

# Proper Utilization of Adequately Iodized Salt at House Hold Level and Associated Factors in Asella Town Arsi Zone Ethiopia: A Community based Cross Sectional Study

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## Abstract

**Back ground:** In Ethiopia the proportion of house holds with adequately iodized salt and knowledge and practices on proper utilization of adequately iodized salt was low to achieve the target for elimination of iodine deficiency disorder. The objectives of this study was to assess the proper utilization of adequately iodized salt and associated factors at house hold level in Asella town, Arsi Zone Ethiopia in 2015.

**Methods and material:** A Cross-sectional study design with multi stage sampling technique was applied to take sample size of 840 HHs. Standard questionnaire with modification and improved iodized salt test kit was used to collect data. Twenty four hour recall period was used to minimize recall bias. Data entered by epi info 3.5.4 and tranfered to SPSS Version 21. Logistic regression model was used to adjust confounders and P-Value <0.05 was considerd to declare signficancy.

**Result:** Proportion of HHs with adequately iodized salt was 62.9%. About 76.8% of HHs add salt to their cooking at the end of cooking or right after cooking. Female Sex (AOR = 3.39, 95% CI = 1.07,10.73), Education status with only read and write (AOR = 0.19, 95% CI = 0.05, 0.71), having monthly income  $\geq$ 2000 ETB (AOR = 2.39, 95% CI = 1.09, 5.01), Being married (AOR = 2.65, 95% CI = 1.24,5.67), Knowing that goiter resulted from iodine deficiency (AOR = 9.38, 95% CI = 3.50, 24.89) and having knowledge on IDD and iodized salt (AOR = 4.93, 95% CI = 2.54, 9.58 ) were significantly associated with proper utilization of iodized salt at house hold.

**Conclusion and Recommendation:** Proportion of households with adequately iodized salt was low (not adequate) and significant number of households have improper utilization. Monitoring iodized salt at HH by using test kit and health promotion and communication activites by using different communication methods is important to imprve proper utilization of aduqaute iodized salt at household level.

**Keywords:** Proper utilization of iodized salt; Iodine defficancy disorder; Salt test kit; Household level; Asella town; Arsi Zone; Ethiopia

## Abbreviations and Acronyms

AIS: Adequately Iodized Salt; EDHS: Ethiopian Demographic and Health Survey; HAD: Health Developemnt Army; HHs: House Holds; ICCIDD: InternationalCouncil for the Control of Iodine Deficiency Disorders; IDD: Iodine Deficiency Disorder; NNP: National Nutrition Program; TSH: Thyroid Stimulating Hormone; UHEW: Urban Health Extension Workers; USI: Universal Salt Iodization

## Introduction

Iodine is a trace element that is essential for growth, development, and control of metabolic process in the body. Where iodine intake is inadequate the thyroid gland may no longer be able to synthesize sufficient amount of thyroid hormones. Low level of thyroid hormone in the blood responsible for damage to the developing brain and for whole spectrum of iodine deficiency disorder (IDD) [1]. Consequence includes mental retardation and other defects in development of nervous system, goiter, physical sluggishness, growth retardation, reproductive failure, increased child mortality and economic stagnation [2]. Iodine deficiency also decreases IQ by 13-15 points, and leading to stunting this effect decreases educability and reduce work capacity [3] Endemic goiter is a worldwide disease, according to WHO; nearly 30% of

worldwide populations are living in the deficiency of iodine condition. the problem is very high in developing countries, 350 Million Africans are at high risk of iodine deficiency [4]. Each year 37 million newborns in developing countries are unprotected from life long causes of brain damage associated with IDD [5]. Studies in Ethiopia showed that 26% of population have goiter and 62% are at risk of IDD [6].

IDD can be prevented by ensuring that the population has an adequate intake of iodine. WHO recommend 150  $\mu$ g daily intake for adolescents and adults. this increase to 250  $\mu$ g for pregnant and lactating mother and for children of (0-59 M) the required 90  $\mu$ g and 120  $\mu$ g for

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6-12 year [1]. Iodine does not occur naturally in specific foods, rather it present in Soil, and Ocean water and sea foods. Soils from mountain range and from areas with frequent flooding are likely to be iodine deficient and food grown in such area can never provide enough iodine and the correction can be achieved by supplying iodine from external source thus fortifying iodine with commonly eaten food is the common and effective strategy [2].

The most effective way to control IDD is through salt iodization, WHO, UNICEF, and ICCIDD recommended that iodine should be added to salt a concentration of 20-40 ppm depending on salt intake [7].

As far back 1988, Ethiopia, one of the first countries in Sub Sahara African ( SSA) that was close to Universal Salt iodization (USI) having achieved at 80% [8,9]. But in 2005, only 4% of households had access to iodized salt and little incremental after few year to 15.4% [7] in which 23.2% in urban and 13.3% in Rural house hold. In 2011, this shows the lowest coverage of adequately iodized salt amongst countries in SSA [6,10].

According to WHO, countries salt iodization program considered to be on good track; poised to attain the goal of elimination iodine deficiency when 90% of the household is using iodized salt and Ethiopia was planned to achieve USI the availability of adequately iodized salt at house hold level 95% in 2015 [9,10]. More over the level of awareness on the consequence of IDD, advantages of using iodized salt, knowledge awareness and practices in preventing iodine deficiency disorder and proper use of iodized salt are important factors. There was a desirable variation among knowledge and actual practices in using iodized salt at house hold level [7]. Therefore, this study was tried to assess the proper utilization of adequately iodized salt and associated factors at house hold level in Asella town, Arsi Zone Ethiopia.

## Methodology

### Study design

A Community based cross-sectional study design was used.

### Study area and period

The study was carried in Assela town, which is located near Chilalo Mountain in Oromiya regional state: Central Ethiopia, and found at a distance of 175 KM south east of Addis Ababa. The town has 8 administrative areas sub cities and 57 Villages and the total population is 93,729 [11]. The study was carried from January 11 to 26, 2015.

### Study population

House holds in four selected administrative areas (kebeles) of the town.

### Inclusion criteria

Household member mostly participate in food item purchasing and preparation.

### Sample size

Ep info version 3.5.4 software was used to calculate sample size using double population proportion formula by considering the following assumptions; associated Factor in utilization of iodized salt (p) 17.%, 95% confidence interval, probability of detecting the real effect (power) 80%, exposed to unexposed 1:1, Odds ratio 2, design effect 2. and non respondent /absentees 2% added to calculated sample size to get total sample size. Therefore the final sample size was 840 [12].

### Sampling procedure

Multistage Sampling procedure was used to reach the study participants. Four local administrative (Kebeles) were selected using simple random sampling from the total 8 administrative area (kebeles) of the town and then sample was allocated to each selected kebele using Proportional to population size (PPS) to the house hold size of each selected kebele. In the same way from 29 Villages (ketenes), 14 were selected randomly with simple random sampling from each kebele and then the house holds were selected using systematic random sampling (Table 1).

### Data collection tools, procedure and technique

Field work consists completing questionnaire on socio-demographic characteristics, knowledge and practices associated with utilization of iodized salt and testing the salt for iodine at HH. Standard structured questionnaire which was modified for this study was used for recording the responses of interviewee. The questionnaire developed in English and then translated to Amharic and Afan Oromo for data collection and finally retranslated to English. Data collectors started with brief introduction and information given to the respondent. After consent obtained from participants, questionnaire completed by face to face interview in language of respondent and salt tested for its iodine content. One extra visit was made to absentees HHs, before substitution to the right or left to the initial Sample HH. To assess practices and minimize recall bias data collectors used 24 hour recall period.

### Using salt test kit

Determination of availability of adequately iodized salt, the interviewer asked every sample HH to provide a teaspoon of salt used for food preparation and fill small cup spread flat, add two drop of test solution on surface of salt by piercing the white ampule and compare color on salt with color chart with one minute and determine the iodine concentration (intense color). If no color change appeared on the salt (after one minute, on a fresh sample add up to 5 drop of recheck solution in red ampule and the 2 drops of test solution on same spot and compare the color with color chart and determine iodine content. 0 ppm (no iodine), <15 ppm (Light blue), ≥ 15 ppm (Deep blue). This was determined by using Improved Iodized salt Field test kit B.NO M 044,

S.No	Kebele name	Population	No. of HHs	No. of village (Ketena)	No. of selected villages	Sample size (HH)
1	Buseta	9082	1892	6	*(3 ketenas)	165
2	Arada	15157	3158	9		
3	Hanku	14649	3052	8	*(4 ketenas)	265
4	Welkesa	10669	2223	7	*(3 Ketenas)	194
5	Burkitu	14811	3086	8		
6	Halilla	9465	1972	6		
7	Chilalo	11929	2485	8	*(4 Ketenas)	216
8	Kombolcha	7967	1660	5		
	Total	93729	19527	57	14	840

**Table 1:** Proportion of HHs selected for the study on Proper utilization of Iodized Salt in Asella Town, Ethiopia 2015.

MFG JAN 2014, EXP JUN 2015 for salt fortified with potassium iodate only. Unopened ampule was used and, the kit was accurate for visual detection of potassium iodate concentration at threshold of 15 ppm and result was valid. The test kit was obtained from UNICEF through Oromiya Regional Health Bureau.

Data Collectors were 6 diploma graduates Nurses and 2 Bsc Environmental Health professional for supervisory activity and Face to face interview technique was used. The selection of data collectors and supervisors was based education background, experience and interest and to participate on the study. In addition both data collectors and supervisors language proficiency for both local (Afan Oromo and Amharic) and English was a required criteria. Prior to the field work, training was given for two days both in class room and field test on questionnaire and test kit for practical exercise. The training was focused on communication and technical issues how to collect data, interview technique, and recording, time management, how to test the salt for adequately iodized and ethical issues and supervisors on how to supervise. Methods used include lecture, roleplay, and practical exercise in class room and field test.

Before actual data collection questions was piloted and tested for completeness, consistency, and timeliness on similar kebele but not included in the study subject. Supervisors were checked filled questionnaire and contacted at least 3% of the respondents to verify that the correct procedures has been followed in data collection and testing for iodized salt.

### Data Quality Management and Analysis

After completion of data collection from sample households, each questionnaire were checked and screened for completeness and consistency. Omissions, errors, completeness, were checked by principal investigator or after the filled questionnaire was returned. Data was cleaned, edited, and coded and before entry. Data entry was by Epi info version 3.5.4 software and transferred to SPSS version 21 for analysis.

Before Analysis data were prepared using transform menu. activities Computing, count, recoding were performed. Adequately iodized salt at house hold level was defined as salt  $\geq 15$  ppm (deep bluecolor) of iodine. Data processing was done before analysis. Univariate and Bivariate (Descriptive statistics) was used to summarize the study sample results of categorical variables and examined for distribution of certain variables frequency distribution, central tendency, and dispersion to describe the shape of variable distribution and for subsequent analysis. The relationship or association between variables and the strength of the relationship described and examined by correlation. Participants who score above mean for knowledge questions were considered having good knowledge about proper utilization of iodized salt.

Data analysis to measure association factors and provide information about the strength of the association between variables and simultaneously controlling confounders was performed by logistic regression model. The Model fitness for Logistic regression was tested using Hosmer-Lemeshow goodness of fit test at P-Value  $>0.05$ . Chi-Square to detect the association in between independent and dependent variables with P-Value  $<0.2$  was entered to logistic regression model to detect the strength of the association. Odds ratio with confidence interval of 95% was used to show the significance of association of independent variable in proper utilization of iodized salt. 5% chance (P-Value  $< 0.05$ ) of finding had significant result in multivariate analysis. Controlling of known and potential confounding factors with proper utilization of

iodized salt at house hold level was assessed by multivariate analysis.

### Operational Definition

#### Proper utilization of iodized salt

Adding salt to cooking at the end or right after cooking in the last 24 hour.

#### Adequately iodized salt

Salt is said to be adequately iodized when the test result gives the determination of  $\geq 15$  ppm by using rapid test kit.

#### Good knowledge

Respondants answer more than half of knowledge questions on IDD, Iodized salt considered to have good knowledge.

### Ethical Consideration

Ethical clearance was obtained from ethical review board of Adama science and Technology University and oromia regional health bureau ethical review committee. And formal letter of cooperation was written to Asella town administration. Consent was obtained from each study subjects after information on study explained to them. Participants were given the right to continue or to withdraw from the study at any point if they are not comfortable with the study. Interviewer presented questions with the language the respondent knows. Name of the respondent was not included in the questionnaire and information of individual respondent was not be shared to ensure confidentiality. All the responses of participants and the results obtained from each house hold kept anonymous and confidential by using coding system whereby no one will have access except the principal investigator. The study had no any risk on the study subject and interview was conducted in private area. Advice was provided non-users to utilize Iodized Salt and goiter cases were informed to seek care at nearby hospital.

### Results

#### Socio demographic characteristics

A total 828 study participants were participated making a response rate 98.6%, among this 798 (96.4%) were female in Sex. Oromo 424 (51.2%) and Amhara 277 (33.5%) were the predominant ethnic groups. More than half 516 (62.3%) of respondents were Orthodox christian. Majority (71.6%) of the respondents were married and the mean age of respondents was 33.5 year with SD  $\pm 11.8$ . The respondents educational status showed that 531 (64%) were attended secondary and above. The majority 250 (30.2%) have monthly income of 1000-1999 ETB (Table 2).

#### Proportion of adequately iodized salt at house hold level

The result of Iodized Salt field test kit showed that from the total sample 513 HHs, 62.9% had adequately iodized salt with  $\geq 15$  ppm (Figure 1) and 92.9% buy locally produced iodized salt. Comparing locally produced and iodized salt and imported iodized salt, the level of iodine content shows slight difference i.e imported salts has more iodine concentration than locally produced (Figure 2).

#### Knowledge and awareness on proper utilization of iodized salt at house hold level

Majority of respondents, 92% know that Goiter is out come of Iodine deficiency and 86.4% have good knowledge on IDD and how to prevent and about iodized salt and 67.2% knows that regular consumption of iodized salt prevents iodine deficiency in the body (Table 3). Television

Variables	Frequency	Percentage (%)
<b>Sex</b>		
Male	30	3.6
Female	798	96.4
<b>Age</b>		
17-24 Year	186	22.5
25-29 Year	156	18.8
30-39 Year	282	34.1
40-49 Year	114	13.8
50-59 Year	53	6.4
≥60 Year	37	4.5
<b>Ethnicity</b>		
Oromo	424	51.2
Amhara	277	33.5
Other	127	15.3
<b>Religion:</b>		
Othodox Christian	516	62.3
Muslim	216	26.1
Protestant	92	11.1
Others	4	0.5
<b>Marital Status</b>		
Single	135	16.3
Married	693	85.7
<b>Education</b>		
Secondary and above	531	64.1
Primary(1-8)	172	20.8
Read and Write only	65	7.9
Non-educated	60	7.2
<b>Occupation</b>		
Government Employee	100	12.1
Buisness man	113	13.6
House wife	406	49.0
Unemployed	78	8.7
Other	137	16.5
<b>Monthly Income</b>		
<500 ETB	204	24.6
500-999 ETB	184	22.2
1000-1999 ETB	250	30.2
2000-4999 ETB	161	19.4
≥5000 ETB	29	3.5

**Table 2:** Socio demographic characteristics of respondents in Asella town: January 2015.

(58.1%). was the main source of information on IDD and methods of prevention and use of iodized salt.

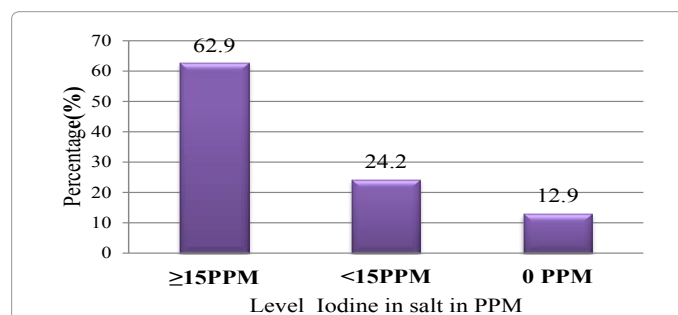
### Utilization of iodized salt at house hold level

Concerning on storage practices, 98.2% HHs stored their salt for ≤2 month, 99% HHs store in dry place and 87.7% HHs store in covered container. Majority (59.9%) of the respondents add salt at the end of cooking and less than 15% of the respondents add before the cooking (Tables 4 and 5).

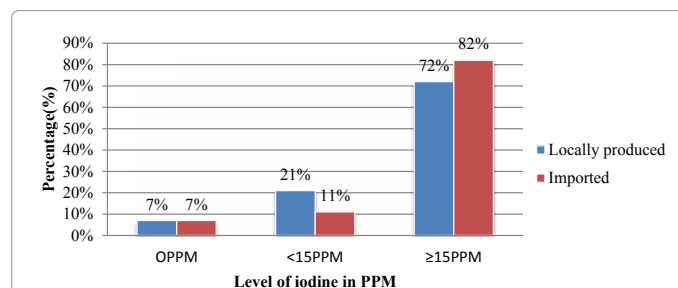
### Factores associated with proper utilization of iodized salt at house hold level

In bivariate analysis; sex, education, occupational status, income, marital status, Regular use of IS remove IDD, knowledge on causes of IDD and use of iodized salt were significantly associated with proper utilization of iodized salt at household level.

In multivariate analysis after controlling the possible confounders; Being female were 3.39 times more likely to properly utilize iodized salt (AOR = 3.39, 95% CI = 1.07, 10.73). Respondents with higher educational level more likely to properly utilize iodized salt (AOR = 2.13, 95% CI = 1.68,5.06) and employed were three times more likely to properly utilize (AOR = 2.93, 95% CI = 1.05, 8.32). Having monthly income between 1000-1999 ETB increase the odds of proper utilization of Iodized salt by 2.12 (AOR = 2.12, 95% CI = 1.06, 4.26 ) and also getting monthly income ≥2000 ETB were) times more likely associated with proper utilization (AOR = 2.39, 95% CI = 1.09, 5.01). Those who married were more than 2 times more likely to utilize properl than their counner parts (AOR = 2.65, 95% CI = 1.24, 5.67). Respondents with good knowledge about IDD and Iodize salt were about 5 times more likely to properly utilize than their counter parts (AOR = 4.93, 95% CI = (2.54, 9.58 )



**Figure 1:** Proportion of adequately iodized salt at household in Assella town: January 2015.



**Figure 2:** Proportion of adequately iodized salt at household in Assella town: January 2015.

Variable	Frequency	Percentage (%)
<b>Goiter results from iodine deficiency</b>		
Yes	472	92
No	41	8
<b>Regular consumption of iodized salt prevents iodine deficiency in the body</b>		
Yes	344	67.2
No	168	32.8
<b>Knowledge on IDD and use of iodized salt</b>		
Good	443	86.4
Poor	70	13.6
<b>Source of Information on IDD and Prevention</b>		
Television	298	58.1
Radio	61	11.9
Others	154	30

**Table 3:** Knowledge on iodine deficiency disorder and in Asella town January 2015.



Variable	Number	Percentage(%)
Place usually buy iodized salt		
Retail shop	471	91.8
Open market	11	2.1
Store(wholesale)	5	1.0
At bazaar	1	0.2
Iodized Salt You Buy		
Locally produced	442	91
Imported	46	9
Duration of storage		
≤ 2 Month	504	98.2
> 2 Month	9	1.8
Storage place		
Dry place	511	99.6
Moisture place	1	0.2
Exposed to Sun light	1	0.2
Stored with covered Container		
Yes	450	87.7
No	63	12.3
Time salt added to cook in the last 24 hour		
Early at the beginning of cooking	75	14.6
Late in the Middle of cooking	44	8.6
At the end of cooking	307	59.8
Right after cooking	87	17

**Table 4:** Proper utilization of iodized salt at house hold in Assela town, Arsi Zone Ethiopia 2015.

## Discussion

In this study the proportion of households Adequately Iodized Salt was 62.9%. The finding is higher than study done in Gondar North west Ethiopia in 2012, which was 28.9% (13), in Asosa 26.1% (14) and DHS 2011, which showed 23.2% of Urban HHs have access to iodized salt [10]. But low compared to other developing countries like Kenya, Uganda and Zimbabwe, which have successful HHs iodized salt coverage which is about 90% [13]. According to WHO, UNICEF and ICCIDD elimination of IDD is possible when the proportion of HHs using iodized salt reaches 90% [14], and Ethiopia also set target to reach 95% in 2014/2015 [15].

In this study it was observed that there were good storage practices of iodized salt at HH level, 99.6% HHs store in dry place. Iodine content will remain relatively constant if the salt, kept dry, cool and away from light [16]. This study result also showed 87.7% of HHs store their salt with covered container which showed higher compared to similar studies conducted in Ghana in which 62.6% [17] and in Neelambur, Panchayat-Coimbatore, India 51.4% [18] but similar to the study result in Basra City of South Iraq in which which was 89.3% [19].

This study showed 76.8% of HHs add salt to cooking at the end of cooking or right after cooking i.e proper utilization of iodized salt. In contrast to the study at Laylay Maychew District, North Ethiopia 2014, which was 40.3% HH add salt to cook at early the beginning of cooking [20]. The amount of iodine retained in cooking food varies with cooking method including cooking time, and cooking temperature and

Variable	Proper utilization of adequately iodized Salt		COR(at 95%CI)	AOR(at 95%CI)
	Yes (%)	No (%)		
Sex				
Male	11(65)	6(35)		1
Female	383(77)	113(23)	1.85(0.67,5.11)	3.39(1.07,10.73)*
Education				
Second.&above	326(89.1)	40(9.9)	1.84(1.60,4.36) *	2.13(1.68,5.06)*
Primary(1-8)	67(72)	26(28)	0.93(0.46,1.88)	0.96(0.70,2.41)
Illiterate	34(57.4)	23(42.6)	0.36(0.17,1.12)	0.19(0.05,1.71)
Occupation				
Employed	64(83)	13(17)	2.95(1.16,7.49)*	2.93(1.05,8.32)*
Buisness man	60(74)	21(26)	1.71(0.72,4.09)	1.84(0.81,3.76)
House Wife	176(76)	55(24)	1.92( 0.88,4.18)	1.23(0.71, 2.12)
Others	20(63)	12(37)		1
Monthly Income				
<500 ETB	76(67)	38(33)		1
500-999 ETB	78(74)	27(26)	1.44(.08,2.59)	1.03(0.05,2.84)
1000-1999ETB	129(80)	32(20)	2.02(1.16,3.49) *	2.12(1.06,4.26)*
≥ 2000 ETB	111(83)	22(17)	2.52(1.38,4.60)*	2.39(1.09,5.01)*
Marital Status				
Single	49(65)	26(35)		1
Married	345(78.8)	93(21.2)	2.03(1.19,3.48)*	2.65(1.24,5.67)*
Goitor results of IDD				
No	17(62)	24(38)		1
Yes	377(64)	95(36)	1.43(0.78, 2.62)	1.38(0.50,2.89)
Regular use of IS remove IDD				
No	118(70)	50(30)		1
Yes	275(80)	69(20)	1.69(1.11,2.58)*	0.98(0.87,2.35)
Knowledge on IDD and I Salt				
Poor	41(59)	29(41)		1
Good	353(71)	90(29)	1.91(1.45,2.52)**	4.93(2.54,9.58)**

\*P-value <0.05, \*\*0.01 to 0.005

**Table 5:** Factors associated with proper utilization of iodized salt among respondents of Assela town, Arsi Zone Ethiopia 2015.

iodine retention varied from 36.6% to 86.1% [21]. Higher portion of iodine lost when salt is subjected to high temperature and heat and thus stability of iodine in salt determined by heat. Cooking loss could be a major reason for IDD [22]. According to WHO, UNICEF, ICCIDD, 20% of iodine lost from production site to HH and another 20% lost during cooking process [23]. Similar study in Shebe town, South West Ethiopia, showed 50.5% HH add salt to cooking in early beginning and late in the middle of cooking [24]. Similarly; In Chinese cooking, salt added to food during cooking process. Wang et al. [18] and Other study in kasekistan showed nearly half proportion of HHs add salt in the early beginning and in the middle of cooking [21]. Comparing to above studies, less percentage of HHs add salt to their cooking in improper time.

In this study being female was significantly associated with proper utilization of iodized salt at HH level. 77% of female versus 65% male properly utilize adequately iodized salt, this might be due culture that in most cases females prepare food in the family and they might be more concerned. Level of education is also significantly associated with proper utilization of iodized salt, 53% with education level only read and write were improperly use adequately iodized salt and this might show education is one of important factor with proper utilization of iodized salt.

Respondents with higher educational level more likely to properly utilize iodized salt. Similar Study in Basra city of South Iraq showed significantly more of HH respondents with higher education level used AIS than those with lower education level 82% of those with university education versus 57.7% were illiterate or only read/write [17]. Another study in Pakistan showed, there was a desirable variation in using iodized salt at HH level and illiteracy no knowledge, lack of awareness was the main associated factor with non use of iodized salt at HH level [22].

This study also showed that income is significantly associated with proper utilization of adequately iodized salt. There was a variation in proper utilization of adequately iodized salt that 80% of HHs with monthly income 1000-1999 ETB, and 83% of HHs with monthly income  $\geq$ 2000 ETB properly utilize AIS with compared to 67% < 500 ETB and this shows as income of HH increases proper utilization of AIS increases, this might be due to HH with better income, have better access to information and practices healthier life. Previous studies on Global iodine status in 2011 showed that People at the lower end of the socioeconomic spectrum were more likely to suffer the consequences of using under-iodized salt than did people in the higher socioeconomic [23].

Participants those who married significantly associated with proper utilization, 79% of those who married have proper utilization compared to 65% those who are single. This study showed also Knowing Goiter results from iodine deficiency were significantly associated with proper utilization i.e 64% of Participants know Goiter results from iodine deficiency were properly utilize adequately iodized salt. This may be due to awareness creation activities and it is higher compared Similar studies in Shebe town, South West Ethiopia that only 10% of respondents know two or more IDD.

Similar study in Pakistan showed, only 17% of respondents in Sindh and 42% in Punjab indicated that iodized salt prevent goiter [22]. The present study also showed knowledge is significantly associated with proper utilization of AIS i.e 71% of Participants with Good knowledge properly utilize iodized salt compared to 59% with poor knowledge. This finding shows 86.4% of HHs increased knowledge may due to that HHs get information on IDD and Iodized salt through different communication methods. Similar study conducted in Ethiopia showed

that more than 90% of child bearing age women in Ethiopia do not know the cause of iodine deficiency and the importance of iodized salt [24]. Other study conducted in Shebe town of South West Ethiopia, showed 78.5% has poor knowledge on iodized salt [20]. Another finding from Gondar town in 2012, also showed that, 74.8% has poor knowledge on IDD [13]. Changes in knowledge on IDD observed in laylay maychew district, North Ethiopia showed that only 44.2% of respondents reasons for not using related to lack of awareness [12]. Another study in Asosa, South west Ethiopia also showed lack of knowledge of iodized salt, unawareness about the advantage of use of iodized salt were the main associated factor with non-use of iodized at HH [14]. Similar study in Pakistan showed, 59% were not aware about advantage of iodized salt [22]. Compared to previous studies, there is a change in knowledge on IDD and iodized salt was observed in current studies that 86.4% of HHs with adequately iodized salt have good knowledge.

## Conclusion

The proportion of households with adequately iodized salt was 62.9%, it was below the targeted plan of the country. Being Female, those who have high income, educational status, being married, knowing iodine deficiency disorder and knowledge and awareness on iodine deficiency disorder and use of adequately iodized salt significantly increases the likelihood of proper utilization of iodized salt at house hold level. It is recommended that increasing health promotion and communication activities on iodine deficiency disorder and proper utilization of adequately iodized salt to the Community using different communication methods.

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