6. Other (specify) \_\_\_\_\_

4. Ethnicity

1. Oromo 2. Amhara. 3. Tigrie. 4. Gurage. 5. Other (specify) \_\_\_\_\_

5. Marital status:

1. Single 2. Currently Married. 3. divorced 4. Widowed. 5. Other (specify) \_\_\_\_\_

6. Educational status:-

1. Illiterate

2. Can read and write

3. Primary

4. Secondary

5. Tertiary

**7. Occupation:**

1. Governmental worker
2. Merchant
3. Housewife
4. Daily labor
5. NGO worker
6. Other (specify) \_\_\_\_\_

**Section two: To know the level of utilization**

1) Does iodized salt is available in your house? \_\_\_\_\_

1. Yes, iodized salt
2. Yes but not iodized salt.
3. Not available

**Section three: Predisposing related factors**

**Knowledge status**

1) Have you ever heard of iodized salt?

1. Yes \_\_\_\_\_
2. No \_\_\_\_\_

2) Do you know that iodized salt prevents iodine deficiency disorder?

1. Yes
2. No

3) Do you know that lack of consuming iodized salt will bring iodine deficiency?

1. Yes
2. No

4) If yes, what are the effects of iodine deficiency you know?

1. Goiter
2. Effect on child learning capacity

3. Still birth

4. Effect on growth and development of body. 5.Others (specify) \_\_\_\_\_

5) Do you think that every salt contains iodine?

1. Yes

2. No

6) At what time does iodized salt is to be added during food cooking?

1. Early and at the middle of cooking

2. Right after cooking.

7) Do you wash salt before adding to food?

1. Yes

2. No

### **Practice status**

1) How is your iodized salt storage container?

1. Container with lid \_\_\_\_\_

2. Container without lid \_\_\_\_\_

3. Other (specify) \_\_\_\_\_

2) Where do you store iodized salt?

1. In dry place \_\_\_\_\_

2. In moisture place \_\_\_\_\_

3. At fire place \_\_\_\_\_

4. Other (Specify) \_\_\_\_\_

3) Does your iodized salt storage place exposed to sunlight?

1. Yes

2. No

4) If yes, for how long? \_\_\_\_\_

5) How long do you store salt in the house? \_\_\_\_\_

**Section four: Enabling factors**

1) What is a monthly income of the household? \_\_\_\_\_

2) What is the family size of the household?

\_\_\_\_\_

3) What is your common source of information on iodized salt?

1. Health worker

2. Radio

3. Neighbors

4. Own child

5. Another shop keeper

6. Television

7. No information of iodized salt

4) From where do you buy iodized salt commonly?

1. Local shop in the same town

2. From catholic (NGO)

3. From the wholesale shop in town

4. From weekly market

5. From micro Enterprise

6. Others (specify)

7. I am not buying it

5) How often iodized salt is available from a common source of iodized salt when you went to buy some?

1. Always available
2. Never available
3. Some time available
4. Rarely available
5. I don't how often avail.

6) How far is it from where you live?

1. In meter \_\_\_\_\_
2. In min \_\_\_\_\_

7) Can you afford the cost of iodize salt to buy?

1. Yes
2. No

8) If yes, at what cost?

1. 1KG of unpacked iodized salt in 5 ETB
2. 1KG packed iodized salt at 10 ETB
3. Other (specify) \_\_\_\_\_

9) Perception of costs (what idea you have recording to cost for you?)

1. Unaffordable
2. Affordable

10) Do you have information on the availability of iodized salt?

1. Yes
2. No

**Section five: Need factors**

1) Did you experience goiter on human body?

- 1. Yes
- 2. No

2) Perceived consequence of not using iodized salt?

- 1. Yes
- 2. No

3) If yes, what type of consequence you perceived?

- 1. Goiter
- 2. Effect on child learning capacity.
- 3. Still birth
- 4. Effect on growth and development of body

4) Perceived of taste of iodized salt is different from that of common salt

- 1. Yes
- 2. No

5) Do you have perceived need recording to importance of iodized salt?

- 1. Yes, to be healthy
- 2. Yes, to suspect goiter
- 3. No perception

6) We would like to verify whether the salt you use in your home is iodized or not. Can you please bring a sample of the salt that you use for food (testing)?

- 1. No coloring \_\_\_\_\_
- 2. Light blue \_\_\_\_\_
- 3. Dark blue \_\_\_\_\_

**Data collection tools( In Afaan oromo)**

**Kutaa tokko: Gaaffilee waa'ee hawwasummaa qorataan (isaa sirri ta'e qofaatti mari.)**

Koodii \_\_\_\_\_

Maqaa gaafataa \_\_\_\_\_

1. Saala:      1. Dhiira    2. Dhalaa

2. Umurii \_\_\_\_\_

3. Amantii

1. Pirootestaantii. 2. Adiveentistii. 3. Ortodoksii. 4. Musliima. 5. Kaatolikii.

6. Kan bira (Ibsi) \_\_\_\_\_

4. sabummaa

1. Oromoo    2. Amhaara.    3. Tigiree.    4. Guragee.    5. Kan biraa(Ibsi) \_\_\_\_\_

5. Haala fuudhaa fi heerumaa:

1. kan hin fuune/hin heerumne    2. Kan fuudhe/kan heerumte .    3. Kan hiike/hiikte    4. Kan irraa duute/irraa du'e    5. Kan biraa(Ibsi) \_\_\_\_\_

6. Haala barnootaa:-

1. kan hin baranne

2. Dubbisuu fi barreessu kan danda'u

3. Barnoota sadarkaa jalqabaa

4. Barnoota sadarkaa lammaffaa

5. Barnoota sadarkaa ol-aanaa



**7. Haala hojii:**

1. Hojjetaa mootummaa
2. Daldalaa
3. Haadha manaa
4. Hojjetaa guyyaa
5. Hojjetaa miti mootummaa
6. Kan biraa (Ibsi) \_\_\_\_\_

**Kutaa lama: sadarkaa itti fayyadama ashaboo ayodinii beekuu**

1) Ashaboon mana keessan keessa jira? \_\_\_\_\_

1. Eeyyee , Ashaboo ayodiniiti
2. Eeyyee,garuu Ashaboo ayodinii miti
3. Mana keessaa hin jiru.

**Kutaa sadii: Rakkoo fuulduran ta'aan**

**Haala beekumsaa**

1) waa'ee Ashaboo ayodinii dhagessanii beektuu?

1. Eeyyee \_\_\_\_\_
2. lakki \_\_\_\_\_

2) Ashaboon ayodinii rakkoo hir'ina ayodiinii ittisuu ni danda'aa ?

1. Eeyyee
2. lakkii

3) Ashaboo ayodiinii Nyaachuu dhabuun rakkoo hanqina ayodinii fida jette ni yaaddaa?

1. Eeyyee
2. lakki

4) yoo deebiin kee ‘eeyyee’ ta’e rakkoo akkamiifaa fida?

1. Qufa moormaa
2. Dandeettii barnootaa ijoollee hir’isa
3. ulfa guddate baasa
4. Garaa hadha keessatti mucaa ajjessa    5. Kan biraa (Ibsi) \_\_\_\_\_

5) Ashaboo hundi ashaboo ayodinidha jettee ni yaada?

1. Eeyyee
2. lakki

6) yeroo nyaata hojjettaan yeroo kam asaboo ayodiinii itti dabaltu?

1. Gara jalqabaa fi gara gidduutti itti daballa
2. erga xumurree lafa keenye booda.

7) Utuu ashaboo ayodiinii nyaatatti hin dabalin dura ni miccituu?

1. Eeyyee
2. lakki

### **Haala hojji isaa**

1) Ashaboo ayodiniin maal keessa keessu?

1. Qodaa qadaaddii qabu \_\_\_\_\_
2. Qodaa qadadii hin qabne \_\_\_\_\_
3. Kan biraa (Ibsi) \_\_\_\_\_

2) Ashaboo ayodiinii eessa keessu?

1. Bakka qoraa isaa \_\_\_\_\_
2. Bakka jiidha qabu \_\_\_\_\_

3. Abidda bira \_\_\_\_\_

4. kan biraa (Ibsi) \_\_\_\_\_

3) Yeroo ashaboo ayodiinii keessan ifaa aduu ni argataa?

1. Eeyee

2. Lakkii

4) yoo debiin kee 'Eeyee' ta'e ammamiif? \_\_\_\_\_

5) Yeroo ammamiif ashaboo ayodiinii mana keessa keessu? \_\_\_\_\_

**Kutaa Afur: waantoota dandessisan**

1) Ji'atti galiin maatiin argatu meeqa? \_\_\_\_\_

2) Mana keessa nama meeqatu jirata?

\_\_\_\_\_

3) Yeroo baayyee wa'ee fayyadama ashaboo ayodinii eessaa dhagessu?

1. Hojjetaa fayyaa

2. Raadiyoo

3. Ol'aa

4. ijoollee manaa irraa

5. namoota suqii irraa

6. Televiziyinii irraa

7. waa'ee Ashaboo ayodiinii dhaga'e hin beeku.

8. kan biraa (ibsi) \_\_\_\_\_

4) Yeroo baayyee ashaboo ayodiinii eessaa bitattu?

1. Suuqii nannoo irraa
2. Kaatoolikiii irraa
3. Warra jiilmaan gurguraan irraa
4. Gabaa irraa
5. warra IMXn ijaramaan irraa
6. Kan bira (Ibsi)
7. Bitachaa hin jiru

5) Bakka yeroo baayyee bittu irraa yeroo akkam akkamii Ashaboo ayodiinii argatta?

1. Yeroo hundumaa ni argama
2. Yeroo hunda miti
3. Yeroo tokko tokko argama
4. Baayyee hin argamu
5. Yeroo akkam akkami akka argamu hin beeku.

6) Bakka isin jiraattan irraa hammam fagaata?

1. Meetriin meeqa \_\_\_\_\_
2. Daqiqaan meeqa \_\_\_\_\_

7) jiraachuu ashaboo ayoodiinii odeffaannoo qabdu?

1. Eeyyee
2. Lakki

8) Ashaboo ayodiinii kana gatii isaa ni dandeessaa ?

1. Eeyyee
2. lakki

9) yoo ni dandessa ta'e gati meeqaan?

1. kilo gramii tokko kan hin saamsamne birri shaniin
2. kilo gramii tokko kan saamsame birrii 10nin
3. kan bira (Ibsi) \_\_\_\_\_

10) Gatii ashaboo ayodiinii kun madalaawaa dha?

1. Eeyyee
2. lakki

**Kutaa shan : wantota feedhi qoratan**

1) waa'ee quufa mormaa namoota irratti beekta?

1. Eeyyee
2. lakkii

2) Hir'ina ashaboo ayodiinii fayyadamuu dhisuun fidu wanta amante fudhate qabda?

1. Eeyye
2. lakki

3) Yoo deebin kee Eeyyee ta'e maalfaa amantee fudhatte?

1. Quufa mormaa
2. Dandeetii barnootaa ijoollee hir'isa.
3. Ulfa garaa baasa
4. Garaa hadhaa kessatti mucaa ajjessa

4) Dhandhami ashaboo ayodiinii ashaboo kaan irra adda jette fudhatte jirta?

1. Eeyyee
2. lakki

5) Barbachisummaa faayyidaan ashaboo ittatti fedha guutuu ta'e qabda?

1. Eeyyee, Fayyaa ta'uuf

2. Eeyyee, soda qofa mormaatiif

3. lakki fedha kana hin qabu,

6) Ashaboon mana keessaan kessa jiru Ayodiinii qabachu fi qabachu dhiisu isaa baruu barbanne.

Qorannoo kanaaf ashaboo jiru irra hanga ta'e nuu fidu ni dandessu?

1. Halluu dhabeessa \_\_\_\_\_

2. Xiqqoo cuquliisa \_\_\_\_\_

3. Baayyee cuquliisa \_\_\_\_\_

4. Ashaboon mana kessa hin jiru, Guyyaa itti aanu kotta.

DECLARATION

The undersigned declare that the work submitted in this thesis is original and a result of my own study except where otherwise acknowledged. This thesis has not been submitted for another degree award in this or any other university or institution.

Name: .....

Signature: .....

Name of institution: .....

Date of submission: .....

I have approved this thesis as University advisors

Name and signature of first advisor

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Name and signature of second advisor

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