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ORIGINAL ARTICLE

Use of Iodized Salt at Household Level in Jig Jiga Town, Eastern Ethiopia

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ABSTRACT

Regular household use of iodized salt not only improves iodine deficiency disorder with in short period of time, but also it restores the lost cognitive functions among school children. The purpose of the study was to assess the level of use of iodized salt, handling practices, knowledge of food cookers towards iodized salt at household level and associated factors in Jig jiga town, Somali region, East Ethiopia. A cross sectional community based quantitative study design was conducted. The study was conducted in Jig jiga town between January and March, 2013 using standardized questionnaire among household food cookers. A systematic sampling technique was performed and a total 478 food cookers were included in the study. Data were entered using Epi – info 3.3.2 software; then exported and analyzed in SPSS 16 software. The rate of adequate iodized salt use at household level was 26.6%. Household food cookers who had non corrugated iron sheet house (AOR ,95% CI:1.904, 1.07, 3.38); those who had good knowledge score towards iodized salt and IDD (AOR, 95% CI:11.23,6.41, 19.6); and those with occupation of daily labor(AOR, 95% CI:3.21,1.204, 8.56); were more likely to use adequate iodized salt than those who had corrugated house, poor knowledge score and other types of occupation respectively. More than one third (34.3%) of the salt samples which had taken from the containers with lids (proper practice) were contain adequate iodine compared with few (7.1%) of the salt samples from containers without lids at household level. This difference was statistically significant (AOR, 95% CI: 3.547,1.61, 7.83). Food cookers who were using to store their salt in a proper way (Dry place) were found to use adequate iodized salt significantly more than those who had improper practices (moist place) (AOR, 95% CI:5.15, 1.32, 20.06).The consumption of adequately iodized salt at household level which is substantially below the expected level of 90% and the limited knowledge about iodized salt and IDD among food cookers in the study area would be a setback in the progress towards eliminating IDD. Behavioral Change Communication and Information Education Communication should be carried out in the study area regarding importance of iodized salt use.

Key words: *iodized salt, household level, Jigjiga town,Somali region Ethiopia*

INTRODUCTION

Iodine deficiency disorder (IDD) is a broad term that refers to all effects of iodine on growth and development on both human population and animals. The effect of Iodine deficiency disorder include Goiter, stillbirth, neonatal and other types of hyperthyroidism, dwarfism and the most severe one is fetal brain damage, that is preventable through adequate iodine exposure to the population. (Hetzel BS, 2005; Velsascol et al, 2009; Kapil U and Sareen N, 2012). Many studies evidenced that iodine deficiency disorder contributes the increment of morbidity and mortality of infants and neonates (Kapil U and Sareen N, 2012). Iodine deficiency disorder reduces the quality of life, national productivity and 13.5 points of intelligent quotient (IQ) (Barrios E et al, 2007).

In Ethiopia national productivity loss due to IDD has been estimated at nearly 1 billion US during 2000 to 2005 (FMOH, 2006). According to global iodine status report in 2011, IDD affected about one third of world's SAC, where Ethiopia was leading among the top ten iodine deficient countries with the greatest number of SAC that had insufficient iodine intakes (Kapil U and Sareen N, 2012; Anderson M et al,2012).In addition to this, iodine deficiency disorder was severe public health problem in Ethiopia, since total goiter rate and mean urinary of Ethiopian school children were 39% and 2.45 microg/dL, respectively (Cherinet A etal,2007).

Despite the effort of FMOH of Ethiopia towards USI, EDHS 2011, reported that adequate iodization of Ethiopian households' salt were 15%. In addition to this, Some local studies in Ethiopia shows inadequate use of iodized salt at household level (Tefera B et al,2003; Dawit Shawel et al,2010).
Another study conducted in urban slums of cuttack city, Orissa in 2005 indicates low per capita monthly income of households, Containers without lids are predictors for iodine deficiency in the salt. In addition to this, the study also shows the iodine deficiency in the salt is significantly determined by type of houses that the people live (katcha houses i.e., 120 (47.6%) as compared with pucca houses i.e., 14 (16.7%) (M Bijaueen et al, 2009).
Another Cross sectional community based study done (2005) in west Bengal, India, shows the majority of the study respondents (75%) were using adequate iodized salt(> or =15PPM). Use of adequate iodized salt at household level were found to be associated significantly with being in rural, Muslim, and household per capita monthly income of less than or equal to 10 US$ at [prevalence ratio (PR): 0.8, 95% confidence interval (CI) 0.7-0.9], (PR: 0.8, 95% CI 0.7-0.9), (PR: 0.7, 95% CI 0.6-0.8) respectively.
In addition to this, respondents who had aware about iodized salt and iodine deficiency disorder (IDD), those who heard about the ban of non iodized salt, and those had good salt storage place were more likely to use adequate iodized salt at (PR: 1.2, 95% CI 1.1-1.3), (PR: 1.1, 95% CI 1.01-1.3) and (PR: 1.6, 95% CI 1.3-2.0), respectively (Biswas Akhil Bandhu et al, 2010).
As to my knowledge, In our country, there are rare study conducted on this issues, specially eastern part of Ethiopia. Thus, this study is conducted to provide information about the determinants and level of iodized salt use at household level in jig jiga town.

GENERAL OBJECTIVE

To assess the level of use of iodized salt, handling practices, knowledge of food cookers towards iodized salt at household level and associated factors in Jig jiga town, Somali region, Eastern Ethiopia.

Specific objectives:

- To determine the level of use of iodized salt at household level in Jig jiga town, Somali region, Eastern Ethiopia.
- To assess the knowledge and handling practices of households towards iodized salt in Jig jiga town, Somali region, Eastern Ethiopia. .
- To identify factors associated with the level of use of iodized salt at household level in Jig jiga town, Somali region, Eastern Ethiopia.

METHODS AND MATERIALS

The study was carried out in Jigjiga town. Jigjiga town is the administrative city of the Somali regional state located at a distance of 636 kms away from Addis-Ababa, eastern part of Ethiopia. According to the third Population and Housing Census, over 125,584 inhabitants were living in Jig jiga town in 2006 technical report on population and housing census (CSA, 2007). Furthermore adequate iodization of household salt in Somali region was 19.2% (EDHS, 2011).
A cross sectional community based quantitative study was conducted in Jig jiga town, east Ethiopia. The study was conducted between January and March 2013. The Source population was all household food cookers residing in Jig jiga town. The study population was the selected household food cookers residing in Jig jiga town during the study period.
The sample size was calculated using formula for a single population proportion by considering the following assumptions:

$$n = \frac{(Z_{\alpha/2})^2 p\,(1-p)}{d^2}$$

Where: n = required sample sizes, $Z_{\alpha/2}$ = critical value for normal distribution at 95% confidence level which equals to 1.96 (z value at alpha =0.05)
P = Expected prevalence of Household adequate iodized salt use (19.2%)(EDHS,2011).
d = An absolute precision (margin of error 5%).

The formula yielded n = 239, and design effect of two to maximize sample size, lastly the required total sample size was 478 Households.

In this study multi-stage sampling method was used, by considering jigjiga town, which consist of ten kebeles. Four kebeles were selected from those ten kebeles by simple random sampling. The calculated sample size (478 Households) were proportionally allocated to each selected kebele based on its size of households. Then a systematic sampling technique was used to identify the study households from each Kebele. In cases where there was more than one eligible individual in the selected households, a lottery method was used to pick one of them. Moreover, in cases where the selected household was closed or the eligible person was absent two attempts were made to find the respondents.

Data were collected by trained ten diploma Nurse professional students and four Medical laboratory professional supervisors with two types of instruments: Questionnaire and Rapid Test kit of iodate. Standardized structured questionnaire was adopted from United Nations International Children's Fund (UNICEF) (Almaty, 2005).Some modification of the questionnaire was done in accordance with the local situation. Original English version of the questionnaire was translated into Somali and Amharic versions, and then the local versions was translated back into English by professional personnel to check its consistence.

The respondents were requested to provide a piece of salt that from the salt they were using for food cooking of last night. Improved iodized salt field test kit which is an international rapid test kit from BMI KITS, India, was used to test the salt sample from the selected households.

Lastly, the collected salt samples were tested by trained data collectors through standard procedure. The questionnaire was pre-tested a week before the actual data collection days for 10% of the sample size. Trained supervisors were strictly supervising the correctness of questionnaire and the procedure every day. At the end of each data collection day the principal investigator was also checking the completeness and correctness of filled questionnaire.

Dependent variables was inadequate use iodized salt and adequate use iodized salt. While Independent variables included in this study were Socio-demographic variables, Socio economic variables, knowledge of households about iodized salt and Households handling Practices about iodized salt.

Collected data were entered into a computer using Epi– info 3.3.2 software; then exported and analyzed in SPSS software. Odds ratio with 95% confidence interval was used to examine associations between dependent & independent variables. To confirm the association, variables found to have strong association (P =0.3) in bivariate analysis were used to construct the multivariate logistic regression model.

This study obtained ethical clearance from Institutional Research Ethics Review Committee (IRERC) of Haramaya University, Harar campus. A formal letter was submitted from the college to all the concerned bodies in the region to obtain their co operation in facilitating the study. All the interviews of participants were made after getting written signed informed consent from the respondents.

Strengths of the study the systematic random sampling, representative sample size, pretested and structured questionnaire was used to collect the data. Multiple logistic regression model during analysis phase were also used to control for possible confounders. While urban area, bias, cross sectional nature of the study may be some of the limitations of the study.

RESULTS

Knowledge score of food cookers about iodized salt and IDD- knowledge score was calculated from ten "Yes" "No" questions prepared to assess knowledge by rating scale in Excel sheet. Respondents who answered correctly more than half of the questions prepared to assess knowledge were categorized in to a good knowledge category. While those who correctly answered less than half to the questions prepared for knowledge were categorized in to a poor knowledge category.

From 478 study participants of household food cookers who were interviewed, only some (34.3%) had good knowledge about iodized salt and iodine deficiency disorder, but most 314(65.7%) of the food cookers had poor knowledge about iodized salt and IDD (Table 1).

Table 1: Handling practices of household food cookers about iodized salt in Jig jiga town, eastern Ethiopia, 2013(n=478)

Variables	Frequency	Percent (%)
Salt container		
With lid	341	71.3
Without lid	137	28.7
Sunlight exposure of salt		
Yes	110	23.0
No	368	77.0
Salt adding time during food cooking		
Early and the middle of cooking	342	71.5
Late at the end of cooking	136	28.5
Salt storage place		
Dry place	433	90.6
Moist place	45	9.4

Level of use of iodized salt at household level from the total of 478 study participants, who were requested to brought a sample of their salt, more than half (56.07%) of salt samples had inadequate iodine (<15PPM) and 17.36% of the salt sample had zero iodine. While less than one third (26.6%) of salt samples had adequate iodine (> or = 15PPM) at household level.

Food cookers who had good knowledge score (AOR, 95% CI:11.23,6.41, 19.6); those stored their salt in a dry place (AOR, 95% CI:5.15(1.32, 20.06), those had salt store in containers with lids (AOR, 95% CI:3.547(1.61, 7.83), those had non iron sheet house (AOR,95% CI:1.91,1.07, 3.38) and those with occupation daily laborer (AOR,95% CI:3.21(1.204, 8.56), where more likely to use adequate iodized salt than those who had poor knowledge score, store salt in moist place, store salt in containers without lids, iron sheet house and other type of occupation, respectively (Table 2).

Table 2: Final model of predictors of iodized salt use in multivariable logistic regression in Jig jiga town, eastern Ethiopia, 2013

Variables	No or inadequate Iodized salt (%)	Adequate Iodized salt(%)	Crude OR (95%)	Adjusted OR(95% CI)
Occupation				
Merchant	72(79.1)	19(20.9)	1.00	1.00
Farmer	10(100.0)	0(.0)	---	----
Government employee	48(73.8)	17(26.2)	1.342(.634, 2.839)	.565(.217, 1.47)
Housewife	187(72.5)	71(27.5)	1.439(.810, 2.556)	1.799(.848, 3.82)
Daily laborer	34(63.0)	20(37.0)	2.229(1.054, 4.713)	3.21(1.204, 8.56)
House type				
Iron sheet house	167(84.8)	30(15.2)	1.00	1.00
Non iron sheet house	184(65.5)	97(34.5)	2.935(1.853, 4.648)	1.904(1.07, 3.38)
Salt container				
With lid	224(65.7)	117(34.3)	6.633(3.356, 13.113)	3.547(1.61, 7.83)
Without lid	127(92.7)	10(7.3)	1.00	1.00
Salt storage				
Dry place	309(71.4)	124(28.6)	5.618(1.710, 18.461)	5.15(1.32, 20.06)
Moist place	42(93.3)	3(6.7)	1.00	1.00
Knowledge score				
Poor knowledge	279(88.9)	35(11.1)	1.00	1.00
Good knowledge	72(43.9)	92(56.1)	10.186(6.382, 16.258)	11.23(6.41, 19.6)

Statistically significant (P-value <0.05) 95% CI was considered for the final model.

Fig.1: Conceptual framework.

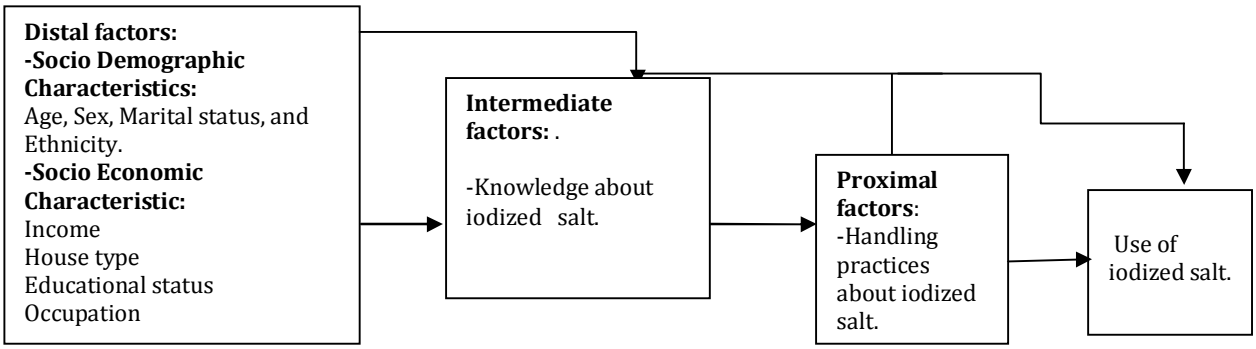
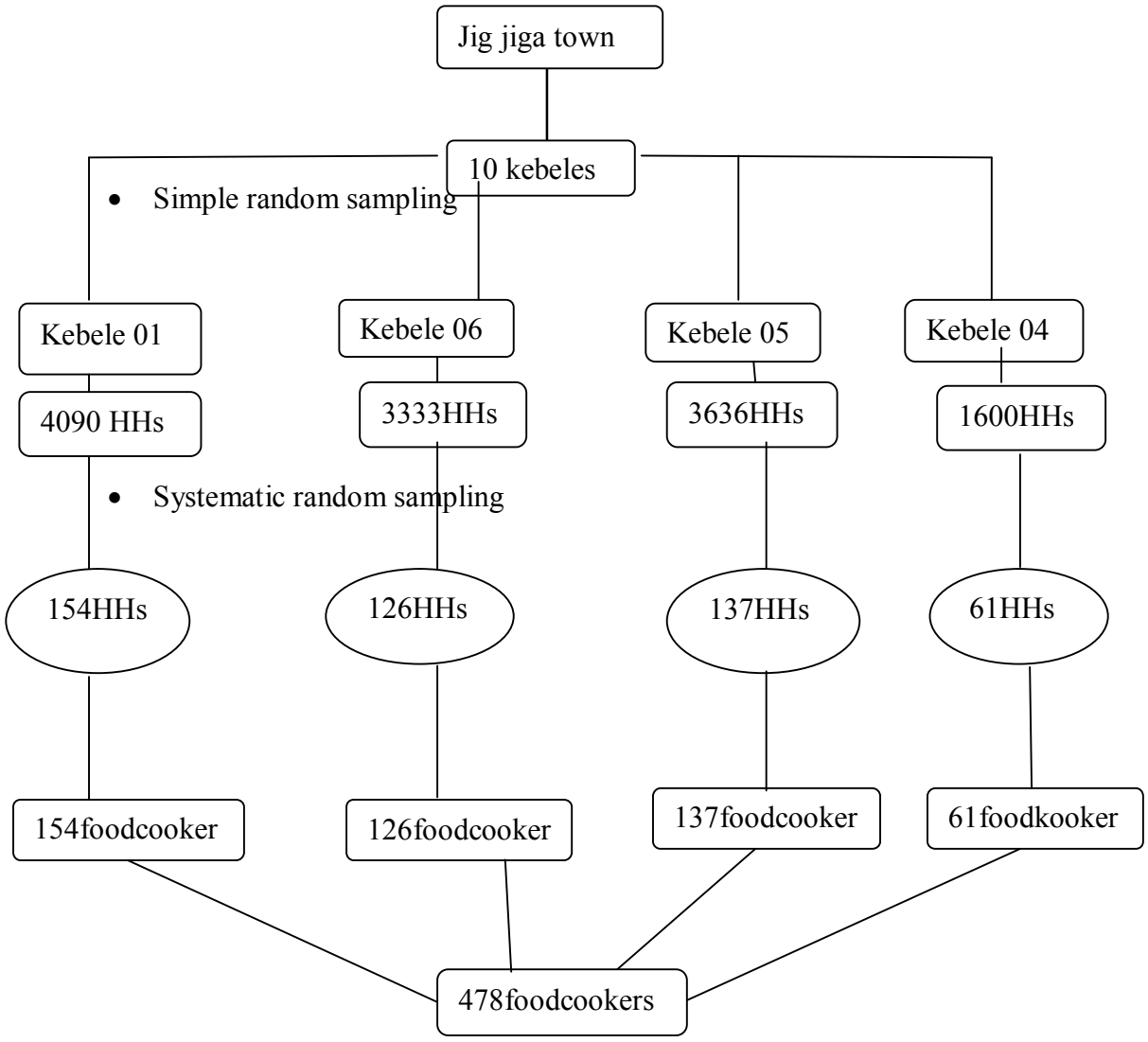


Fig.2: Schematic presentation of sampling procedure



DISCUSSIONS

In the present study, 478 households are participated. Our study reveals that small proportion (26.6%) of households are using adequate iodized salt (> = 15PPM); which is a substantially below the expected level (90%) of the universal salt iodization(USI) program(Anderson M et al, 2004). The finding of the present study is in line with study done in Bengladesh (25%) [AA Shamins et al 2012)].

However, the level of use of adequately iodized salt in this study is more than a report in Ethiopian Demographic Health Survey 19.2% [EDHS,2011], Hawassa, Southern part of Ethiopia (2.6%) [Cherinet A et al 2012], Nationwide Ethiopia (4.2%) [Cherinet A *et al*, 2007], Malaysia (6.8%) [AA Zainuddin et al, 2010] and study in Orissa, India (16.4%) (AS Acharya et al, 2001).

The variation could be due to the situation that the current study is conducted in urban, where the iodized salt is accessible. Moreover, sample size and proximity of God Osbo (one of the sites for sources of iodized salt in Afder, Somali region, Ethiopia.) to the study area may contribute for the variation as well.

Our study, salt samples in containers with lids (proper handling practices) are three times more likely to be adequately iodized salt than salt samples in containers without lid (AOR,95% CI:3.55, 1.61, 7.83). This association is also consistent with a report in Urban Slums of Cuttack City, Orissa.

In our study, food cookers who have proper handling practices(store salt in a dry place) about iodized salt is five times more likely to use adequate iodized salt than those with improper handling practices(store salt in moist place)(AOR,95% CI:5.15, 1.32, 20.06). This association is in line with a finding reported from a similar study in Indonesia; (PR: 1.6, 95% CI 1.3-2.0), respectively (Biswas Akhil Bandhu *et al,* 2010). This could be due to improper handling practices (store salt in moist place) contribute to iodine loss from the salt.

Household food cookers who have non corrugated iron sheet house are more likely to use adequate iodized salt than those who have corrugated house (AOR, 95% CI:1.904, 1.07, 3.38). This result is concordant with a report in Orissa, India (M Bijaueen et al, 2009). This is possibly due to ambient temperature that creates a room for iodine loss from the salt; as corrugated iron sheet houses have higher room temperature than non corrugated houses.

Our study shows household food cookers with occupation of daily labor are three times more likely to use adequate iodized salt than those who have other types of occupation (AOR ,95% CI:3.21,1.204, 8.56). This may be due to different awareness level among occupations about iodized salt.

Moreover, the our recent study shows food cookers who have good knowledge score about iodized salt and IDD are more likely to use adequate iodized salt than those who have poor knowledge score (AOR, 95% CI:11.23,6.41, 19.6). Likewise this finding is consistent with a study findings in West Bengal India (PR: 1.2, 95% CI 1.1-1.3), [Biswas Akhil Bandhu et al, 2010], in Xinjiang, China (F Wang *et al,* 2002). This may show the role of good knowledge on influencing demand and need of iodized salt use.

CONCLUSIONS AND RECOMMENDATIONS

The consumption of adequately iodized salt at household level which is substantially below the expected level of 90% and the limited knowledge about iodized salt and IDD among food cookers in the study area would be a setback in the progress towards eliminating IDD.

Somali regional health bureau and other health care providers should give behavioral change communication and information education communication in the study area regarding importance of iodized salt use. Concerned organizations in the study area should improve the quality of iodized salt through continuous monitoring and evaluation. In general, Somali region's IDD control program needs to emphasize on the improvement of the salt-iodization coverage, create awareness campaign for household food cookers, initiate ban on sale of non iodized salt, and give special attention to good storage practices at household levels.

ACRONYMS AND ABBREVIATIONS

IDD	Iodine Deficiency Disorder
SAC	School Age Children
IS	Iodized Salt
USI	Universal Salt Iodization
GTP	Growth and Transformational Plan
FMOH	Federal Ministry of Health
ICCIDD	International Council of Control of Iodine Deficiency Disorder
IQ	Intelligence Quotient

EDHS	Ethiopian Demographic Health Survey
UIC	Urinary Iodine Concentration
TGR	Total Goiter Rate
CV	Curriculum Vitae
CSA	Central Statistical Agency

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