Iodine Deficiency in the UK – Scientific Advisory Committee on Nutrition

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Department of Health

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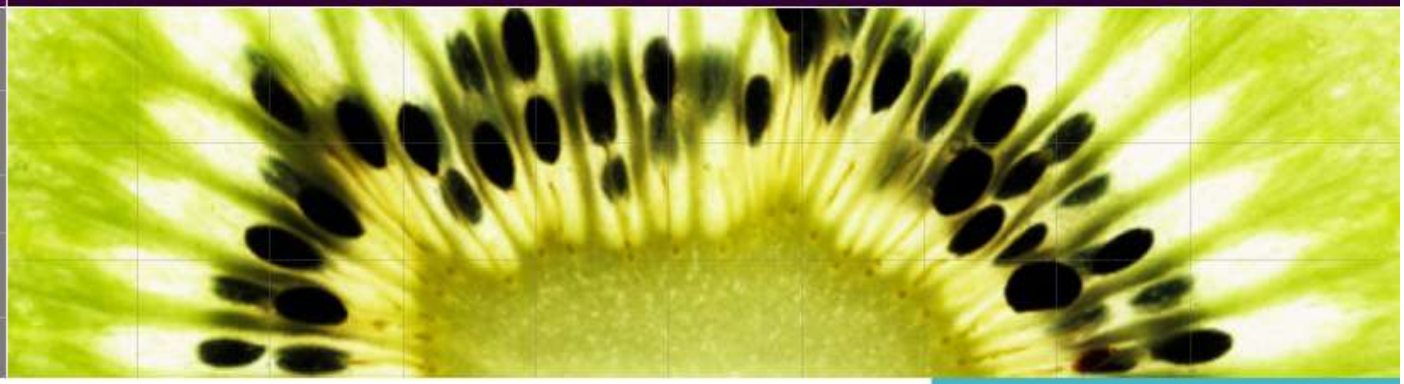
- MAIN COMMITTEE MEETINGS
- WORKING GROUP MEETINGS
- SUB GROUP MEETINGS
- REPORTS & POSITION STATEMENTS
- NEWS & PRESS RELEASES



Chairman's Introduction

Dr Ann Prentice OBE PhD

The Scientific Advisory Committee on Nutrition (SACN) is an advisory Committee of independent experts that provides advice to the Food Standards Agency and Department of Health as well as other government agencies and Departments. Read more...

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News

SACN statement on hard water and cardiovascular disease - 20th August 2010 - Click here to view

Draft Report for Scientific Consultation: 'The influence of maternal, fetal and child nutrition on the development of chronic disease in later life' - 8th February 2010 - Click here to view

Draft Energy Requirements report 'Scientific Consultation' - 5th November 2009 - Click here to view

Forthcoming Meetings

Main SACN Meetings	15th October 2010
Carbohydrate	18th November 2010
Carbohydrate	28th January 2011

Latest Meetings

Maternal and Child Nutrition	8th September 2010
Carbohydrate	3rd September 2010
Main SACN Meetings	7th June 2010

SACN now holds its main meetings in open session. If you would like to attend a SACN meeting as an observer please contact the secretariat for further information.

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Iodine deficiency disorders according to physiological group (Hetzel, 1983[1])

Physiological group	Health consequences of iodine deficiency
All ages	Goitre Hypothyroidism
Fetus	Spontaneous abortion Stillbirth Congenital anomalies Perinatal mortality
Neonate	Endemic cretinism including mental deficiency with a mixture of mutism, spastic diplegia, squint, hypothyroidism and short stature Infant mortality
Child and adolescent	Impaired mental function Delayed physical development Iodine-induced hyperthyroidism
Adults	Impaired mental function Iodine-induced hyperthyroidism

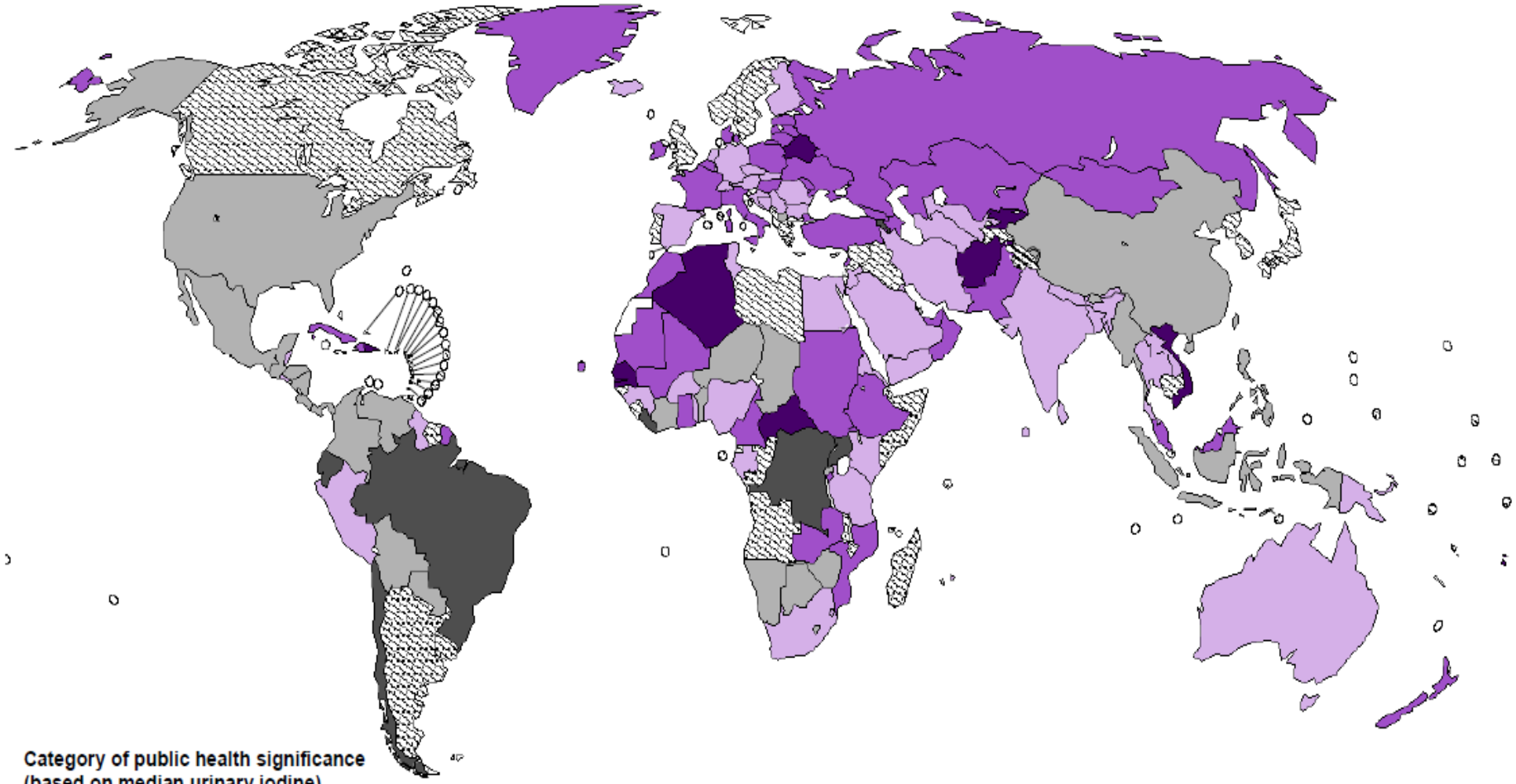
[1]Hetzel BS. Iodine deficiency disorders (IDD) and their eradication. *Lancet* 1983;2:1126-7.

WHO suggested norms used to define iodine deficiency or sufficiency (WHO/UNICEF/ICCIDD, 2007[2]),

	No iodine deficiency	Mild iodine deficiency	Moderate iodine deficiency	Severe iodine deficiency
Median urinary iodine (µg/ L)	>100	50-99	20-49	<20
Goitre prevalence	≤4.9%	5.0-19.9%	20.0-29.9%	≥30%

[2]World Health Organization, United Nations Children's Fund & International Council for the Control of Iodine Deficiency Disorders. *Assessment of iodine deficiency disorders and monitoring their elimination. A guide for programme managers 3rd ed*. Geneva: World Health Organization; 2007

Degree of public health significance of iodine nutrition based on median urinary iodine: 1993-2006



Category of public health significance (based on median urinary iodine)

- Moderate iodine deficiency (20-49 µg/l)
- Mild iodine deficiency (50-99 µg/L)
- Optimal (100-199 µg/l)
- Risk of iodine induced hyperthyroidism (200-299 µg/l)
- Risk of adverse health consequences (>300 µg/l)
- No data

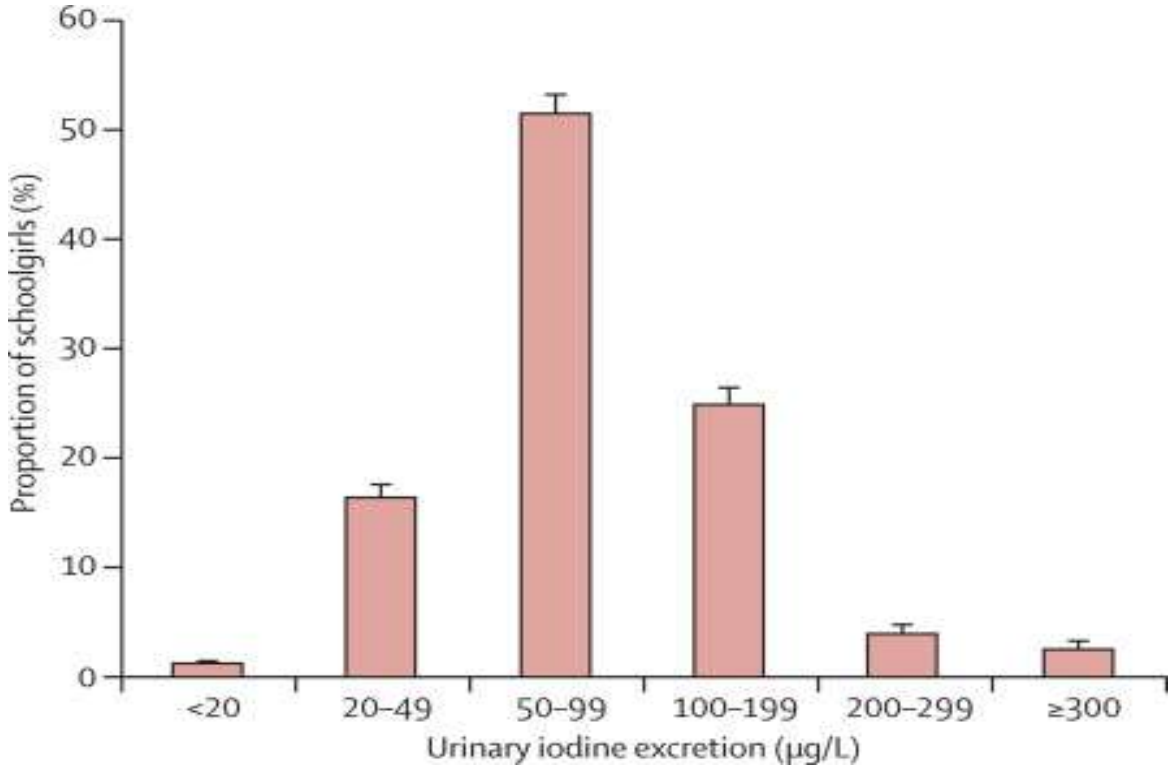
Source:
de Benoist B et al. Iodine deficiency in 2007: Global progress since 1993. Food and Nutrition Bulletin, vol 29, no. 3, 195-202, September 2008.

Background to the review

- The Scientific Advisory Committee on Nutrition (SACN) asked for an overview of the current evidence on iodine deficiency in the UK
- Purpose of the SACN review is to scope out the current literature and to consider whether there is enough evidence to judge whether iodine intakes are adequate in the UK

Background to the review

Cross-sectional study by Vanderpump *et al*[3]*.,* published 2011 suggested UK teenage girls were mildly iodine deficient (median UIC 80.1 µg/L)



UIC in UK schoolgirls, showing the proportions with mild (50-99 µg/L), moderate (20-49 µg/L), and severe (<20 µg/L) iodine deficiency. Bars show standard error

[3]Vanderpump MPJ, Lazarus JH, Smyth PP, Laurberg P, Holder RL, Boelaert K, Franklyn JA. Iodine status of UK schoolgirls: a cross-sectional survey. *Lancet* 2011;377(9732): 2007-2012

National Data

Dietary Reference values (DRVs) for the UK population

Age (years)	Lower Reference Nutrient Intake (LRNI*) (µg/day)[4]	Reference Nutrient Intake (RNI) (µg/day)[4]
1-3	40	70
4-6	50	100
7-10	55	110
11-14	65	130
15-18	70	140
19-50	70	140
50+	70	140

*The LRNI is the amount of a nutrient that is sufficient to meet the needs of only 2.5% of the population

[4]Department of Health. *Dietary Reference Values for Food, Energy and Nutrients in the United Kingdom No. 41*. London: HMSO; 1991

UK iodine intakes

Mean daily iodine intakes of the UK population, from food sources only

Population group (years)	Mean iodine intake (µg) (2008/09 - 2009/10 NDNS)	Mean iodine intake (µg) (2000/01 NDNS)	Mean iodine intake (µg) (1997 NDNS)	Mean iodine intake (µg) (1994/95 NDNS)
Boys 4-10	153		154	
Girls 4-10	133		135	
Boys 11-18	138		171	
Girls 11-18	110		134	
Men 19-64	192	221		
Women 19-64	143	161		
Men 65+	216			187
Women 65+	169			149

Nationally representative UK data on UI to be gathered in NDNS via non-fasting spot urine samples from 4+ years from April 2013

% below LRNI for iodine

Proportion of UK population groups with mean daily intake of iodine from food sources only below the LRNI

Population group (years)	%age below LRNI (2008/09 - 2010/11 NDNS)	%age below LRNI (2000/01 NDNS)	%age below LRNI (1997 NDNS)	%age below LRNI (1994/95 NDNS)
Boys 4-10	2		2	
Girls 4-10	3		4	
Boys 11-18	8		5	
Girls 11-18	21		14	
Men 19-64	5	2		
Women 19-64	10	6		
Men 65+	0			2
Women 65+	1			6

Percent contribution of selected food groups to daily mean iodine intakes for adults aged 19-64 years in 2008/09 – 2009/10†

Food group	Percentage contribution
Milk and milk products total,	33%
of which cows' milk	23%
Fish and fish dishes	11%
Beer and lager	11%
Cereal and cereal products	10%
Egg and egg dishes	6%
Other	29%

†Secondary analysis of data from the NDNS 2008/09 – 2009/10. Food sources only (excluding supplements)

Dietary patterns

- Vanderpump *et al.,* showed that low iodine excretion was associated with low milk consumption and high intake of eggs
- NDNS shows teenage girls generally have poor diets - low intake of fruit & veg and oily fish, iron and calcium and high intake of sugars.

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Quantities of liquid cows' milk (whole, semi-skimmed, skimmed and '1% fat milk') consumed according to age group

Population group (years)	Milk consumption (g per day)	
	Previous NDNS	NDNS 2008/09 -2010/11
All 1½-3	276	278
Boys 4-10	220	214
Girls 4-10	175	185
Boys 11-18	208	156
Girls 11-18	136	110
Men 19-64	225	152
Women 19-64	195	124
Men 65+	236	192
Women 65+	226	182

Functional effects of mild/moderate iodine deficiency

- New Zealand RCT in mildly deficient 10-13 year olds showed improving iodine intake improves some markers of cognition
- Albanian RCT in moderately deficient 10-12 years olds showed improvements in cognitive tests
- Bolivian, Malaysian and Bangladeshi interventions studies – no effect

Uncertainties

- Iodine excretion varies within a day and from day to day-implications for comparability of results between studies
- WHO cut-offs established using UIE data and incidence of goitre in school-aged children (yet applied to older children and adults)
- The cut-off of 100 µg/L may over-estimate the risk of iodine deficiency in older children and adults (due to higher urinary outputs)
- Interpretation of UI data is uncertain due to lack of understanding about how UI relates to functional adverse effects
- Health implications of mild-moderate iodine deficiency not clear – lack of studies, esp. RCTs
- Evidence of the iodine requirements for pregnant and lactating women is lacking. Adaptive response? No national data on these vulnerable groups

Summary-draft

- Iodine is an essential component of thyroid hormones. Iodine deficiency has multiple adverse effects in humans
- Young children and adults in the UK generally have adequate intakes in relation to the RNI
- Concerns about the risk of low iodine intakes in older girls, pregnant women and the fetus
- NDNS to generate UI data for the general UK population – additional research required to aid interpretation
- Difficulties associating UI data with tangible evidence of functional iodine deficiency
- Randomised controlled trials assessing functional outcomes of altering iodine intake have been carried out

Conclusions-draft

- Results from UI analysis from the NDNS will enable the iodine status of the UK population to be categorised by sex-age group based on WHO cut-offs
- Research into a valid iodine biomarker that is proportional to status would be desirable to aid interpretation of new NDNS data
- Research looking at the functional significance of the WHO thresholds is required
- SACN to ask the subgroup on Maternal and Child Nutrition to consider requirements for pregnant women and the fetus
- SACN cautious in drawing conclusions due to the uncertainties surrounding the available data

Thank you