

## IODIZED SALT FOR ALL

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**Summary.** Iodine deficiency disorders (IDD) are a public health problem in developing countries such as Bosnia and Herzegovina (B&H). In addition to high-quality iodized household salt on the retail market, IDD prevention requires a well-informed population and the appropriate consumption of iodized salt. The aim of our paper was to estimate the influence of the level of knowledge upon iodized salt consumption practice, to estimate the level of knowledge, attitude to and practices of salt producers, and to recommend future intervention measures to be taken among target groups in order to make progress in promotion of iodized salt. We performed a cross population study carried out in the Federation of B&H. The sample included 0.05% of the total B&H population. We used a modified ICCIDD questionnaire. About half of our participants (49.1%) know of IDD. The consequences of IDD such as goiter are known by 70.2% participants. Almost half of the participants (49.1%) are familiar with iodized salt, but only 51.8% of them buy exclusively iodized salt. The majority of the participants commonly buy iodized salt in small bags and in short time intervals. Our results suggest the necessity for social mobilization in promotion of iodized salt consumption, especially among pregnant women.

**Key words:** Iodized salt, informed, habit

### Introduction

Iodine deficiency disorders (IDD) have been recognized as a common public health problem in about 130 countries with approximately 2.2 billion people at risk, 750 million of whom are from developing countries (1,2,3). The consequences of iodine deficiency can be considered at all stages of life, but the most vulnerable groups include children, adolescents and pregnant women.

Iodine is an essential element built into the chemical structure of thyroid hormones. Its deficiency leads to decreased secretion of these hormones. A wide range of disorders induced by iodine deficiency includes goiter, stillbirth, and neonatal and other types of hypothyroidism. Severe consequences, such as mental retardation accompanied by hearing and speech defects, are found in infants born to mothers suffering from hypothyroidism. In children and adolescents, iodine deficiency results in juvenile hypothyroidism, mental retardation, and slow mental and physical development.

The most effective preventive measure against IDD is universal salt iodization, recommended by the international IDD elimination program. In the early 1960s, the World Health Organization drew attention to the public health significance of iodine deficit. However, it was not until 1985 that the International Council for the Control of IDD (ICCIDD) was established, which in 1990s set out

to promote the usage of adequately iodized salt in prevention, control and elimination of IDDs.

During the early 1980s, only a few countries knew of the effects of IDDs, and even fewer already had legislature arranging IDD control. In 1998, there were 93 countries with laws enforcing salt iodization. More than two thirds of worldwide households in iodine deficient countries use iodized salt exclusively (4,5).

Large surveys on the prevalence of goiter were conducted during 1993. The results obtained showed the highest prevalence of goiter in Albania (40%) and Turkey (36.2%). Iodized salt was available in 17 of 25 countries included in the survey.

Although the results of iodine supplementation programs have been so far remarkably successful, IDDs are still present throughout Europe. A small number of countries have made efforts to create measures aimed at IDD control through iodized salt consumption, as did Austria, Switzerland, and the Scandinavian countries (6,7).

Bosnia and Herzegovina is an iodine deficient area, where endemic goiter was recorded in the past (Podrinje). In 1953, B&H adopted the Law on obligatory salt iodization for human and animal consumption. The implementation of this law resulted in a significant decrease in iodine deficiency disorders but not to their eradication (8).

After the war, several surveys in B&H were conducted in 1997 and 1998, which revealed a high incidence of goiter among children aged 7-14 years (9). Endemic goiter was identified in 26.07% children, but unevenly spread across the cantons. The level of iodine in salt ranged from 10 to 20 mg of iodine per 1 kg of salt. A statistically significant correlation was found between goiter incidence and iodine concentration in salt samples.

The significant prevalence of goiter in the B&H population can be accounted for as a likely consequence of the consumption of low-quality retail salt during the war and shortly after its end. In addition, the only salt factory (Tuzla Salt Factory) stopped its production during the war. People bought and used imported salt which was by large non-controlled, non-iodized or inadequately iodized, sold after expiry date and, frequently, inappropriately shelved.

In the light of the above results, we can conclude that B&H is an iodine-deficient area in which sustainable elimination of IDD is highly necessary. Salt should be ionized in the concentration range 20-40 mg/kg (according to WHO, ICCIDD), and cooperation is needed on the part of salt industry so as to provide salt of the good quality.

Eradication of IDDs is not only beneficial from the medical perspective but from an economic one as well. It leads to increased productivity at work and better quality of life in adults, as well as to improved school performance in children. It is important to consider these benefits when attempts are made to encourage the implementation of iodization programs (10, 11).

## The Aim

Public health measures for prevention and eradication of IDD include education of the population about proper consumption of iodized salt in food. The selection of adequate measures should take into consideration the present level of knowledge, habits and use of iodized salt among the population.

The objectives of the paper are stated as follows:

- to estimate the influence of the level of the population's knowledge upon consumption of iodized salt;
- to estimate the level of the salt producers' knowledge, attitude, and practices; and
- to recommend future public health measures for specific target groups in order to make progress in promotion of iodized salt.

## Material and Methods

We carried out a cross-population study in the Federation of B&H. The sample included 0.05% of the total B&H population. The subjects were selected randomly by including one in every five participants living in the municipality under survey.

The governing criteria for inclusion into the target group were as follows:

- the period of intensive growth and development, i.e. the age at which iodine deficiency is most likely to occur (children and adolescent in the age range 14-18 years);
- the period of pregnancy as the period inducing the most damaging effects of iodine deficiency upon fetus and infant development;
- the period of mature age, i.e., the period of IDD development, with an emphasis of the role of adults as parents and their children's educators, as well as the most significant group of consumers and customers of iodized salt; and
- employees in salt production industry, with a reference to application of recommended criteria and standards in salt iodization;

We used a ICCIDD questionnaire, modified for our purposes so as to include questions about the participants' knowledge of iodized salt and IDDs, their attitudes towards the importance of consumption of iodized salt, and their buying habits.

Activists from several NGOs led interviews at the participants' homes, schools, health-care centers, and Tuzla Salt Factory. The duration of each interview was 10-15 minutes.

## Results

The participants were mostly females (79.8%), of whom 66.7% were adult women.

The average age of the participants was 32 years, which is the result of a great proportion of the target groups including schoolchildren and pregnant women. The majority of participants were in the age range 19-29 years (25%) and 30-39 years (18.6%).

The average number of family members was 3.6. The sample included mainly the families of a poor economic status. The average monthly income per family was 75-250 Euros in 43.8% participants and 250-500 Euros in 37.4% participants. Among the families with an income of 75-250 Euros per month, we found mainly schoolchildren (55.6%) and salt producers (53.5%). The monthly income of above 500 Euro was registered in 28% pregnant women, 13% adult subjects, 7.2% schoolchildren, and 6.7% salt producers.

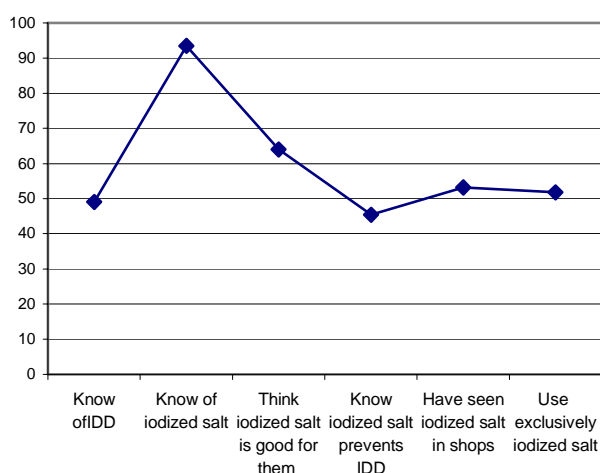
The participants were mainly from urban areas (74.6%), which is in accordance with the current distribution of rural and urban population in B&H.

Close to half of the participants (49.1%) know of IDDs. Differences in knowledge between the target groups exist and are found to be statistically significant. Poor knowledge of IDD was typical of pregnant women, followed by salt producers and schoolchildren.

Only 26.0% participants could name the factors contributing to IDDs. The best knowledge was found among salt producers, whereas schoolchildren and pregnant women had the least information. Salt producers and a great number of adult consumers thought that prevention against IDDs is possible, unlike schoolchildren and pregnant women who did not share this view.

Only 70.2% of the participants knew of goiter being the most prevalent iodine deficiency disorder, 22.3% mentioned cretinism and mental retardation, and only 14.5% abortion and stillbirth. The answers were significantly different depending on the target group (Table 1).

The majority of the participants know of iodized salt, but only 51.8% buy it exclusively. Iodized salt is mainly purchased by salt producers and adult subjects. Pregnant women rarely buy iodized salt (34.0%). The main reason for purchasing iodized salt is the opinion that it is good for health. A small number of the participants buy iodized salt due to the doctor's or the shop-assistant's recommendation, and even a smaller number are guided by recommendations read on salt bags (Table 2).



Graphic 1. Comparison of knowledge, practice, and experience of iodized salt and IDD

The results show that about half of the participants are properly informed, have an adequate attitude and good practice of using iodized salt, have a good knowledge of IDD and know that iodized salt prevents IDD (Fig. 1).

Most of the participants buy iodized salt in short time intervals and in small bags. No difference between the target groups was found with respect to the time interval between two purchases. Only 33.5% participants store iodized salt in adequate conditions, i.e. closed in a glass bowl, whereas 49.8% use inadequate dishes. The manner of adding iodized salt when cooking is found to be wrong in the majority of the participants, with the exception of salt producers (69.2%) who add salt at the end of cooking (Table 3).

### Discussion

The most important method for successful prevention of IDD is universal salt iodization. It is one of the most effective public health interventions. In eight European countries, including Belgium, Denmark and Germany, salt iodization is voluntary (12), while in other countries such as Hungary, Poland, Slovenia, Croatia, and B&H salt iodization is enforced as obligatory through various legislative acts. The prescribed level of iodine for household use ranges between 5-70 ppm (Sweden 40-70 ppm; Bulgaria 22-58 ppm; Italy 24-42 ppm; Austria 15-20 ppm; Croatia 25 ppm; Slovenia 5-15 ppm; B&H 5-15 ppm).

The availability of iodized salt on the retail market varies from 1% in Portugal through 37% in B&H, 84% in Germany, 90% in Croatia, to above 90% in Finland and even 100% in Macedonia (12).

Table 1. Knowledge of and attitude to IDD

	schoolchildren		pregnant women		adults		salt producers		p value
	No	%	No	%	No	%	No	%	
Know of IDD	40	42.2	10	20.0	188	53.8	7	46.7	<0.05
Know factors of IDD	13	13.4	10	20.0	106	30.3	7	46.7	<0.0001
Possible IDD prevention	28	28.8	18	36.0	172	49.3	14	93.3	<0.001
Knowledge IDD									
– goiter	48	49.5	25	50.0	273	78.2	13	86.7	
– mental retardation	8	8.2	7	14.0	114	32.7	5	33.3	<0.05
– abortion and stillbirth	15	16.5	6	12.0	123	35.2	3	20.0	

Table 2. Knowledge, attitude, practice for buying iodized salt

	schoolchildren		pregnant women		adults		salt producers		p value
	No	%	No	%	No	%	No	%	
Know of i-salt	87	89.74	8	96.0	328	93.3	15	100.0	NS
Buy exclusively i-salt	33	34.0	17	34.0	202	57.9	13	86.7	<0.001
Reasons for buying i-salt									
– good for them	30	90.9	11	64.7	158	78.2	12	92.3	
– only in distribution	1	3.0	1	5.9	21	10.4	1	7.7	
– doctor's recommendation	1	3.0	1	5.9	15	7.4	–	–	
– shop-assistant's recommendation	–	–	–	–	3	1.5	–	–	
– reading labels on bags	1	3.0	4	23.5	5	2.5	–	–	
Total	33	100.0	17	100.0	202	100.0	13	100.0	

Table 3. Practice in using iodized salt

	schoolchildren		pregnant women		adults		salt producers		p value
	No	%	No	%	No	%	No	%	
Time between two purchases									
– 1 month	20	60.6	5	20.4	97	48.0	10	86.7	NS
– 2 months	8	24.2	7	41.1	74	36.6	3	23.1	
– 6 months	15	15.1	5	29.4	41	20.3	–		
Storing									
– opened bag	6	18.5	5	29.4	32	15.8	1	7.7	p<0.001
– closed in bowl	17	51.5	9	52.9	97	48.0	9	69.2	
– closed in glass bowl	10	30.3	3	17.6	73	36.1	3	23.1	
Adding i-salt during cooking									
– at the beginning	6	18.2	5	29.4	38	18.8	1	7.7	p<0.001
– at the end	5	15.1	5	29.4	97	48.0	9	69.2	
– indefinite	22	66.7	7	41.2	67	33.1	3	23.1	

The program of IDD elimination includes the estimation of IDD situation, salt production, knowledge, social mobilization, and promotion of iodized salt (13).

The greatest problem in B&H is that no official system exists for monitoring IDD. According to the data obtained from salt producers, iodized salt production is satisfactory. In 2002, a total of 13,875 tons of iodized salt was produced in the B&H salt factory in Tuzla, the amount that fully meets the B&H needs. However, some amounts of non-iodized retail salt are also present in B&H that are imported from Poland, Romania, and other countries. The quality of these supplies, as well as their shelf life, is insufficiently controlled.

The results of our survey show that the participants are not well informed about the importance of using iodized salt in prevention of IDD. Only half of the participants (49.1%) know of IDD. Most of them are familiar with goiter (70.2%), while only 14.5% are able to single out stillbirth as a consequence of IDD. The least knowledge of the IDD-inducing factors and measures of their prevention was found in pregnant women. This finding is most surprising, as iodine-lacking food has a direct consequence on the growth and development of the fetus. It would therefore be expected that pregnant women are well informed about the range of health problems induced by iodine deficiency, as well as possible measures of IDD prevention.

The results of the survey also show that the population of B&H is well informed on the importance of consuming iodized salt. Most of the participants know of iodized salt, but only 50% of them use it exclusively. Only 34% pregnant women buy iodized salt, while salt producers purchase it most frequently. Most of the participants buy iodized salt because they think that it is good for health. Some of the participants buy iodized salt at the recommendation of the doctor or shop assistant.

As iodized salt has a limited shelf life (5-8 months), it is important to purchase it in small bags and in short time intervals. This positive practice is confirmed in the majority of the participants. Iodized salt must be stored in a closed glass bowl put in a dry and dark place, which

is the practice of only 33.5% participants. Close to 50% participants store iodized salt in inadequate conditions.

In order to serve its purpose, iodized salt must be added to a meal at the end of cooking. This is the practice most commonly found among salt producers (69.2%) and least frequently in pregnant women (29.3%) (14).

Our results suggest the necessity for social mobilization (adoption of procedures for monitoring retail salt quality by sanitary inspectors); promotion of the use of iodized salt among pregnant women; training seminars on elimination of IDD organized for teachers and health professionals.

For the purpose of public awareness and general education, communication strategies should be developed that would send messages of the importance of adequately iodized salt and its appropriate storage and usage for IDD prevention.

## Conclusion

In order for successful sustainable elimination of IDD, it is necessary that legislature on salt iodization should consistently take effect. Iodized salt should be available in the market, and used in the facilities where food is prepared and served (restaurants, school kitchens, etc.).

Training courses for sanitary inspectors should be organized so that the quality of iodized salt could be adequately controlled. A number of stimulating methods should be singled out, and educational material and tests kits should be provided.

In addition, education of vulnerable groups, in particular pregnant women and children, is of paramount importance. The focus should be placed on promotion of using iodized salt in prevention of IDD; information on iodine level in salt, adequate storage of iodized salt, and its proper use in food preparation.

It is also necessary to improve the cooperation between health workers, salt producers and public educators, as well as developing a functional salt monitoring system. This would substantially decrease the incidence of IDD in the future.

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## JODIRANA SO ZA SVE

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Kratak sadržaj: *Jod deficitarne poremećaje (IDD) predstavljaju javnozdravstveni problem zemalja u razvoju kojima pripada i BiH. Za prevenciju IDD pored dostupnosti kvalitetne jodirane soli potrebna je dobra obavještenost stanovništva i pravilna praksa njenog korištenja. Cilj rada je bio ispitati uticaj stepena obavještenosti stanovništva na ponašanje u konzumiranju jodirane soli, ispitati nivoe znanja, stavove i praksu proizvođača jodirane soli i ukazati na buduće javnozdravstvene intervencije. Rad predstavlja populacijsku studiju presjeka. Istraživanje je provedeno na području Federacije BiH. Uzorak je činilo 0,05% ukupnog broja stanovnika. Korišten je modificirani anketni upitnik ICCIDD. Polovina ispitanika (49,1%) poznaje jod deficitarne poremećaje. Gušavost kao posljedicu IDD poznaje 70,2% ispitanika. Većina ispitanika zna za jodiranu so, ali samo 51,8% od njih kupuje isključivo jodiranu so. Većina ispitanika kupuje češće manja pakovanja soli. Naši rezultati ukazuju na potrebu mobilizacije društvenog sektora u promociji jodirane soli posebno među trudnicama.*

Ključne reči: *Jodirana so, obavještenost, ponašanje*