

# The Relationship of Knowledge, Attitudes, and Salt Availability with Iodized Salt Consumption at Household Level in Sepanjang, Gondanglegi District of Malang, Indonesia

Dimas Dwi YS<sup>1</sup>, Theresia Puspita<sup>1</sup>, Cameleia DS<sup>2</sup>, Poedyasmoro<sup>1</sup>

<sup>1</sup> Nutrition Division, Malang Health State Polytechnics, Malang, Indonesia

<sup>3</sup> Internal medicine resident, Medical Faculty of Brawijaya University, Malang  
Indonesia

**Abstract.** The Indonesian government would limit the administration of iodized oil capsules as a short-term program and enhanced long-term program of universal salt iodization program to solve the problem of iodine deficiency disorders (IDD). This policy was worried will cause the redevelopment of IDD due to various constraints such as unstandardized iodized salt (< 30 ppm) in society, lack of information and understanding about IDD and its elimination, or because of inadequate uses of iodized salt in household level. Households consuming of iodized salt surveys in Gondanglegi Health Care (March 2011) showed Sepanjang Village was one of seven villages with the lowest rate iodized salt consumption. It was only 23,8 % from government target in 2011, which was 77%.

This was an analytical observational with cross sectional design and held on November 2011. The purpose of this study was to know the relationship of knowledge, attitudes, and salt availability with iodized salt consumption at the household level in Sepanjang, village Gondanglegi district of Malang, Indonesia. Twenty three housewife whose their children attend school at State primary school 1 Sepanjang and live at Sepanjang village were randomly to submit this research.

There was no significant association of knowledge ( $p=0,304$ ), attitudes ( $p=0,407$ ) with iodized salt consumption at the household level in Sepanjang village. All subjects had sat in his or her home, whether it was not a standardized iodized salt. So that, we conclude that iodized salt consumption at household level was influenced by iodized salt product circulated in society. Therefore, we need strict evaluation from all of toward salt producer to accomplish iodized salt requirement, especially in moderate and sever IDD endemic regions.

**Key-Words:** Knowledge, attitude, salt availability, household iodized salt consumption

## 1. Introduction

Iodine deficiency disorders (IDD) is one of main nutrition burden in Indonesia due to lack of iodine consumption in diet for a long period[1]. Iodine deficiency manifests over a wide spectrum of clinical presentations depending on the age of patients. Iodine deficiency can causes directly disorders includes hypothyroidism, goitre (a swelling of the thyroid gland in the neck), cretinism<sup>2,3</sup> and mental retardation, and indirectly cause social and economy disturbance<sup>4</sup>. According to Almatsier (2004)[5], iodine deficiency also influence quality of human resource because its affect the human brain development and growth[2],[6]. People living in areas affected by severe IDD may have an intelligence quotient (IQ) of up to about 13,5 points below of those from comparable communities in areas where there is no iodine deficiency<sup>7</sup>. Thus, bigger prevalence of IDD will decrease the human resource[8], by decrease child learning capacity.

Elimination of IDD is a most important health and social goal, because it is the single most preventable cause of brain damage. It divided into 2 programs, which are short-term program (lipiodol injection for high risk IDD population; iodized oil salt capsules administration for reproductive women, pregnant women and children) and long-term program (iodized salt and iodization of water supplies). In nearly all countries where iodine deficiency occurs, it is now well recognized that the most effective way to achieve the virtual elimination of IDD is through universal salt iodization (USI)[7]. So that, Indonesian government would limit the administration of iodized oil salt capsules and increase iodized salt (USI) production and distribution and salt fortification<sup>4</sup>. This policy was worried will cause the redevelopment of IDD due to various constraints such as unstandardized iodized salt (< 30 ppm) in society, lack of information and understanding about IDD and its elimination, or because of inadequate uses of iodized salt in household level<sup>9</sup>. Otherwise, there is wide distribution of un-iodized salt, which has lower price, so people tend to use it rather than standardized iodized salt, also because of less of awareness about usefulness of iodized salt[10].

Based on IDD mapping survey in East Java province on 200, Malang regency was moderate IDD endemic region with total goiter rate (TGR) was 20,68%[11]. Household consuming of iodized salt surveys in Gondanglegi Health Care (March 2011) showed Sepanjang Village was one of seven villages with the lowest rate iodized salt consumption. It was only 23,8 % from government target in 2011[12], which was 77%. The purpose of this study was to know the relationship of knowledge, attitudes, and salt availability with iodized salt consumption at household level in Sepanjang, village, Gondanglegi district of Malang, Indonesia.

## 2. Methods

This was analytical observational with cross sectional design and held on November 2011 in Sepanjang village, Gondanglegi district of Malang. The sample size was calculated using Lot Quality Assurance Sampling (LQAS) formula, which is used for monitoring of iodized salt at household level[13]. Thus, the calculated sample size was 23 subjects from 3.523 heads of family in Sepanjang village.

Respondents were 23 housewives who were randomly selected using systematic random sampling, and fulfilled inclusion criteria:

1. Having a child and attending school in SDN 01 Sepanjang village, Gondanglegi district of Malang regency,
2. Live at Sepanjang village, Gondanglegi district of Malang regency,
3. Willing to be a responder

Data was collected form several questioners about knowledge, attitude and salt availability in household and consist of:

- a. Ten questions describes the level of knowledge includes housewives knowledge on iodized salt, benefits, deficiency disorders, storage methods and iodized salt manner. If she able to answer correctly more than 80% questions, it categorized to good knowledge, enough knowledge if the correctly answer was 60-79%, and less knowledge if the correct answer was less than 60%.
- b. Eight statements regarding the housewives response or reaction to iodized salt
- c. Salt available in their home; which was categorized "available" if she can show the salt, and vice versa.

Iodine level in household salt was checked by performing Iodine test, produced by PT. Kimia Farma. If the result of the rapid test showed purplish blue, it means that the salt contains enough iodine (>30 ppm  $KIO_3$ )[14]. In contrary, if there is no discoloration, it means that there was not enough iodine (<30 ppm  $KIO_3$ ) in salt. Collected data would be analyzed using chi-square test with SPSS version 16 programs.

## 3. Results And Discussion

Respondent's ages ranged between 20-50 years old; the highest number of age was in 40-50 years old group (9 housewives (39,2%). The level of education also determines whether or not a person easy to absorb and understand the knowledge they received, including information and knowledge about nutrition and health which in turn will lead to a positive attitude. Most respondents had a moderate level of education (junior and senior high school) amounted to 69.6%, while 8,7% of respondents had a higher education level in the category (S1). Therefore, in this study, the majority of respondents have a good level of knowledge (56.5%) and only 8.7% of respondents have a low level of knowledge.

Attitude is a tendency to behave in a certain way in the form of a closed reaction or has not been declared to the action to a stimulus or object. Most respondents (52.2%) have a negative attitude toward iodized salt.

All subjects (100%) have salt in households, yet 56% of that salt were iodine less containing salt (<30 ppm  $KIO_3$ ). The basic characteristic of the research data can be seen in Table 1.

**Table 1.** Basic Characteristic of the Respondents

Variable	n = 23 (%)
Age (year old)	
20-30	7 (30,4)
31-40	7 (30,4)
41-50	9 (39,2)
Occupation	
Housewives	16 (69,6)
Trader	4 (17,4)
Tailor	2 (8,7)
Factory workers	1 (4,3)
Education	
Low (elementary school)	5 (21,7)
Moderate (junior and senior high school)	16 (69,6)
High (bachelor)	2 (8,7)
Knowledge level	
Good	13 (56,5)
Moderate	8 (34,8)

Less	2 (8,7)
Respondent's attitude	
Positive	11 (47,8)
Negative	12 (52,2)
Salt availability	
Available	23 (100)
Unavailable	0 (0)
Iodized salt consumption	
Sufficient ( $\geq 30$ ppm $KIO_3$ )	10 (43,5)
Insufficient ( $< 30$ ppm $KIO_3$ )	13 (56,5)

The relationship between the levels of knowledge about iodized salt with the iodized salt consumption in the household was presented in Table 2. Respondent with good level of knowledge had consumed enough iodized salt (61.5%). However, respondents with moderate level of knowledge had shown no inclination to consume sufficient iodized salt (25%;  $p = 0.304$ ). This is supported by research by Cahyo (2003)<sup>15</sup>, Doni (2000)<sup>16</sup>, and Elita (2009)<sup>17</sup>, that there was no significant relationship between the levels of knowledge with the iodized salt consumption at household.

The results of this study showed that, although the level of knowledge was quite good, but the behavior of respondents consuming iodized salt was still low. Respondent's reasons choose daily consumed salt because the salt they buy was labeled with "iodized salt" and they can easily get in the stalls around their house. In fact, they had consumed insufficient iodized salt (less than requirement dosage: 30-80 ppm  $KIO_3$ ), so it could be concluded that the quality of iodine to salt used for cooking at home, depends on the quality of salt availability in their area.

There were also many factors that determine the actual availability of iodine from iodized salt at the consumer level, including<sup>7</sup>:

- a. Variability in the amount of iodine added during the iodization process
- b. Uneven distribution of iodine in the iodized salt within batches and individual bags,
- c. The extent of loss of iodine due to salt impurities, packaging, and environmental conditions during storage and distribution
- d. Loss of iodine due to food processing, washing and cooking processes in the household

Iodate is recommended in preference to iodide for iodized salt because it is much more stable. Potassium iodate and potassium iodide have a long-standing and widespread history of use for fortifying salt without adverse health effects. Potassium iodate has been shown to be a more suitable substance for fortifying salt than potassium iodide because of its greater stability, particularly in warm, damp, or tropical climates such as Indonesia<sup>7</sup>. Overall, estimates iodine lost from salt is 20% from production site to household.

Control of moisture content in iodized salt throughout manufacturing and distribution, by improved processing, packaging, and storage, is critical to the stability of the added iodine. A recent laboratory showed, porous packaging results 30-80% loss of iodine within a period of six months. The study also determined that losses could be significantly reduced (in the range of 10-15%) by using packaging with a good moisture barrier, such as low-density polyethylene (LDPE) bags. However, longer storage-beyond six months-aggravated losses. Therefore, it is recommended that the time required for distribution, sale and consumption of iodized salt be minimized as far as possible, to ensure effective use of the added iodine<sup>7</sup>.

**Table 2.** The Relationship Between The Levels Of Knowledge About Iodized Salt With The Iodized Salt Consumption In Household

Level of knowledge	Iodized salt consumption in household		$\chi^2$
	Sufficient	Insufficient	
	n (%)	n (%)	
Good	8 (61,5)	5 (38,5)	p = 0,304
Moderate	2 (25)	6 (75)	
Less	0 (0)	2 (100)	

The relationships between respondents' attitudes about iodized salt towards the iodized salt consumption at household level were presented in Table 3. There were no tendencies for respondents with positive attitude toward iodized salt to consume sufficient iodized salt (36.4%). The negative attitude toward

iodized salt also showed no propensity to consume insufficient iodized salt (50%;  $p = 0.407$ ). The most possibility cause were due to the quality of the salt on the market do not meet the standards of iodine adequacy.

Therefore, it needs the cooperation of various stakeholders, including Malang District Health Office and the Ministry, to conduct periodic monitoring of iodized salt both qualitatively and quantitatively in the market, so that people more secure in using iodized salt in the household. The enactment of government regulations on technical requirements of processing, packaging, labeling of iodized salt in accordance with the Decree of the Minister of Industry No. 77 / SK / M / V / 1995 and carried out supervision by the Ministry assisted by The Malang District Health Office on the application of SNI. No. 01-3556.2-1994 / Rev 2000 by the salt producers, in order to ensure the needs of iodine in society, especially in moderate and severe undernourishment endemic areas.

**Table 3.** Relationships Between Respondents Attitudes About Iodized Salt Towards The Iodized Salt Consumption At Household Level

Attitude	Iodized Salt Consumption At Household Level		$\chi^2$
	Sufficient	Insufficient	
	n (%)	n (%)	
Positive	4 (36,4)	7 (63,6)	p = 0,407
Negative	6 (50)	6 (50)	

The relationships between salt availability in household toward iodized salt consumption in household level were presented in Table 4. Overall, respondents (100%) had salt for everyday cooking. So that the relationship between salt availability in household toward iodized salt consumption could not be statistically analyzed because there are no diversified data about salt availability in household.

**Table 4.** Relationships Between Salt Availability In Household Toward Iodized Salt Consumption In Household Level

Salt Availability	Iodized Salt Consumption In Household Level	
	Sufficient	Insufficient
	n (%)	n (%)
Available	10 (43,5)	13 (56,5)
Unavailable	0	0

#### 4. Limitations

The study only focused to one village in an area with a moderate level of endemic undernourishment of iodine. The research needs to be done also in other areas. It's also not studied about the factors that contributing iodine contains in salt such as iodine form that added to salt, packaging, and time of storage.

#### 5. Conclusion

The level of knowledge and attitude toward iodized salt was not significantly associated with iodized salt consumption in household level, but depends on the availability of sufficient iodized salt by government standards which is contained iodine more than 30 ppm.

#### Conflict Of Interest

Researchers do not have any disclosure.

#### References

- [1]. Indonesia Ministry of Health. Guidance for Public Health Staff. Jakarta: Indonesia Ministry of Health; 1999.
- [2]. Hetzel B. Iodine deficiency disorders (IDD) and their eradication. The Lancet. 1983;322(8359):1126-9.

- [3]. East Java Public Health Office. Handbook for Combating Iodine Deficiency Disorders (IDD) For Health Officer at Regency / City Health Center and Countermeasures Working Group IDD. Surabaya: IDD Elimination Project of East Java Provincial Health Office; 2003.
- [4]. Indonesia Ministry of Health. National Action Plan for Sustainability Management IDD Program. Jakarta: Directorate of Community Nutrition; 2004.
- [5]. Almatier S. Basic Principles of Nutrition. Jakarta: Gramedia Pustaka Utama; 2004.
- [6]. Kapil U. Health Consequences of Iodine Deficiency. Sultan Qaboss Univ Med J. 2007;7.3:267-72.
- [7]. WHO. Assessment of iodine deficiency disorders and monitoring their elimination: a guide for programme managers. 2007.
- [8]. Indonesia Ministry of Health. IDD Elimination in Indonesia. Jakarta: Directorate of Community Nutrition; 2000.
- [9]. General Director of Regional Development. IDD Elimination Coordination. Semarang: Income Office Region; 1996.
- [10]. Katim W. Iodized Salt Quality in Consumer Level. Jakarta: POM Director General of MOH; 1996.
- [11]. Public Health Office. IDD Elimination Program in Malang Regency, Malang: Malang MOH: Community Nutrition Section; 2002.
- [12]. Gondanglegi Community Health Center. Initial Semester report (in June) Gondanglegi Health Center in 2011. Malang Regency: Gondanglegi Community Health Center: Nutrition Services Unit, 2011.
- [13]. Indonesia Ministry of Health. Guidelines for the Implementation Monitoring iodized salt at the Community Level. Jakarta: Director General of the Public Health Directorate of Community Nutrition; 1998.
- [14]. Indonesia Ministry of Health. Implementation Guidelines for Special Nutrition Surveillance at Regency / City Jakarta. Jakarta: Director General of Nutrition and Maternal and Child Health; 2011.
- [15]. Cahyo S. Factors Influencing the Consumption of Iodized Salt in Households in District Limbangan Kendal. Semarang: Diponegoro University; 2003.
- [16]. Doni K. Factors Associated with the availability and quality of iodized salt in the village Rejosari Household Semarang District. Semarang; Diponegoro University; 2000.
- [17]. Elita C. Relationship Between Knowledge and Attitudes toward the use of iodized salt of Housewife in the village Agungmulyo Juwana Pati. Semarang: UNNES; 2009.