



## Desalinated Sea Water Linked to Iodine Deficiency Disorders

**Hebrew University study suggests that desalination can dramatically increase the prevalence of inadequate iodine intake**

20/09/2016

An estimated 300 million people worldwide rely on over 17,000 desalination plants in 150 countries for water, and the numbers are likely to grow.

"There is no doubt that desalination is a blessing. However, we need to be mindful of unintended consequences," says **Dr. Aron Troen from the Hebrew University's Institute of Biochemistry, Food Science and Nutrition, in the Robert H. Smith Faculty of Agriculture, Food and Environment**. "Desalination removes minerals from the water and could conceivably diminish intake of minerals such as iodine that serve as essential micronutrients," he adds.

His recent study, published on *Public Health Nutrition*, assessed the relationship between iodine intake and thyroid function in an area where drinking water is supplied from iodine-poor desalinated water. It found a surprisingly high prevalence of insufficient iodine intake and a strong association of thyroid dysfunction among adults with low intake of iodine.

The study was conducted in the city of Ashkelon on the southern Mediterranean coast of Israel – a country with the highest percentage of desalinated water consumption in the world, where five desalination plants produce about 50 percent of its water.

In collaboration with Dr. Dov Gefel of Barzilai University Medical Center in Ashkelon and PhD student Yaniv Ovadia, the researchers used an Iodine Food Frequency Questionnaire to model the effect of depleting iodine content in drinking water on the distribution of iodine intake. Thyroid function was rigorously assessed by clinical examination, ultrasound and blood tests, including serum thyroglobulin (Tg) and autoimmune antibodies.

"Our estimated intake data are supported by significant associations of intake with a diagnosis of iodine deficiency disorders and with elevated thyroglobulin, a putative biomarker of inadequate intake," says Dr. Troen.

With surging population growth and water scarcity worldwide, seawater desalination is increasingly used to meet increased demand for water.

"The increasing reliance on desalination could contribute to an increase in iodine deficiency disorders, which raises a nutritional and public health issue of a major global concern," says Dr. Troen. "This research supports the urgent need to probe the impact of desalinated water on thyroid health in Israel and elsewhere," concludes Dr. Troen.

Iodine deficiency is the single most important cause of preventable mental and intellectual deficiency worldwide.

"Luckily, any problems with iodine nutrition that might emerge from desalination can be easily and inexpensively remedied by the iodization of table salt," explains Dr. Troen. "Unlike magnesium, the solution is relatively straightforward - to iodize salt, provided there is legislation for routine population surveillance for iodine intake to ensure that salt iodization does not lead to excessive intake."

Rough calculation of the potential costs for treatment of children born in Israel if a quarter of the population is mildly deficient amounts to 1 billion shekel per year (265 million USD). This calculation is based on a paper by Monahan M. et al, in Lancet Diabetes and Endocrinology 2015.

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# **Iodine Insufficiency is Prevalent in Israel: Findings of a National Survey of School Age Children and Pregnant Women in the Maccabi Healthcare Services**

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## **Introduction**

National data on iodine status in Israel is lacking. Israel's iodine-depleted water, the absence of a universal salt iodization (USI) program and reports of increased use of thyroid medication suggested that the population's iodine intake is likely inadequate.

## **Aims**

To determine iodine status in the Israeli population in a nationally-representative sample of school age children (SAC) and pregnant women (PW).

## **Methods**

Pre-discard spot-urine samples, from 1,023 SAC and 1,074 PW, representing all regions and major sectors in Israel (Arab, Jewish secular and orthodox) were collected during 2016 at the Maccabi Healthcare Services (MHS) central laboratory. Urinary iodine concentration (UIC) was measured using the modified Sandell-Kolthoff method, and analyzed by trimester, region and sector. The Ministry of Health and MHS ethical committees approved the research.

## **Results**

The Israeli population is mildly deficient (SAC median UIC 83 µg/L; IQR 52-127) and PW are insufficient (median UIC 61 µg/L; IQR 36-97), with 62% of SAC and 85% of PW below the World Health Organization's adequacy range (100-199 µg/L for the population as determined in SAC and 150-249 µg/L for PW). PW residing in Israel's central district had significantly higher, though still insufficient, UIC (median 75 µg/L, n=256) than those residing in all other districts (p0.05); however, UIC did not differ by district for SAC.

## **Conclusions**

The high prevalence of iodine insufficiency in Israel is a serious public health and clinical concern. A USI and monitoring program should be urgently initiated. Caregivers should recommend adequate iodine intake during pregnancy and lactation. A randomized clinical trial of risk and benefit for correction of mild-moderate iodine deficiency during pregnancy must be considered.