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Availability and Knowledge of Iodized Salt at Household Level and Associated Factors at Debre Tabor Town, Northwest Ethiopia

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Abstract

Background: IDDs are among the major public health problems of the world. Nearly two billion individuals worldwide and about 350 million Africans are at risk of iodine deficiency and face many risks from its deficiency and complications. Poor knowledge related to iodine diet and iodized salt utilization were some of the factors. Poor Educational status, Occupation and Sources of Information were frequently cited factors related to Knowledge on iodized salt consumption. Iodized salt is an effective and cheap method to prevent and control iodine deficiency in the community.

Objective: The objective of this study was to assess the knowledge and availability of iodized salt at house hold level and associated factors at Debre Tabor town, Northwest Ethiopia.

Methods: A Community-based cross-sectional study was conducted at Debre Tabor town. Six hundred thirteen households were interviewed using structured questionnaire and face to face interviewing technique. Multistage sampling technique was used. Five hundred eighty-six salt samples were tested using Rapid test kit. The degree of association between independent and dependent variables was assessed using odds ratio with 95% confidence interval and p-value < 0.05.

Results: From six hundred thirty-eight participants, 613 participants with 96% response rate participated. The magnitude of poor knowledge with regard to iodized salt consumption and availability of iodized salt were 53.8% and 95.6% respectively. Three hundred eighty-nine of the households were found consuming adequately iodized salt. Adjusting all other factors in the final model, the multivariate analysis showed that marital status AOR [95% CI] = 0.04 [0.00, 0.179], educational status AOR [95% CI]= 2.28 [1.181,4.395], occupation AOR[95% CI] = 2.51[1.421,4.419], know sources of iodine diet, AOR[95%CI] = 0.28 [0.162, 0.477] and sources of information like school, AOR[95% CI] =0.42 [0.242,0.711] were found significantly associated with poor knowledge.

Conclusion: Poor knowledge on iodized salt consumption was found high. Hence, households and the community as a whole need to be advised about the importance of iodized salt and its availability.

Keywords: Iodized salt

List of Abbreviations: ANRS: Amhara National Regional State; AOR: Adjusted Odds Ratio; BDU: Bahir Dar University; BSc: Bachelor of Science; BOFED: Bureau of Finance and Economic Development; CEE: Central and East Europe; CSA; Central Statistics Agency; EDHS: Ethiopian Demography Health Survey; ETB: Ethiopian Birr; EPHI: Ethiopian Public Health Institute; FMO: Federal Ministry of Health; HEW: Health Extension Workers; HHS: Households; ICCIDD: International Council on Control of Iodine Deficiency Disorder; IDD: Iodine Deficiency Disorder; ID-Iodine Deficiency; PPM: Parts Per Million; PPS: Proportional Probability Sampling; SHHS: Sudan Household Health Survey; SPSS; Statistical Package for Social Science; TV; Television; UIE-Urinary Iodine Excretion; UNICEF; United Nation International Children Funds; USI: Universal Salt Iodization; WHO: World Health Organization; IWI: International Wealth Index

Introduction

Iodine is an essential element that enables the thyroid gland to produce thyroid hormones which are vital for growth and development of the brain and central nervous system [1]. Salt iodization was introduced to control iodine deficiency [2]. Nearly two billion individuals worldwide live in areas of iodine deficiency and the adverse consequences of iodine deficiency are widely observed due to poor knowledge related to poor iodine diet and improper iodized salt utilization [3].

About 350 million Africans are at risk of iodine deficiency [4]. In Ethiopia, one out of every 1000 children is in a state of cretinism and mentally handicapped due to a congenital thyroid deficiency and about 50,000 prenatal deaths are occurring annually due to iodine deficiency disorders and further 26% and 62% have a goiter and at risk of other IDD respectively from the total population. Iodine deficiency is of public-health importance in Ethiopia and hence, iodization of salt is an effective and sustainable strategy

to prevent and control it. It is feasible, economical, safe, most effective and broadly accepted by the community. The effectiveness of salt iodization program depends on the conservation of iodine concentration in salt at various stages of consumption and the supply-chain [5].

Methods and Materials

Study Design and Period

Community based cross sectional study was conducted at household level from September to November 2016.

Study Area

The study was conducted at Debre Tabor town, which is located in South Gondar Zone in Amhara region. It is located about 666 kms from Addis Ababa and 103 kms from the capital city of Amhara region, Bahir Dar. It has 4 kebeles and 21 sub kebeles. According to the current population profile, the Zone has an estimated total population of 2,435,309 of whom 1,224,736 are males and 1,210,609 are females. From the population, around 310,556 are urban and 2,124,789 are rural, Child bearing age is 567601, and less than 5yrs are 302,715 [6]. According to BOFED, 2015, the town has a total population of 83,082 of whom 39,781 are males and 43,301 are females.

Source Population

All households of Debre Tabor town

Study Population

The study population was all the households in the selected kebeles of the town during the study period.

The Inclusion Criteria: All households18 years and above who were engaged in food preparation

The Exclusion Criteria: Participants who are critically ill at the time of data collection and unable to hear were excluded in the study.

Sample Size Determination and Sampling Methods

Sample Size: The sample size was determined by using a single population proportion formula considering the assumptions of households with poor knowledge on iodized salt utilization was 74.8%, 95% CI, level of significance to be 5%, Z α/2 = 1.96, and absolute precision or margin of error to be 5%.

Sample size was calculated as:

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

Where, n= number of study subject

Z $\alpha/2^2$ =1.96 (critical value)

Precision (d) = 0.05

P= Proportion of poor knowledge on proper iodine utilization =74.8%

n= $[(1.96)^2 0.748 (1-0.748)]/0.05^2$

n=290x2 (Design effect) =580

n= and 10% non-respondent rate i.e. 580x10% the total sample was

n= 580+58=638

Sampling Procedure

Multi stage sampling technique was used to address the study subjects. Simple random sampling (lottery method) technique was undertaken to select kebeles. Two kebeles (50%) were included in the study, households were selected systematically every 20 households in each kebele. As the total population of each kebele was known and as mini EDHS, 2014, urban household averagely composes 3.6 persons, participants were allocated proportionally to get 638 participants (HHs).

Operational Definition

Knowledge: If respondents answered equal to or above the mean score of Knowledge questions have Knowledge on iodine Consumption.

Knowledge and Practice for a Single Question: If respondents answer more than the average of each questions having more than two options, have knowledge and did appropriate practice.

Iodized Salt: Household salt which is labeled iodized and contains the required amount of iodine (≥15ppm).

Utilization: Consumption of iodized salt to prepare food at household level without exposing to environmental factors such as heat, moisture and light.

Data Collection Procedures and Data Quality Control

The data were collected by administering structured questionnaire and face to face interviewing. The questionnaire was first prepared originally in English and translated to Amharic by a translator. The Amharic version questionnaire was pre tested before actual data collection in kebeles not included in the research. Salt sample data were also collected simultaneously and tested using qualitatively assured rapid test kit. Data were collected by 10 trained diploma nurses and supervised by four-trained BSc Nurses. The supervisors were available throughout the data collection period.

Data Processing &Analyzing

Data were checked for completeness and all responses to the survey questionnaires were coded against the original English version. The data were entered to EPi Info version 7, and analysis was done by using SPSS version 20 software. For all statistical significance tests, the cut- off value set is $p \leq 0.05$. Logistic regression analysis was used for explanatory variables. Descriptive data were presented using Tables & Graphs.

Ethical Considerations

Ethical clearance was obtained from Bahir Dar University Ethical Review Board, Permissions was be taken from the concerned bodies of the Amhara Regional Health Bureau and Zonal Health Department. The necessary explanation about the purpose of study and its procedure was given and oral consent was obtained from the respondents. Study participants had got information about that, they have full right not to participate in the study if they are not willing. To ensure confidentiality anonymity was explained clearly for participant. Arrangement was made in the kebele if there was any emergency condition happened during data .

Results

Socio-Demographic Characters

From 638 participants invited to participate in the study, 613 of them agreed to participate, yielding a response rate of 96%. The age of participants ranged from 18 to 76 years (mean 37.2, SD, ± 13.7). Out of them 527(86%) were female, 538(87.8%) were Orthodox, 70 (11.4%) were Muslims; 5 (0.8%) were other religion followers, 359 (58.6%) were married, 164(26.8%) were unmarried, 158(25.8%) were unable to read and write, 223 (36.4%) were house wives, 88(14.4%) were government employees, 288(47%) were unemployed, depending on their WI, 205(33.4%), 211(34.4%) and 197(32.1%) were poor, medium and rich respectively, 516 (84.2%) have family size of less than five (Table 1).

Variable		Frequency(n=613)	Prevalence (%)
Sex	Male	86	14
	Female	527	86
Age in years	18–24	119	19.4
	25–34	163	2.6
	35–44	140	22.8
	45–54	115	18.8
	55 and above	76	12.4
Ethnicity	Amhara	613	100
Religion	Orthodox	538	87.8
	Muslim	70	11.4
	Others*	5	0.8

Marital status	Married	359	58.6
	Single	164	26.8
	Divorced	67	10.9
	Widowed	23	3.8
Educational status	Cannot read and write	158	25.8
	Can read and write	178	29
	Secondary school	102	16.6
	College and above	175	28.5
Occupation	Housewife	223	36.4
	Merchant	14	2.3
	Employed	88	14.4
	Un employed	288	47
Wealth index	Poor	205	33.4
	Medium	211	34.4
	Rich	197	32.1
Family size	≤5	516	84.2
	>5	97	15.8

Others*-Protestant, Catholic, Mission

Table 1: Frequency Distribution of Socio-Demographic Factors among Households at Debre Tabor Town, Northwest Ethiopia, 2016

Sources of Information

From 613 participants, 430(70.1%) had the information on iodine nutrient; and 391(63.8%) heard about iodized salt. Most of them had information from the mass media especially through television 205(33.4%) and 50(8.2%) on radio. More than half of the participants heard the information from school and through Television (Figure 1).

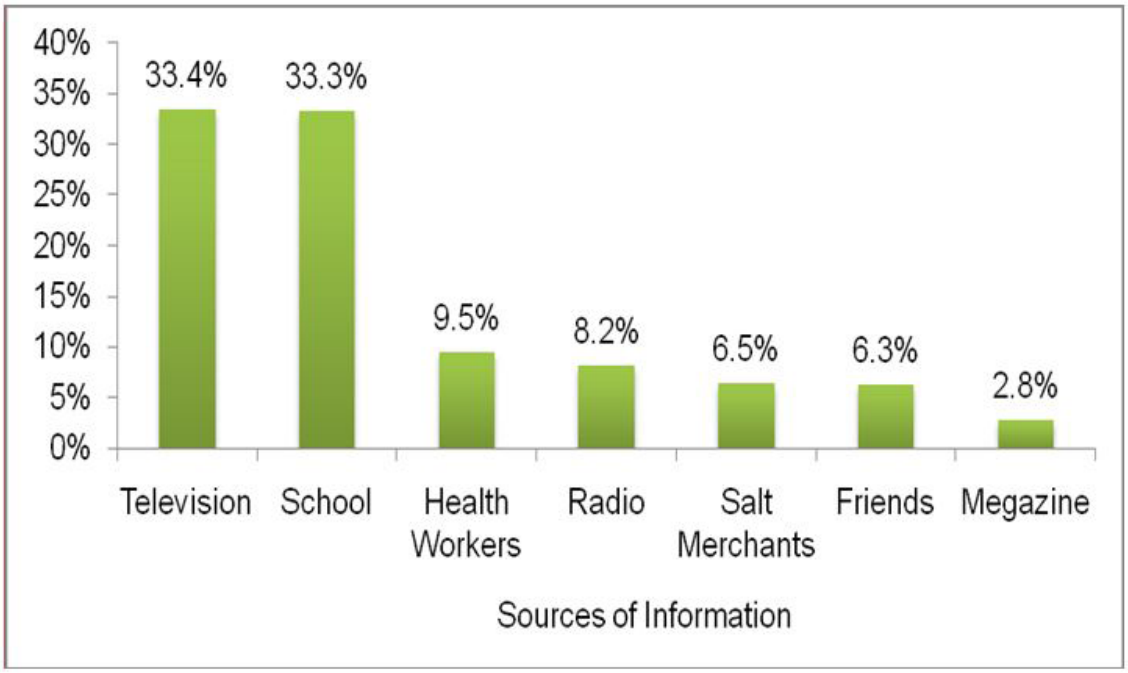

Figure 1: Source of Information about Iodine Nutrient

Availability of Iodized Salt at Household Level

Salt samples were collected from 586(96.6%) of the participants. Among these 389(66.4%) had adequate iodine content (≥15 ppm). Some of the reasons mentioned by the participants not to consume iodized salt were: Cost of iodized salt, lack of awareness, doubts its potency as that of non-iodized one, in addition of its availability was mentioned (Figure 2).

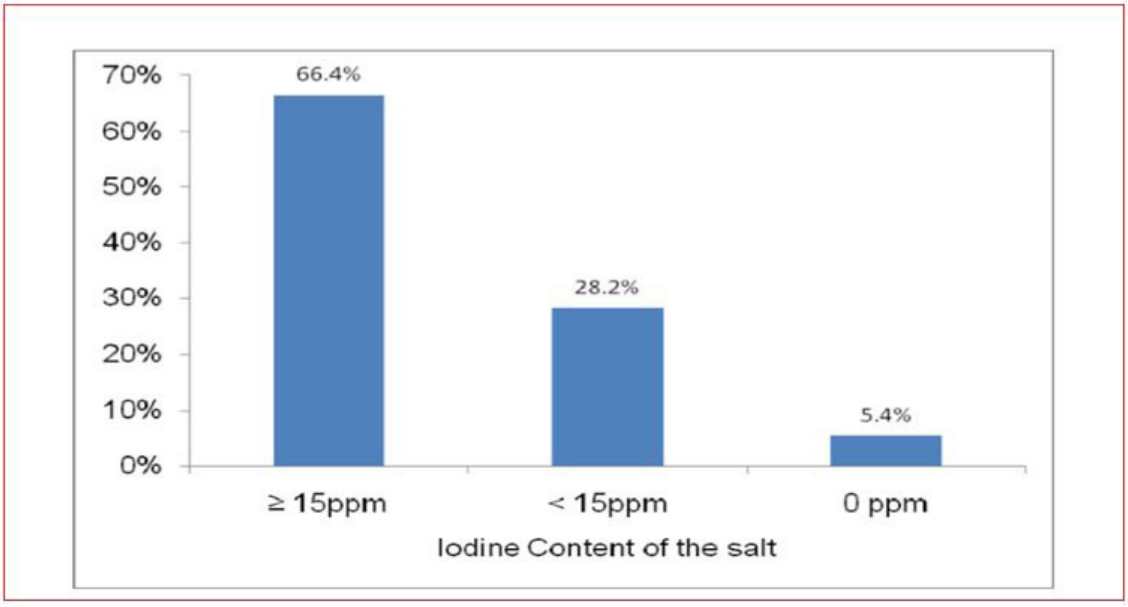

Figure 2: Availability of Iodized Salt

Knowledge of Participants on Iodized Salt Consumption

Even though, 430 (70.1%) had information on iodine nutrient and 391 (63.8%) knew about iodized salt respectively, 330 (53.8%) of the participants had poor knowledge related to iodized salt consumption at household level (Figure 3).

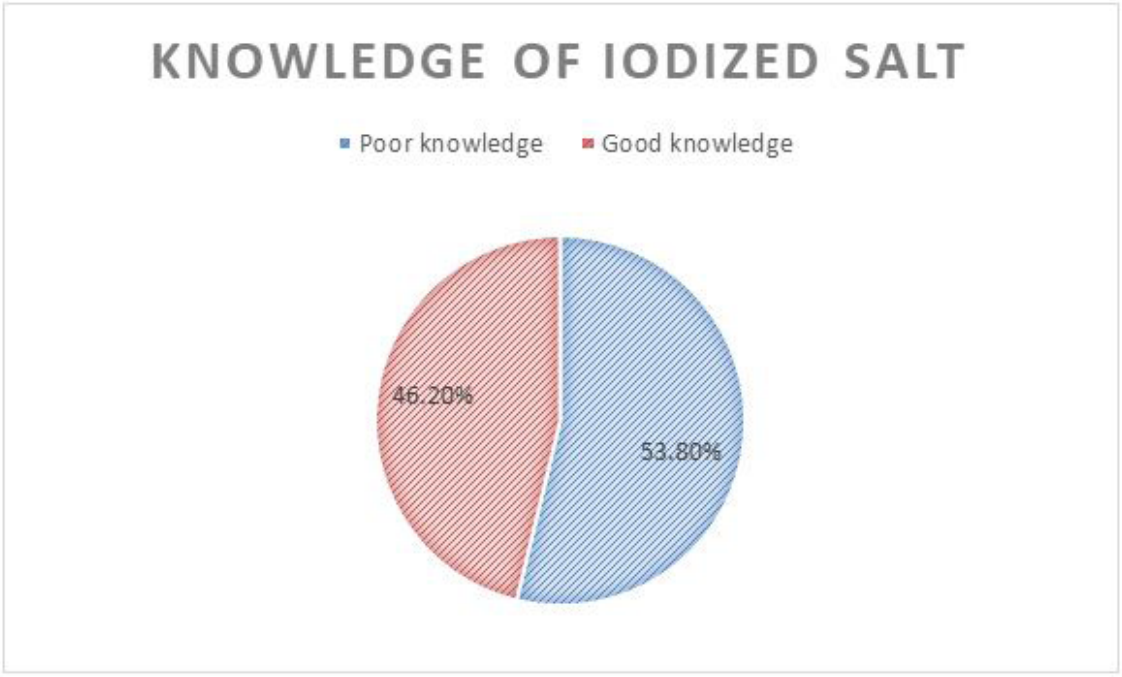

Figure 3: Magnitude of Knowledge on Iodized Salt Utilization

Factors Associated with Knowledge on Iodized Salt Consumption

Bivariate analysis was used to explore the association between knowledge and practice with each of the determinants factors. Marital status, educational status of the participants, educational status of the spouse, occupation of the participants, knowing source of iodine diet and source of information on iodized salt and source iodine nutrient were met the criteria for knowledge to be further analyzed in multivariate logistic regression analysis. In addition to the above, age, wealth index, family size, Knowing sources of iodine diet and sources of information on iodized salt for practice of the participants on iodized salt consumption, also fulfilled the minimum criteria ($P<0.2$) for further multivariate logistic analysis.

Factors which had bivariate associations at p-value < 0.2 were then entered into multivariate logistic regression analysis. The variables associated by multivariate logistics analysis ($p \leq 0.05$) with knowledge were: age, marital status, educational status, spouse's educational status, occupation, knowing types of iodine diet and source of information on iodized salt (Table 2).

Variable		Knowledge		Crude OR(95% CI)	Adjusted OR(95% CI)
		Good	Poor		
Marital status	Married	190	169	1	1
	Single	96	68	1.256 [0.864, 1.824]	0.78 [0.382, 1.595]
	Divorced	42	25	1.494 [0.874, 2.556]	0. 73 [0.320, 1.679]
	Widowed	2	21	0.085 [0.020,0 .367]**	0.04 [0.007, 0.179]**
Educational status	Unable to read and write	97	61	2.12 [1.368, 3.287]**	1.55 [0. 945, 2.557]
	Able to read and write	103	75	1.83 [1.201, 2.793]**	1.22 [0. 759, 1.963]
	Secondary school	55	47	1.56 [0.955, 2.550]	1.32 [0.775, 2.245]
	College and above	75	100	1	1
Spouse's education	Unable to read and write	150	113	1.64 [1.127, 2.397]**	2.35 [1.132, 4.870]*
	Able to read and write	78	53	1.82 [1.159, 2.864]**	1.35 [0. 825, 2.204]
	Secondary school	18	13	1.71 [0.794, 3.699]	1.41 [0. 632, 3.137]
	College and above	84	104	1	1
Occupation	House wife	135	88	1	1
	Merchant	11	3	2.39 [0.648,8.810]	2.43 [0. 571, 10.362]
	Employed	45	43	0.68 [0. 415, 1.121]	0.51 [0.280,0 .931]*
	Unemployed	139	149	0.61 [0.427, 0.867]**	0.69 [0.459, 1.038]
WI	Poor	122	83	1.37 [0.922,2.032]	1.08 [0.690, 1.702]
	Medium	106	105	0.94 [0.638,1.387]	0.84 [0.544, 1.287]
	Rich	102	95	1	1
Source of information					
	School	No	232	172	1.53 [1.092, 2.137]*	1.30 [0. 895, 1.886]
		Yes	98	111	1	1
	Television	No	235	169	1.67[1.192,2.336]**	1.35 [0. 923, 1.974]
		Yes	95	114	1	1
	Magazine	No	325	271	2.88[1.002,8.272]*	1.95 [0. 650, 5.839]
		Yes	5	12	1	1
Know Source of Iodine Diet		Yes	207	211	0.58[0.405, 0.814]*	0.62[0.431, 0.904]**
		No	123	72	1	1

*N.B * p value <0.0.05, ** p value ≤0.01*

Table 2: Bivariate and Multivariate Analysis for Factors Associated with Knowledge on Iodized Salt Utilization among Households at Debre Tabor Town, Northwest Ethiopia, 2016

Discussion

Availability of Iodized Salt

Community based cross-sectional study was conducted to assess the magnitude of knowledge on iodized salt and its availability and the associated factors on iodized salt consumption at household level at Debre Tabor town.

In this study availability of iodized salt at household level with PPM of ≥ 15 was 389(66.4%). This study result is nearly in line with the study conducted in South Africa (62.4%) [7].

This study result is higher than the study conducted in coast province of Kenya (26.4%), in Sheba Town, Ethiopia(19%) in Kyrgyzstan (39.5%) this could be due to high promotion and motivation via different Medias [4,8,9].

This study result is lower than the study conducted in Sri Lanka (88.7%), in Bia district Ghana (75.6%), in Basra city south Iraq (68.3%). This could be due to high economic status and high motivation and determination [10-12].

Proportion of knowledge on Iodized Salt Consumption

In this study the magnitude of poor knowledge on iodized salt consumption was 330(53.8%) with 95% CI (50.2%, 58.1%). Which is nearly in line with the study done in, Sheba Town, Ethiopia (50.6%) [8].

This study result is lower than the studies conducted in Orissa, India, (over 80%), Ghana, 98% and in Ethiopia like, Laelay Maychew (64.2%), Gondar town (74.8%) and Hawasa Town (65.5%) had poor knowledge [13-16]. This significant difference may be due to accessibility of information, time difference as well as government concern about its utilization.

The current study result was higher than, studies done in south Iraq, Basra city (33.6%), Sindh district, Pakistan 41.3%, Bia district Ghana (9.6%), Arsi zone, Ethiopia (13.6%) which had poor knowledge. This may be due to poor sources of information, community awareness, government concern and furthermore the availability of iodized salt [11,12,17,18].

Factors Associated with Consumption of Iodized Salt at Household Level

According to this study the multivariate analysis of logistic regression for knowledge of the participants related to iodized salt consumption pointed out that; Marital status, occupation, educational status, knowing source of iodine diet of the participants were significantly associated with poor knowledge of iodized salt consumption.

In this study, marital status was strongly associated with knowledge. Those widowed AOR [95% CI] = 0.04 [0.007, 0.179] were by 96% less likely to have poor knowledge as compared to married ones. This may be due to accessibility of information; on the other hand workload at home for married ones that could hinder them from information.

Educational status was found to be significant factor. Those participants having lower educational status partners were more likely to have poor knowledge; participants with couples of able to read and write AOR [95%CI]=2.35[1.132,4.870] were two times more likely to have poor knowledge as compared to participants with couples of college and above educational status. This result is consistent with the studies done in Sigh city of Pakistan, Basra City of Iraq, Sudan, Kenya and Shebe Town southwest Ethiopia and Assela town of Ethiopia. This is due to the fact that education could increase awareness and decision making level so that couples could share information [4,8,12,18,19].

Occupation was associated with poor knowledge of iodized salt consumption. Those employed ones, AOR [95% CI = 0.51 [0.280, 0.931]; were by 49% less likely to have poor knowledge as compared to housewives. This result is consistent with the study conducted in Assela Town of Ethiopia [18].

This could be the fact that employed ones may access the information from school, office, workshops; because this study showed that school was one of the main means of sources of information for iodized salt consumption. This could indicate house wives should be informed on iodized salt utilization.

Knowing source and types of iodine diet with AOR [95%CI] =0.63[0.423, 0.926]; was also significantly associated with poor knowledge. Those participants who knew the source of iodine diet were by 37% less likely to have poor knowledge on iodized salt consumption as compared to those who did not know the source of iodine diet.

Conclusion

Poor knowledge and practice related to iodized salt consumption were high. The factors associated with poor knowledge and practice were age, marital status, educational status, occupation and source of information

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Author's contributions

TW designed the study, participated in the data quality control, performed analysis and interpretation of draft of the paper and prepared the manuscript. The author contributed to, and approved, the final manuscript.

Competing Interest

The author declared that there is no competing interest

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