

Consumption of iodized salt among households of Basra city, south Iraq

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استهلاك الملح الميؤدّن بين العائلات في مدينة البصرة، جنوب العراق

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الخلاصة: لا توجد معلومات مؤكدة عن التقدم المحرز في يودنة الملح الشاملة في العراق. وقد أجرت الباحثتان دراسة مستعرضة على عينات عنقودية لاستقصاء مصادر الملح وتعبئته لدى 900 أسرة في مدينة البصرة، ولتقييم المعارف والممارسات لدى أفراد العائلات عن الملح الميؤدّن وعن اضطرابات عوز اليود. ووجدت الباحثتان الملح الميؤدّن بكميات كافية لدى 68.3% من العائلات. وتبيّن لهما أن الملح المستمد من مصادر محلية يغلب أن يكون أقل من حيث اليودنة من الملح المستورد، ولدرجة يُعتدّ بها (إذ تضمن 15.3% من الملح المحلي مقابل 86.9 من الملح المستورد على كمية تعادل أو تزيد عن 15 جزء بالمليون من اليود). كما وجدت الباحثتان أن الملح في العبوات البلاستيكية كان في غالب الأحيان ميؤدّنًا بدرجة كافية (95.0%) مقارنة بالعبوات غير المغلقة (70.3%). واتضح للباحثين أن معظم المستجيبين للدراسة قد سمعوا عن الملح الميؤدّن (92.6%)، إلا أن 27.1 منهم فقط كانوا يعرفون منافعه. كما اتضح للباحثين أن أفراد العائلات الحاصلين على تعليم جامعي لديهم ملح ميؤدّن داخل العائلات أكثر مما لدى الأميين أو الذين يستطيعون بالكاد القراءة والكتابة، والفرق يُعتدّ به (82.0% مقابل 57.7%). واستنتجت الباحثتان أن الحاجة ماسة لرصد أفضل للإمدادات المحلية من الملح وللمزيد من التثقيف لتحسين وعي الناس بيودنة الملح.

ABSTRACT Progress towards universal salt iodization in Iraq is uncertain. A cross-sectional study with cluster sampling was carried out to investigate the sources and packaging of salt in 900 households in Basra and assess the knowledge and practice of household members regarding iodized salt and iodine deficiency disorders. Adequately iodized salt was found in only 68.3% of households. Salt from local sources was significantly less likely to be iodized than salt from imported sources (15.3% versus 86.9% had ≥ 15 ppm). Salt in plastic packages was mostly adequately iodized (95.0%) compared with loose packages (70.3%). Most respondents had heard about iodized salt (92.6%), yet only 27.1% knew about the health benefits. Significantly more household members with university education had iodized salt in the household than those who were illiterate or only could read/write (82.0% versus 57.7%). Better monitoring of local salt supplies and more education to improve the population's awareness of iodization are needed.

Consommation de sel iodé des ménages de la ville de Bassora (sud de l'Iraq)

RÉSUMÉ Les progrès tendant vers une iodation universelle du sel en Iraq sont incertains. Une étude transversale d'un échantillon en grappes a été menée pour connaître les sources d'approvisionnement et le conditionnement du sel dans 900 ménages de la ville de Bassora, mais aussi pour évaluer les habitudes de consommation de sel iodé des membres des ménages et leurs connaissances des troubles dus à une carence en iode. La présence de sel adéquatement iodé a été observée dans seulement 68,3 % des ménages. Le sel de sources locales était significativement moins iodé que le sel importé (15,3 % contre 86,9 % contenait plus de 15 ppm). Le sel conditionné en emballage plastique avait le plus souvent une teneur en iode adéquate (95,0 %) par rapport au sel vendu en vrac (70,3 %). La plupart des répondants avaient entendu parler du sel iodé (92,6 %) ; pourtant, seulement 27,1 % en connaissaient les bienfaits pour la santé. Les membres des ménages qui avaient fait des études universitaires étaient plus nombreux à consommer du sel iodé que ceux qui étaient analphabètes ou savaient seulement lire ou écrire (82,0 % contre 57,7 %). Un meilleur suivi de l'approvisionnement local en sel et une meilleure éducation sont nécessaires pour améliorer la sensibilisation de la population à l'iodation.

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Introduction

The greatest cause of preventable brain damage in childhood is iodine deficiency, caused by a low dietary supply of iodine [1]. This is the primary motivation behind the current worldwide drive to eliminate iodine deficiency through the strategy of universal salt iodization [2–4]. The World Health Organization (WHO)/United Nations Children's Fund (UNICEF)/International Council for the Control of Iodine Deficiency Disorders (ICCIDD) have approved a cut-off point of 20–40 parts per million (ppm) for iodine in salt. The goal is to have 90% of households using adequately iodized salt (≥ 15 ppm iodine) and to use salt iodine testing as an indicator for monitoring progress towards universal salt iodization [5–7].

In 1993 the Iraqi government began a plan of action towards iodization of all salt in the country and to ensure that only iodized salt was distributed in food rations [8]. Yet inadequacies in the programme were reported in 2000 [9] and when the status of iodine deficiency disorders (IDD) in the Eastern Mediterranean countries was monitored in the beginning of 2001, Iraq was classified as having severe IDD along with Afghanistan and Pakistan [8]. Following the invasion of Iraq by the Allied Forces in 2003 and the current political difficulties, the status of iodine nutrition in the Iraqi population is still uncertain. Salt is no longer distributed in food rations and people tend to meet all their salt requirements from the local markets, with most people choosing low-price salt brands which may be partially iodized or even totally uniodized. This was confirmed by the World Food Programme's food security survey in late 2007, which revealed that only 23.4% of Iraqi households had adequately iodized salt and for Basra governorate in the south of Iraq the rate was even lower (20.7%) [10].

The present study was carried out to investigate the sources and packaging of

salt in households in Basra and assess the knowledge and practice of household members in Basra regarding iodized salt and IDD in order to understand reasons behind the low consumption of iodized salt.

Methods

Setting and sample

The study was a cross-sectional, multi-stage study conducted in Basra city, which is located in the centre of Basra governorate in the south of Iraq and is the biggest of the 7 administrative districts. The study was conducted during March and April 2011. The survey used probability proportionate to size cluster sampling, a methodology widely used for health indicators. The sample size was 900 households derived from 30 clusters, with 30 households from each cluster. In the areas selected, 2 field teams coordinated closely with health visitors at local primary health care centres to identify and invite household members for the assessments. Prior to the fieldwork, each team was trained in interviewing techniques, standardized coding and completion of forms and spot-testing of household salt.

Data collection

In this survey, interviewers tested samples of salt found in households for iodine levels using spot test kits (MBI Chemicals) obtained through UNICEF. Adequately iodized salt has been defined as containing ≥ 15 ppm of iodine, and according to manufacturer's specifications these kits were accurate for visual detection of iodine concentrations at 0, 7, 15 and 30 ppm. At the time of testing, information about the brand name (local or imported) and the type of packaging (plastic non-transparent or transparent), and whether it was labelled as iodized or not, was noted.

The person in the household principally responsible for food cooking was identified and given a series of

knowledge and practice questions. Respondents were asked about their level of education and if they knew about the effects of iodine deficiency; had heard about iodized salt; and were aware of the health benefits of iodized salt. Respondents were also asked about their salt storage practices.

Data analysis

All data were expressed as numbers and percentages. SPSS, version 16 was used for the statistical analysis. The chi-squared test was used to examine the association between the groups and a P -value < 0.05 was considered to be significant

Results

Adequately iodized salt (≥ 15 ppm) was found in 614 (68.3%) of the 900 tested salt samples, 75 (8.3%) were partially iodized and 211 (23.4%) were uniodized. Imported brands of salt were consumed by 665 households (73.9%), out of which 578 (86.9%) were adequately iodized. The remaining 235 households (26.1%) consumed locally produced salt from factories in Basra and nearby governorates, out of which only 36 sample (15.3%) were adequately iodized. This difference was statistically significant ($P < 0.01$) (Table 1).

Original salt packages were available in 802 households (89.1%) and all were labelled as iodized. Table 1 showed that of 161 salt samples packed in non-transparent plastic packages and labelled as iodized, 95.0% were adequately iodized, and this was significantly higher than in the 641 salts packed in transparent packages (70.3%) ($P < 0.01$).

Significantly more of the household respondents with higher education level used adequately iodized salt than those with lower education levels (82.0% of those with university education versus 57.7% of those where were illiterate or only read/write) ($P < 0.01$) (Table 1). Although the great majority

Table 1 levels of iodized salt consumption in sampled household by the source of salt production, type of packaging and education of the household respondents (*n* = 900)

Variable	No.	Iodine content (ppm)						<i>P</i> -value
		0		< 15		≥ 15		
		No.	%	No.	%	No.	%	
Source of salt tested								< 0.01
Imported	665	40	6.0	47	7.1	578	86.9	
Local	235	171	72.8	28	11.9	36	15.3	
Total	900	211	23.4	75	8.3	614	68.3	
Type of salt package								< 0.01
Transparent	641	128	20.0	62	9.7	451	70.3	
Plastic	161	3	1.9	5	3.1	153	95.0	
Total	802	131	16.3	67	8.4	604	75.3	
Respondent's educational level								< 0.01
Illiterate/read and write	345	107	31.0	39	11.3	199	57.7	
Primary	214	46	21.5	15	7.0	153	71.5	
Secondary	208	40	19.2	15	7.2	153	73.6	
Higher	133	18	13.5	6	4.5	109	82.0	
Total	900	211	23.4	75	8.3	614	68.3	

of household respondents had heard about iodized salt (92.6%), Table 2 shows that only 27.1% were aware of the health benefits of iodized salt. Even among those who consumed iodized salt only 33.6% were aware of the benefits.

Most of the households (804, 89.3%) had good storage practices, keeping their salt covered, in a place away from humidity.

Discussion

Rapid test kits were used for the assessment of iodine levels in the household salt samples because these give immediate results and may also play a valuable educational role in that they provide a visible indication to the public that salt actually is iodized [5]. Their sensitivity for determining a specific salt iodine concentration (e.g. 15 ppm) has been less firmly established [11]. More than two-thirds (68.3%) of households in Basra city were consuming iodized salt, which was a higher than the rate in 2007. Yet the current rate was still considerably below the national goal of

90% coverage. Our figure did not differ much from the results of household surveys in Egypt (68.3%) and Oman (78%) but was much higher than what was reported for Yemen [12].

The higher rate of consumption of adequately iodized salt in the current study may be because the Ministry of Health in the last few years required all imported salts to be checked at import for the certificate of conformity and this may have been more effective in

promoting adequate iodized salt supplies than the food inspections of the domestic salt enterprises [13].

Imported salts were consumed more than locally produced salt brands due to the fact that salt factories in Iraq supply only about 10% of the salt needed for the country and not all them produce iodized salt [14]. All salt factories in Iraq are private and some of them have no official license and are still producing uniodized salt. However, local monitoring

Table 2 Knowledge of household respondents about iodized salt (*n* = 900)

Variable	No.	%
Knew effects of iodine deficiency		
Yes, at least 1	188	20.9
Yes, 2 or more	54	6.0
No	658	73.1
Heard about iodized salt		
Yes	833	92.6
No	67	7.4
Aware of health benefits of iodized salt		
Yes	244	27.1
No	656	72.9
Consumed iodized salt (<i>n</i> = 614)		
And aware of its benefits	206	33.6
But not aware of its benefits	408	66.4

has also shown that there are a number of fake products on the market, with uniodized salt wrongly labelled as iodized in Basra city. In this study not all the imported salt which was labelled as iodized was found to be iodized when reaching the consumers and this may be related to the following: variability in the amount of iodine added during the iodization process; uneven distribution of iodine in the iodized salt within batches and individual bags due to insufficient mixing of salt after the salt iodization process and/or variation in particle size of salt crystals in a batch; loss of iodine due to salt impurities, packaging and environmental conditions during storage and distribution; and the availability of uniodized salt (which could be past its expiry date) from unconventional marketing sources [5].

In this study salt iodine levels differed significantly between the types of salt packaging materials, similar to a household survey in Kazakhstan [11] and a national micronutrient survey in Oman in 2004 [12]. A study conducted in Canada showed the effect of high humidity coupled with porous packaging that resulted in 30%–80% loss of iodine within a period of 6 months. However, longer storage—beyond 6 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 [15]. This result agrees with the

results of a study in China which suggested that waterproof sealed sacks protect the salt from temperature and humidity [16].

In this study women were targeted in particular because of their role in controlling family food purchasing and consumption in the majority of households. A higher education level of household respondents was associated with higher rate of consumption of iodized salt. That could be because better education may influence good practice through better awareness about iodized salt [17,18] or because those with better education have a higher incomes, which enables them to afford more expensive, imported brands of salt. The rate of knowledge about the benefits of iodine in our study was lower than in a household survey of food caterers in Ethiopia but the proportion who had heard about iodized salt was higher in our study [17]. Respondents' awareness about the benefits of consuming iodized salt was lower than for female respondents in a household survey in Oman [12] and much lower than in Kazakhstan [11]. The rate of consumption of iodized salt among those who aware of the benefits of iodized salt was not much different from a study done in Turkey on the effect of mass media in promoting iodized salt consumption among married women [19].

Most of the households stored their salt with a cover and away from humidity. These good practices may not be

due to care of iodized salt but to prevent salt contamination and to keep it from moisture. More public information is needed about storage practices at the retailer and household level to prevent loss of iodine from salt.

Conclusions and recommendations

Only about two-thirds of salt samples consumed by Basra city households were adequately iodized and we therefore recommend developing and implementing an on-going monitoring system for quality assurance and quality control for importation, production, distribution and marketing of iodized salt. Salt from local sources was significantly less likely to be iodized and therefore efforts should be focused on increasing and ensuring the production of only iodized salt by factories inside Iraq. Only 27.1% of household members knew the benefits of iodized salt and those with better education were significantly more likely to have iodized salt in the household, suggesting that more efforts are needed to raise awareness in the community about the importance of IDD and its effective prevention with iodized salt. Salt producers could be required to place information about the health benefits of iodized salt on salt packages. Iraq should be committed to assessment and reassessment of the programme for the elimination of IDD.

References

1. Delange F. The disorders induced by iodine deficiency. *Thyroid*, 1994, 4:107–128.
2. *The miracle of iodated salt: Ethiopia's commitment of universal salt iodations*. Addis Ababa, Ministry of Health/United Nations Children's Fund, 1995 (USI Circular No.9).
3. *Iodine status worldwide: WHO global database on iodine deficiency*. Geneva, World Health Organization, 2004.
4. *State of the world's children 2006*. New York, United Nations Children's Fund, 2006.
5. *Elimination of iodine deficiency disorders. A manual for health workers*. Geneva, World Health Organization, 2008.
6. *Recommended iodine levels in salt and guidelines for monitoring their adequacy and effectiveness*. Geneva, World Health Organization/ United Nations Children's Fund/ International Council for the Control of Iodine Deficiency Disorders, 1996 (WHO/NUT/96.13).
7. *Guiding for a national program for the control of iodine deficiency disorders in the Eastern Mediterranean*. Alexandria, World Health Organization Regional Office for the Eastern Mediterranean, 1988 (EMRO Technical Publication No. 12).
8. Azizi F. IDD in the Middle East. *IDD Newsletter*, 2001, 17(3) (<http://www.iccid.org/media/IDD%20Newsletter/1991-2006/aug2001.html>, accessed 12 August 2012).
9. *Multiple indicator cluster survey for the year 2000 (detailed report)*. Baghdad, United Nations Children's Fund, 2001 (<http://www.childinfo.org/files/iraq1.pdf>, accessed 11 July 2012).

10. *Comprehensive food security and vulnerability analysis in Iraq*. Baghdad, United Nations World Food Programme, 2008 (http://www.uniraq.org/documents/Iraq_CFSVA_Flyer_EN.pdf, accessed 11 July 2012).
11. *An assessment of the household use and adequacy of iodized salt in the republic of Kazakhstan*. Geneva, United Nations Children's Fund, 2005.
12. Izzeldin SH. *Latest status of iodine nutrition*. World Health Organization Regional Office for the Eastern Mediterranean, Permanent Advisory Committee in Nutrition, 2010.
13. Haar F et al. Renewed stimulus for USI in Kyrgyzstan. *IDD Newsletter*, 2010, 35(1):10–12.
14. Azizi F. Current status of iodine nutrition in Iraq. *IDD Newsletter*, 2010, 36(2):1–3.
15. Diosady LL et al. Stability of iodine in iodized salt used for correction of iodine-deficiency disorders, II. *Food and Nutrition Bulletin*, 1998, 19:240–250.
16. Yuqin Y et al. Long-term stability of iodized salt: the multiple province study in China. *IDD Newsletter*, 2002, 18(1) (<http://www.iccidd.org/media/IDD%20Newsletter/1991-2006/feb2002.htm>, accessed 12 August 2012).
17. Takele L, Belachew T, Bekele T. Iodine concentration in salt at household and retail shop levels in Shebe town, south west Ethiopia. *East African Medical Journal*, 2003, 80:532–539.
18. Agarwal S et al. Consumption of iodized salt among slum households of north-east Delhi, India. *Indian Journal of Community Medicine*, 2009, 34(4):368–369.
19. Gamze C et al. The role of local mass media in promoting the consumption of iodized table salt. *Health Education Research*, 2001, 16:603–607.

Regional strategy on nutrition 2010–2019 and plan of action

The *Regional strategy on nutrition 2010–2019 and plan of action* proposes approaches to address the major health and nutrition problems in the Region. It aims to support countries in establishing and implementing action in nutrition in accordance with their national situation and resources. The overall goal of the strategy is to improve the nutritional status of people throughout the life-cycle by encouraging countries to reposition nutrition as central to their development agenda. It provides a framework to assist countries to decide which nutrition actions are appropriate for a particular context and according to the most prevalent health problems.

The strategic approaches target undernutrition, micronutrient deficiencies, prevention and control of obesity and noncommunicable diseases. The strategy emphasizes support for the most vulnerable groups and alleviation of poverty and hunger, the root causes of malnutrition.

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