Iodine Deficiency in Europe

La condizione di carenza iodica in Europa

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John Lazarus has nothing to disclose

Iodine deficiency disorders health - consequences, by age

All ages

- Goitre
- Increased susceptibility of the thyroid gland to nuclear radiation
- In severe iodine deficiency, hypothyroidism

Fetus

Abortion
Stillbirth
Congenital anomalies
Perinatal mortality

Neonate

Infant mortality
Endemic cretinism

Child and adolescent

Impaired mental function
Delayed physical development

Adults

Impaired mental function
Reduced work productivity
Toxic nodular goitre; hyperthyroidism

Epidemiological criteria for assessing iodine nutrition (WHO, 2007)

Median urinary iodine	Iodine intake (µg/L)	Iodine nutrition
From WHO/UNICEF/ICCIDD		
< 20	Insufficient	Severe iodine deficiency
20-49	Insufficient	Moderate iodine deficiency
50-99	Insufficient	Mild iodine deficiency
100-199	Adequate	Optimal
200-299	More than adequate	Risk of iodine-induced hyperthyroidism within 5-10 years following introduction of iodized salt in susceptible
> 300	Excessive	Risk of adverse health consequences (iodine-induced hyperthyroidism, autoimmune thyroid diseases)

RECOMMENDED DAILY IODINE INTAKE

[Results of WHO Technical Consultation 2005]

Table 1 The daily recommended nutrient intake (RNI) for iodine proposed for pregnant and lactating women, and children less than 2-years-old, and the daily intake that is considered should not to be exceeded.

Population group	Recommended iodine intake ($\mu g\,day^{-1}$)	Level of iodine intake beyond which no added health benefit can be expected ($\mu g\,day^{-1}$)
Pregnant women	250	>500
Lactating women	250	>500
Children less than 2-years-old	90	>180 X

X corresponds to urinary iodine 177µg/litre (approx)

Andersson et al Public Health Nutrition 10(12A) 1606-11, 2007

Pregnant and lactating requirement 250µg/day [de Benoist & Delange 2007 Pub Hlth Nutr]

Iodine deficiency results in neurodevelopmental delay [Vermiglio et al 1999, de Escobar et al 2007]

Iodine supplementation improves child neurocognitive outcome [Velasco et al 2009 JCEM, Berbel et al 2009 Thyroid]

Sustained I intake of 500µg - 1000µg/day should be avoided because of concerns about fetal hyperthyroidism


Europe
Population
App 590m
1. LITHUANIA
2. LUXEMBOURG
3. LIECHTENSTEIN
4. CZECH REPUBLIC
5. BOSNIA & HERZEGOVINA
6. SERBIA
7. MONTENEGRO
8. KOSOVO
SVALBARD
JAN MAYAN
ICELAND
FAROE ISLANDS
Atlantic Ocean
North Sea
NORWAY
SWEDEN
FINLAND
RUSSIA
ESTONIA
LATVIA
ISLE OF MAN
UNITED KINGDOM
DENMARK
IRELAND
NETHERLANDS
BELARUS
POLAND
GERMANY
UKRAINE
GUERNSEY
JERSEY
BELGIUM
SLOVAKIA
MOLDOVA
AZERBAIJAN
Caspian Sea
SWITZERLAND
AUSTRIA
HUNGARY
ROMANIA
GEORGIA
Black Sea
SLOVENIA
FRANCE
CROATIA
ARMENIA
AZER.
BULGARIA
ANDORRA
ITALY
SAN MARINO
TURKEY
PORTUGAL
SPAIN
MONACO
MACEDONIA
VATICAN CITY
GREECE
Mediterranean Sea
ALBANIA
GIBRALTAR
MALTA
Israel
70°
60°
50°
40°
5°
0°
5°
15°
25°
35°
45°

Urinary Iodine in Europe

Urinary Iodine (µg/Litre)	No of Countries
≤ 100 [63-100]	6
100-150 [101-148]	13
≥ 150 [173-252]	7

PREGNANT WOMEN IODINE STATUS (DATA from 21 COUNTRIES)

UI > 150µg/Litre 8

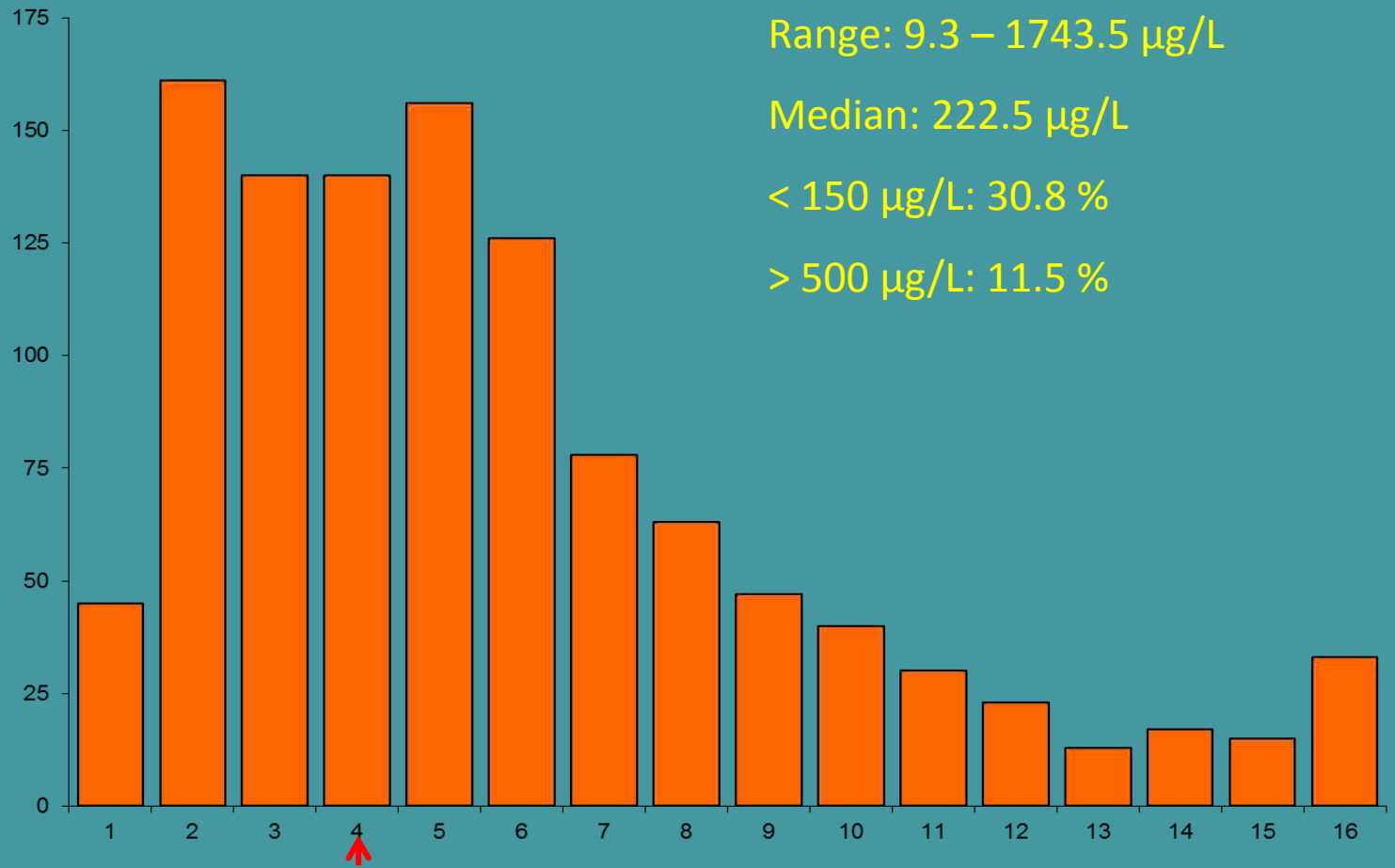
UI < 150µg/Litre 13

Mandatory Salt Iodisation

Mandatory Salt Iodisation	No of Countries	Population (million)
YES	13	184.4 [30.8%]
NO	22	410.0 [69.2%]

NETHERLANDS

Maternal urinary iodine levels in early pregnancy



Range: 9.3 – 1743.5 µg/L

Median: 222.5 µg/L

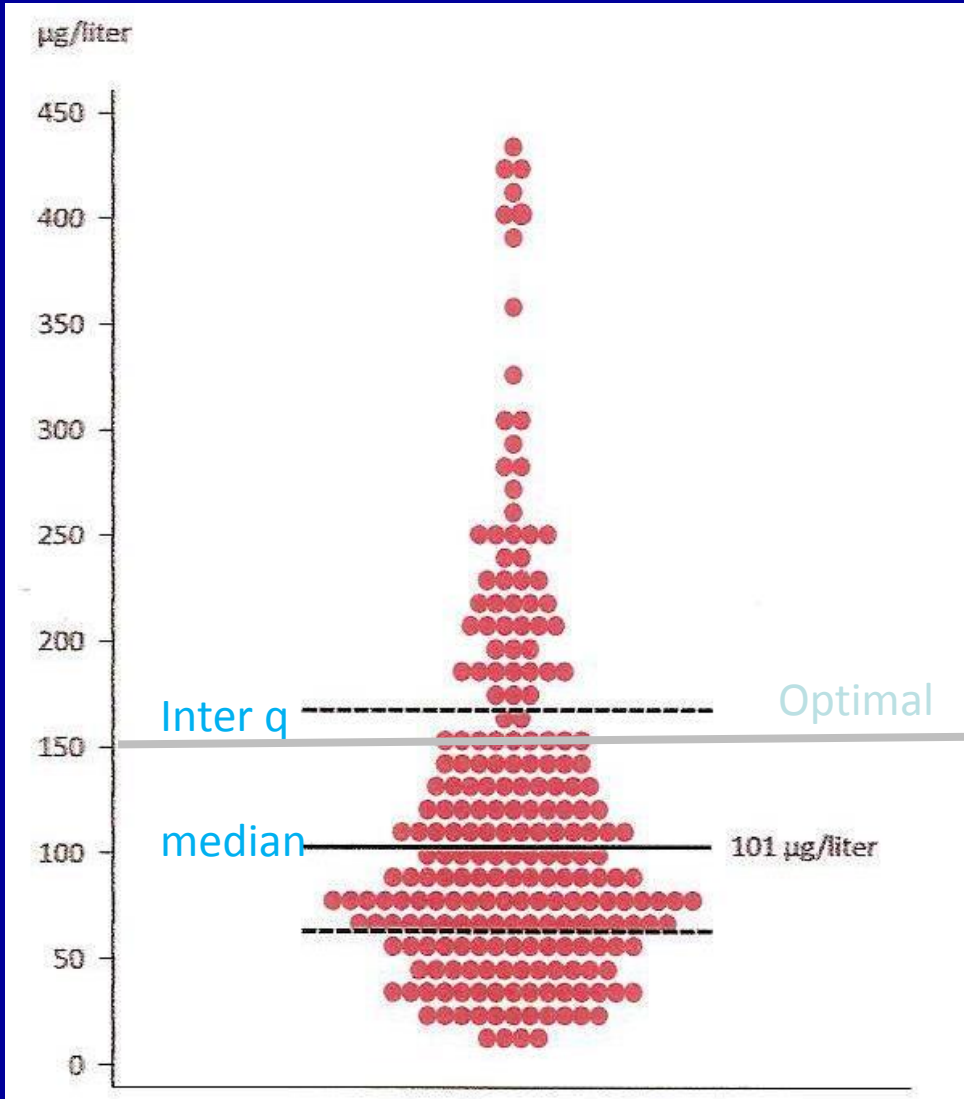
< 150 µg/L: 30.8 %

> 500 µg/L: 11.5 %

DENMARK

UIE in 238 pregnant women 2012

Iodine Suppl	Yes **84.1%**	No **15.9%**
UIE (µg/L)	109	68

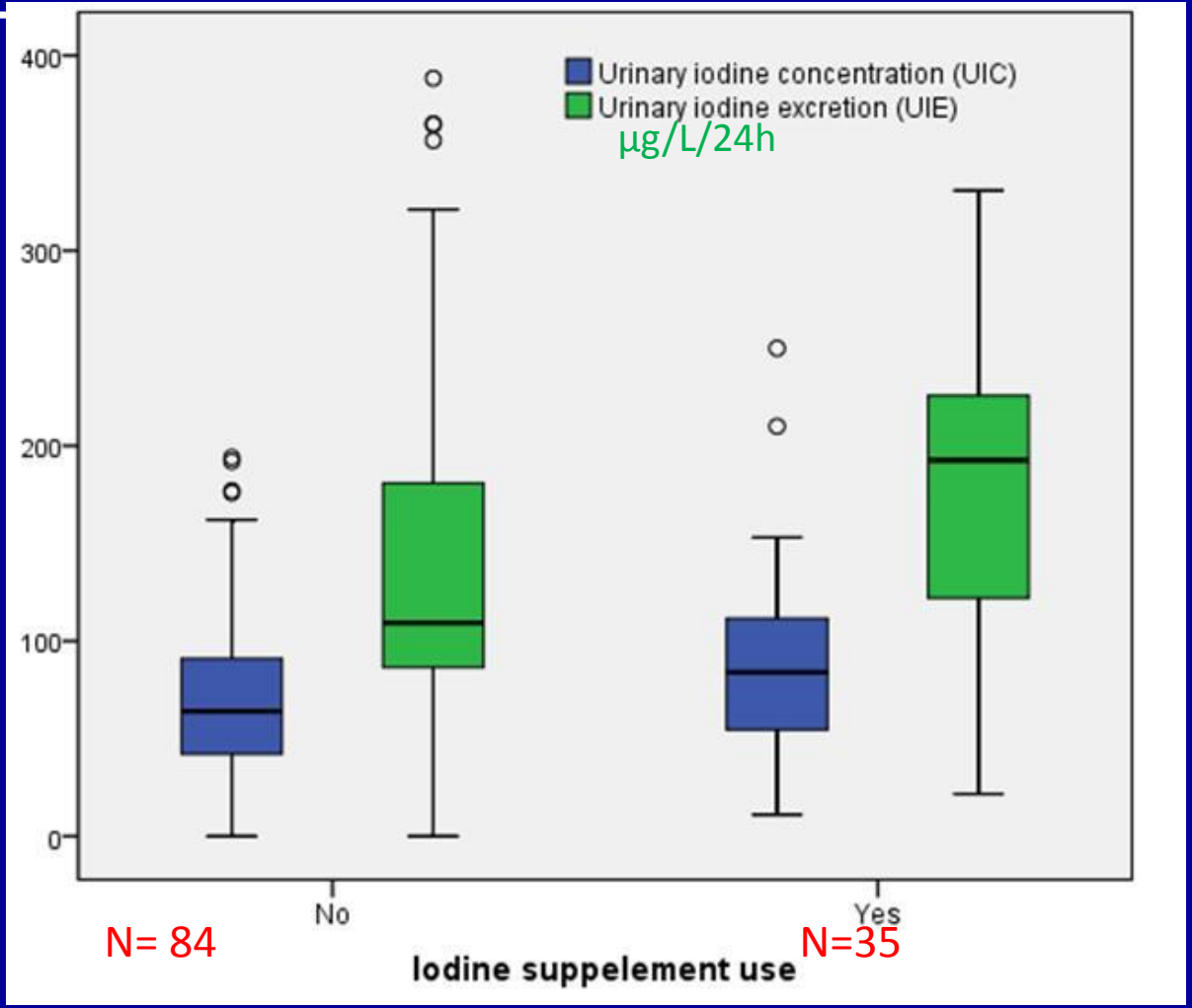


Urinary iodine concentrations in range from 460-1000 µg/liter (n=8) not illustrated.
Values were stratified into 40 bands in the range from 7-440 µg/liter; each band corresponding to 10.8 µg/liter.

Andersen et al
Dan Med J 2013

NORWAY

U0UIC>150 µg/L defined by WHO as adequate iodine nutrition



UIC indicate suboptimal iodine status in pregnancy – especially in women without supplementation

NORWAY

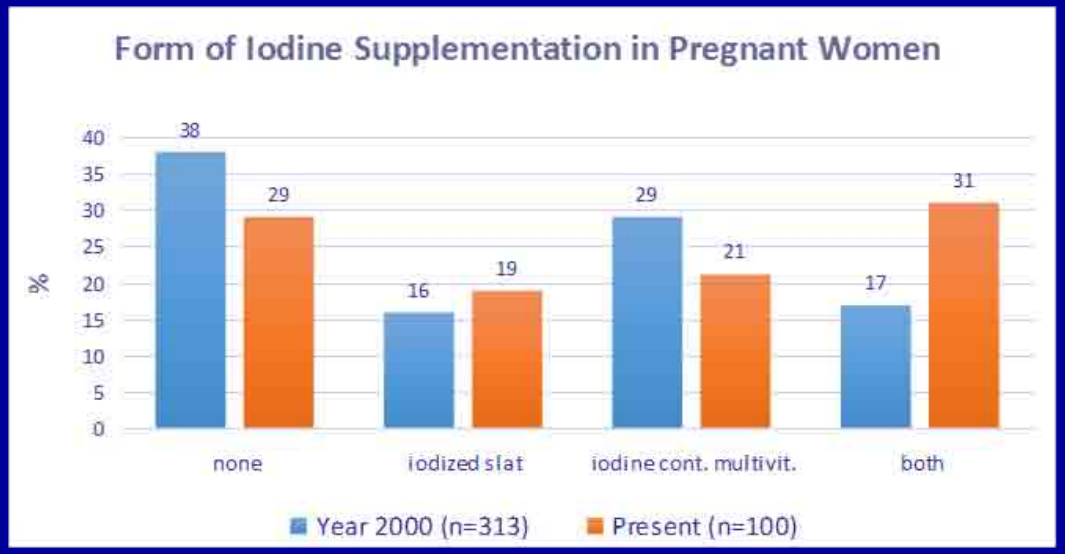
Conclusion and future perspectives

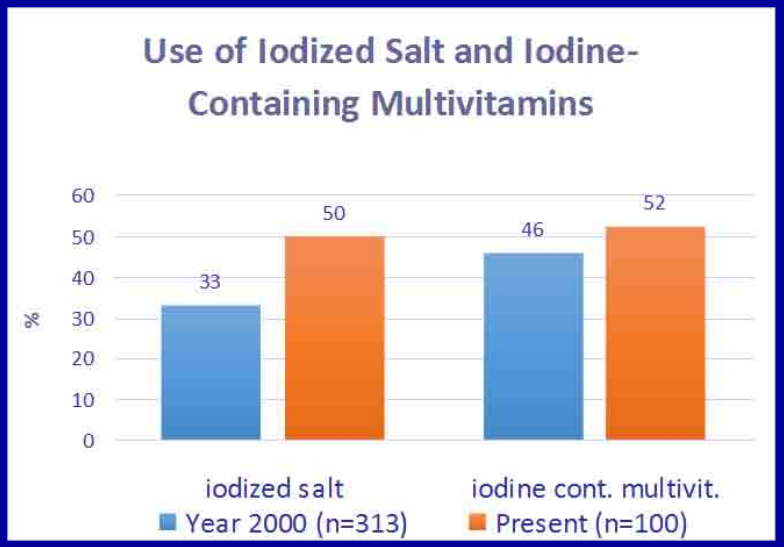
Pregnant women who do not consume or have low intake of dairy and/or seafood and who do not obtain iodine from supplements are at great risk of having inadequate iodine intake.

There is an urgent need for public health strategies to monitor and secure the iodine status in Norway.

The detailed assessment of diet and supplement use in MoBa represents a unique opportunity to study potential associations between inadequate maternal iodine intake and cognitive development in their children

HUNGARY - Iodine Status in Pregnancy 2013





Partial Success:

MDs, obstetricians and medical staff are aware of the iodine deficiency guideline

New legislation is in preparation 'Healthy food for public schools' – iodized salt mandatory

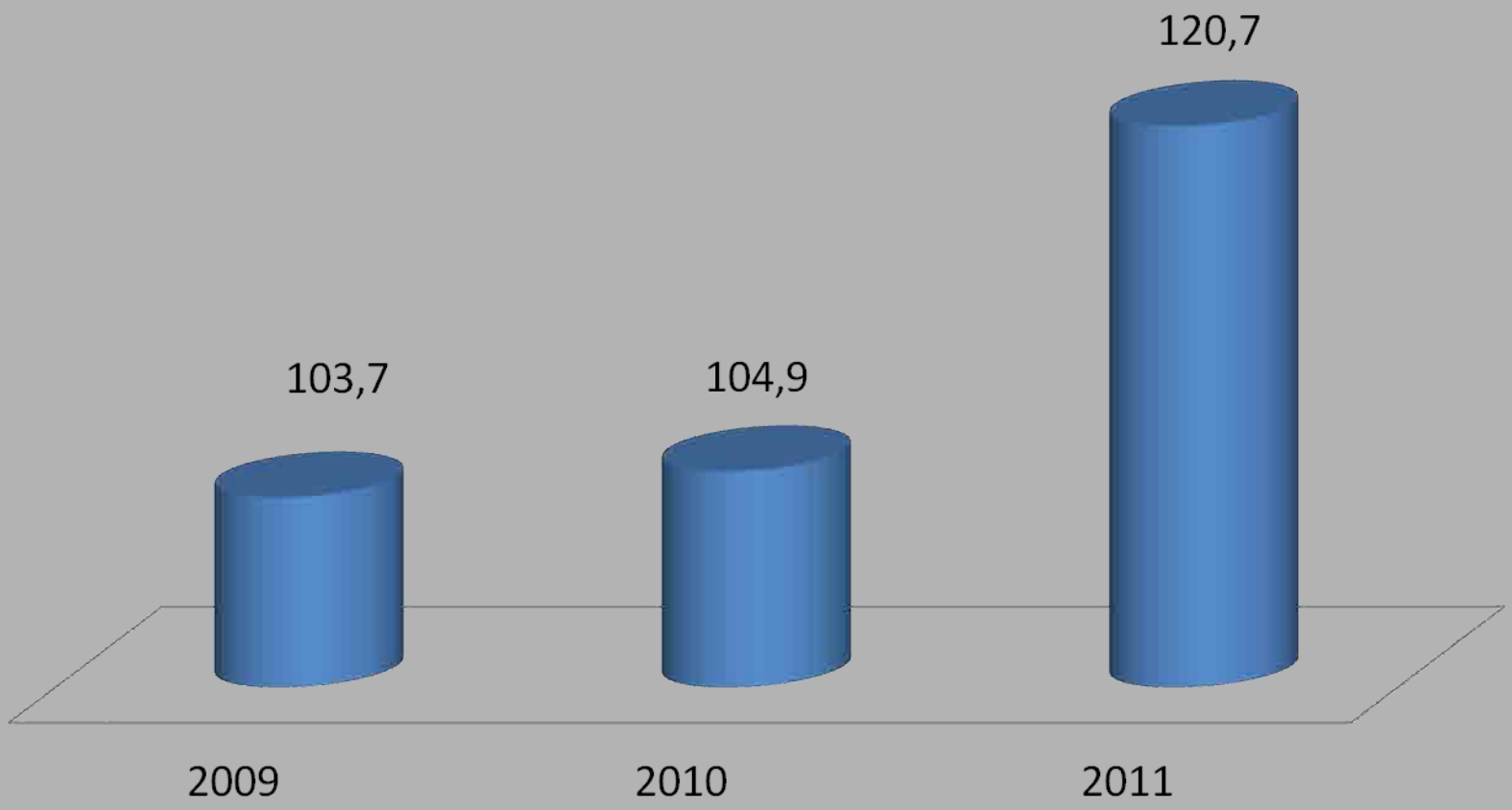
Failure:

USI has not been achieved yet.

Endre V. Nagy 2013

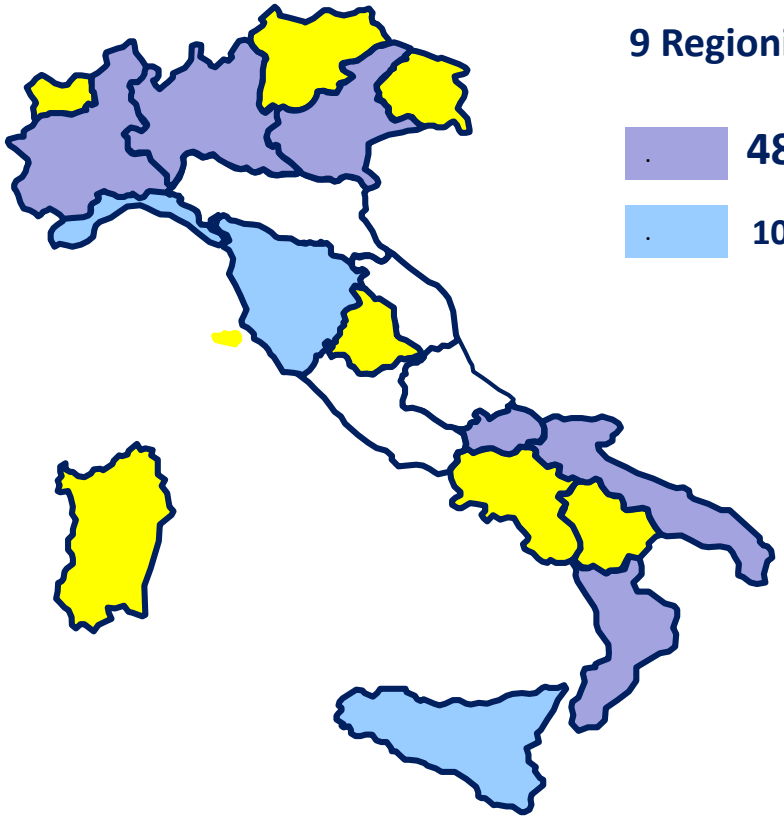
Median urinary iodine concentration (mcg/l)– pregnant women

POLAND



Population studies revealed that median UIC in pregant women has not reached the expected level

VALORI MEDIANI DI IODURIA IN BAMBINI IN ETÀ SCOLARE (2006-2012)



9 Regioni con dati di ioduria in età scolare

48-98 µg/L

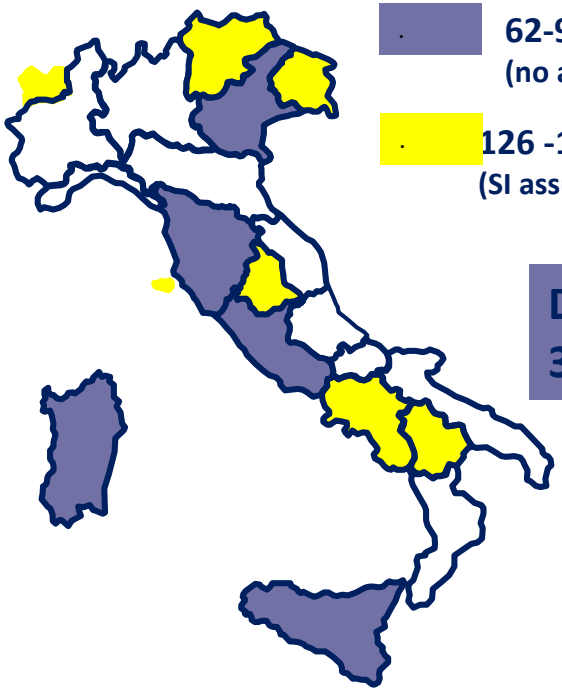
100-160 µg/L

In molti casi indagini condotte in aree limitate

Dati degli Osservatori Regionali per la Prevenzione del Gozzo

OSNAMI

VALORI MEDIANI DI IODURIA IN GRAVIDANZA (2006-2011)



62-95 μg/L
(no assunzione di integratori contenenti iodio)

126 -134 μg/L
(SI assunzione di integratori contenenti iodio)

Dati su 3300 donne

Fabbisogno di iodio in gravidanza 250 μg/die

Ioduria mediana attesa in donne in gravidanza con adeguato apporto iodico

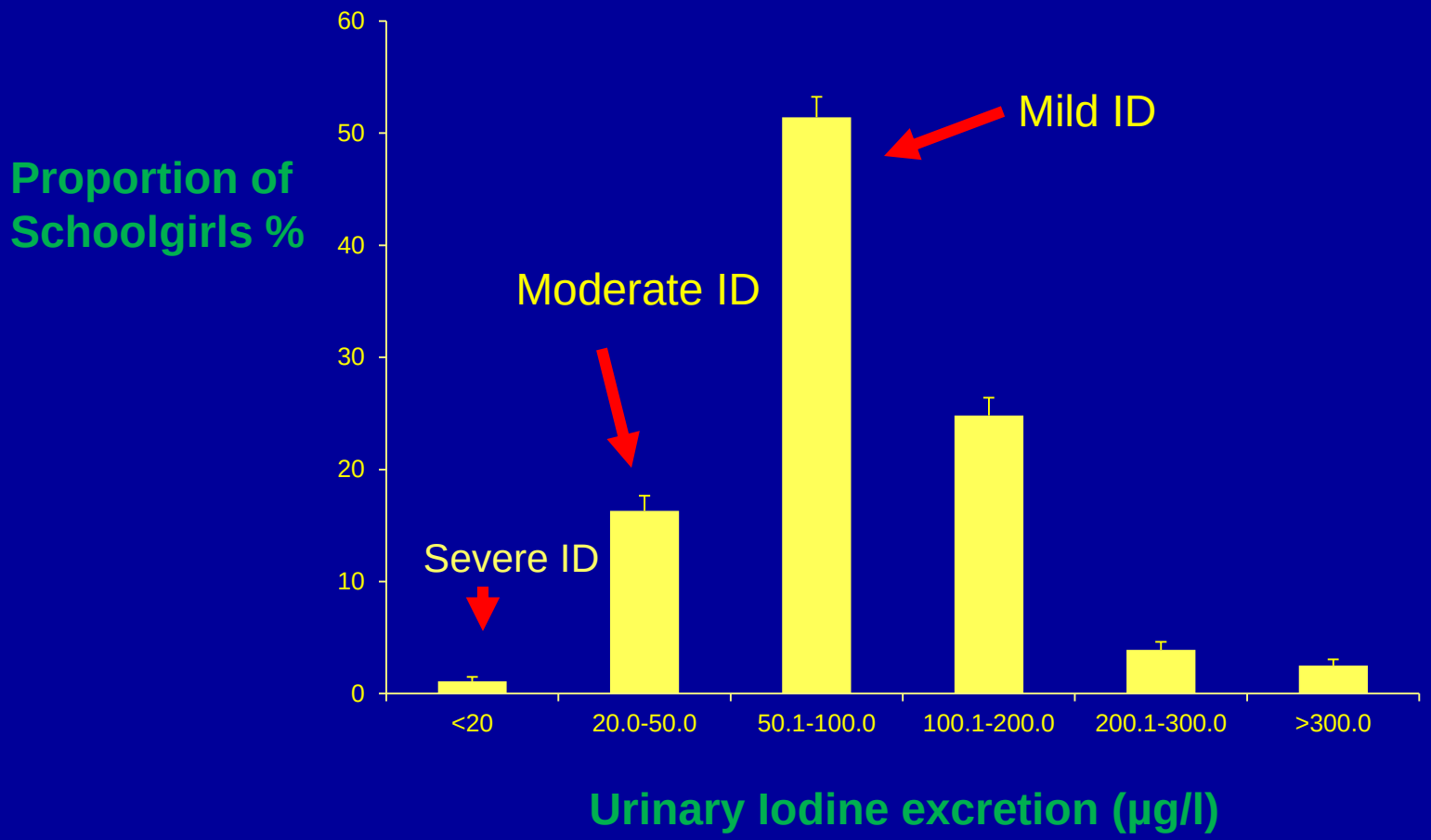
150-249 μg/L

QUANTE SONO IN ITALIA LE DONNE IN GRAVIDANZA CHE ASSUMONO INTEGRATORI CONTENENTI IODIO?

Dati degli Osservatori Regionali per la Prevenzione del Gozzo

URINARY IODINE EXCRETION in UK

2009



N=737 Median UI = 80.1µg/l (95% CI 76.7- 83.6) [IQR 1-3: 56.9-109.0]]

Vanderrpump, Lazarus et al Lancet 2011;377:2007-2012

PORTUGAL PregnantWomen

Median UI (µg/L)	**Continent** N=3261 **84.9µg/L**		**Madeira** N=196 **69.5µg/L**		**Azores** N=370 **46.2µg/L**	
UI µg/L	Nº	%	Nº	%	Nº	%
<50	774	23.7	66	33.7	206	26.3
<150	2712	**83.0**	180	**91.8**	365	**98.6**
≥150	549	**17.0**	16	**8.2**	5	**1.4**

The General Direction of Health decided to implement iodine supplementation

(150-200µg/day) in preconception, pregnancy and lactation.

The use of iodized salt is advised but no concrete measure has been undertaken.

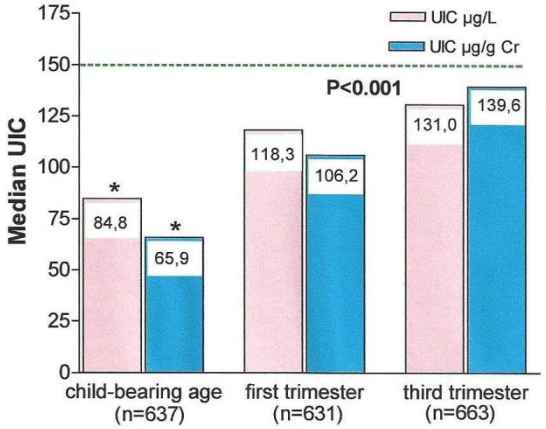
The impact of the supplementation will be evaluated in 2-3 years

Belgium

Iodine nutrition in pregnant women in 2010-2011

Neonatal TSH>5 mU/L

2010 (n=92.961)	2011 (n=81.511)
3.0%	3.3%



Vandevijvere et al PLoS One. 2012

Vandevijvere et al Br J Nutr. 2013

Iodine nutrition in pregnant women

- 87% of the pregnant women did not use iodized household salt

Use of iodine-containing multivitamins (150 µg I)

	First trimester (n=640)	Third trimester (n=666)
Use	51%	70%
Daily use	49%	66%
Start before pregnancy	13%	12%

Vandevijvere et al Br J Nutr. 2013

Conclusions

- Fortification of bread with iodized salt corrected iodine deficiency in school-aged children, but not in pregnant women.
- Although nearly 60% of pregnant women in Belgium reported taking iodine supplements the median UIC still indicated MID particularly in the first trimester of pregnancy.
- Even though pregnant women are mildly iodine deficient in Belgium, the frequency of neonatal TSH >5 mU/L was low: 3%.
- To provide these women with an adequate iodine intake:

–The use of both iodized salt in bread and iodized household salt needs to be increased.

–Iodine supplements should be started before pregnancy

Rodrigo Moreno-Reyes

Iodine deficiency in pregnant women in Austria

Pregnant women in the Vienna area: **median UIC 87 µg/l.**

Only 13.8% were in the recommended range of 150–249 µg/l, [21.5% UIC of 0–49 µg/l, 40.2% UIC 50–99 µg/l and 19.5% UIC 100–149 µg/l].

79 women on iodine supplementation vs no suppl (97.3 vs 80.1 µg/l, P = 0,006) Suppl doses of 100–150 µg per day **insufficient to normalize iodine excretion.**

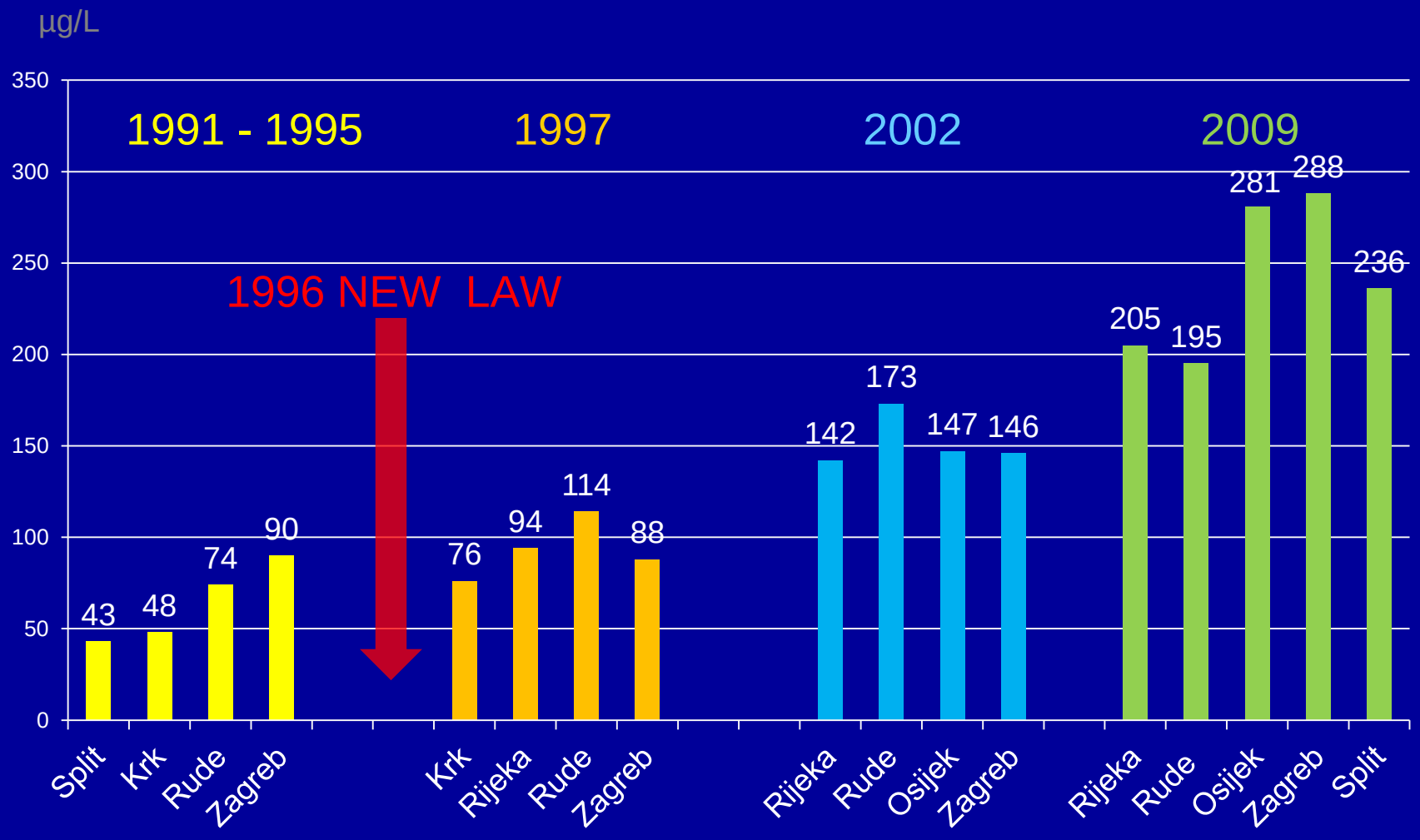
Sodium and iodine concentrations in the urine were tightly correlated (R = 0.539 n = 61), suggesting that low intake of iodized salt might contribute to insufficient iodine supply.

Pregnant women in the Vienna area have a potentially clinically significant iodine deficiency
Currently recommended doses of iodine supplementation may not be sufficient.

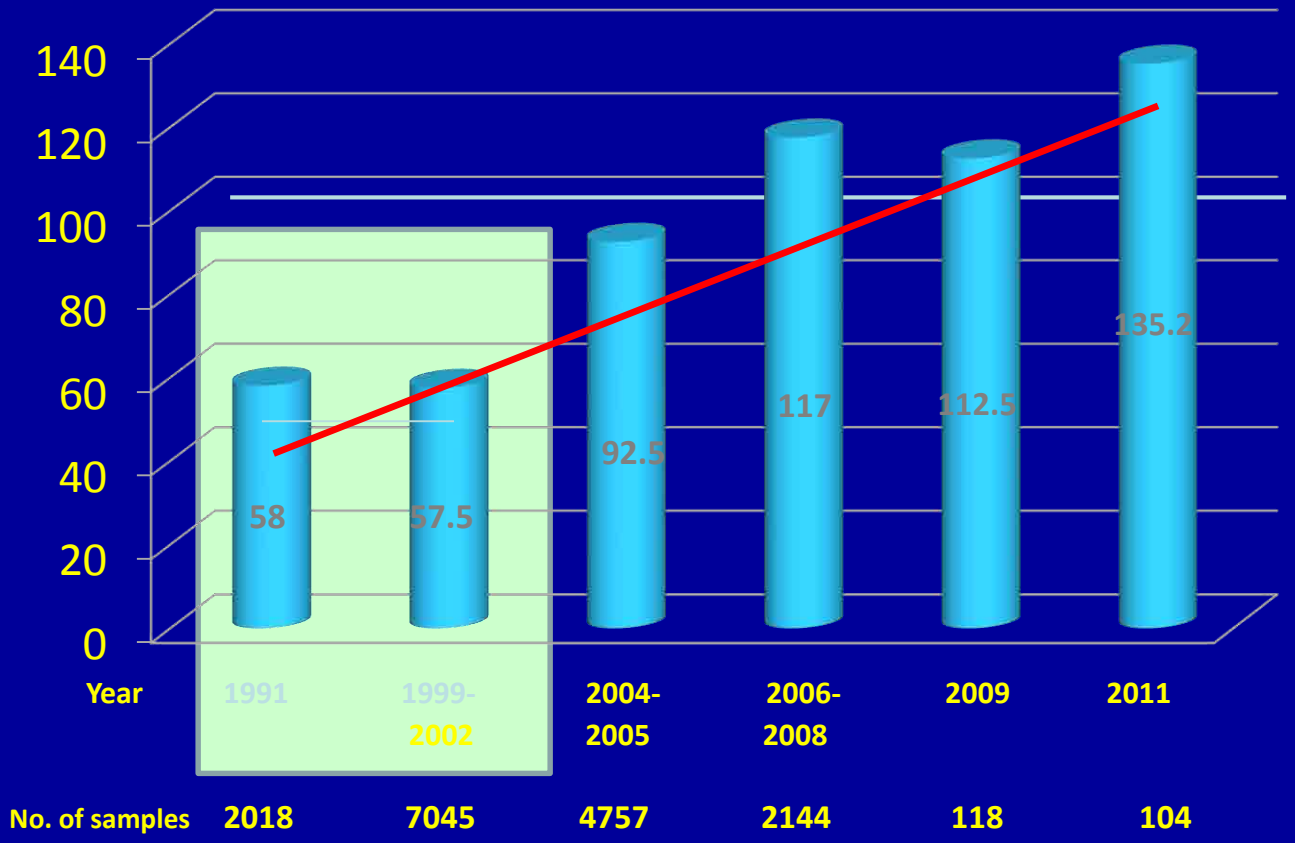
Lindorfer et al Eur J of Clin Nutr online 10 December 2014; doi:10.1038/ejcn.2014.253

CROATIA

URINARY IODINE EXCRETION BEFORE AND AFTER THE NEW REGULATION



Improving UIC after universal salt iodization 2002-2003



ROMANIA

Iodine Status in Most Populous Countries

Country	Population (app 390millions)	UI (µg/L)	UI (µg/L) Pregnant	Monitoring	Iodisation
France	65	136	81*	Y	N
Germany	80	100	**	Y	N
Italy	62	80-100	80-100	Y	Y
Spain	47	173	88***	N	Y
Turkey	75	100	222	Y	N
UK	60	80	60%<150	N	N

* Lyon Area 2012

** Berlin 20% I deficiency 2003

*** N Spain Most women I deficient 2013

South Spain Insufficient 2011

Catalonia I Sufficient 2011

Iodine Deficiency in Europe

General and Pregnancy

- Hungary
- Ireland
- Italy
- UK

n = 4

Pregnancy Only

- suboptimal iodine status in pregnant women n= 10
- Albania, Belgium, Czech Republic, France Greece, Israel, Norway, Portugal, Romania, Serbia

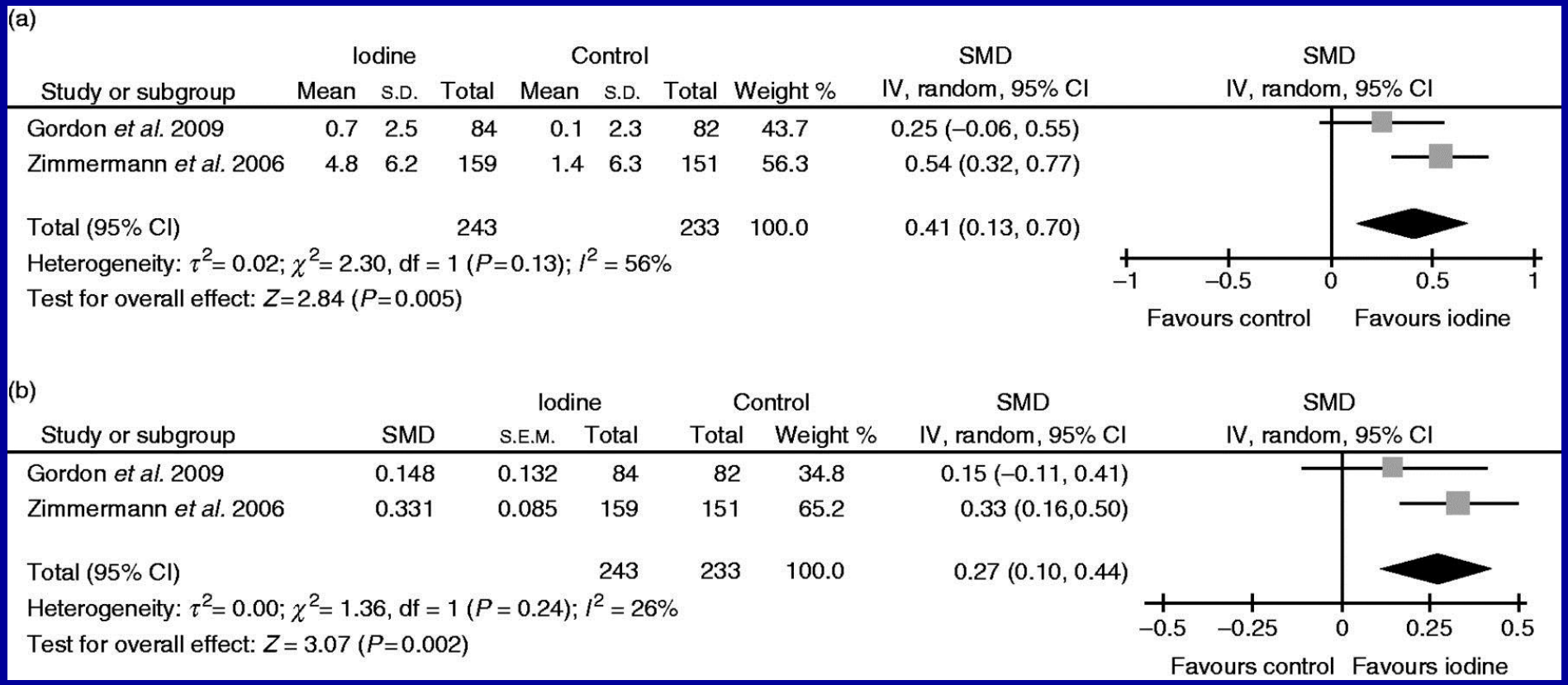
SALT in ITALY

Analysis of 288 food samples commonly consumed in Italy

'Our study suggests that the recommended quantities of salt, if iodized at 30 mg/kg, are sufficient to achieve the adequate daily iodine intake both in adults and children'.

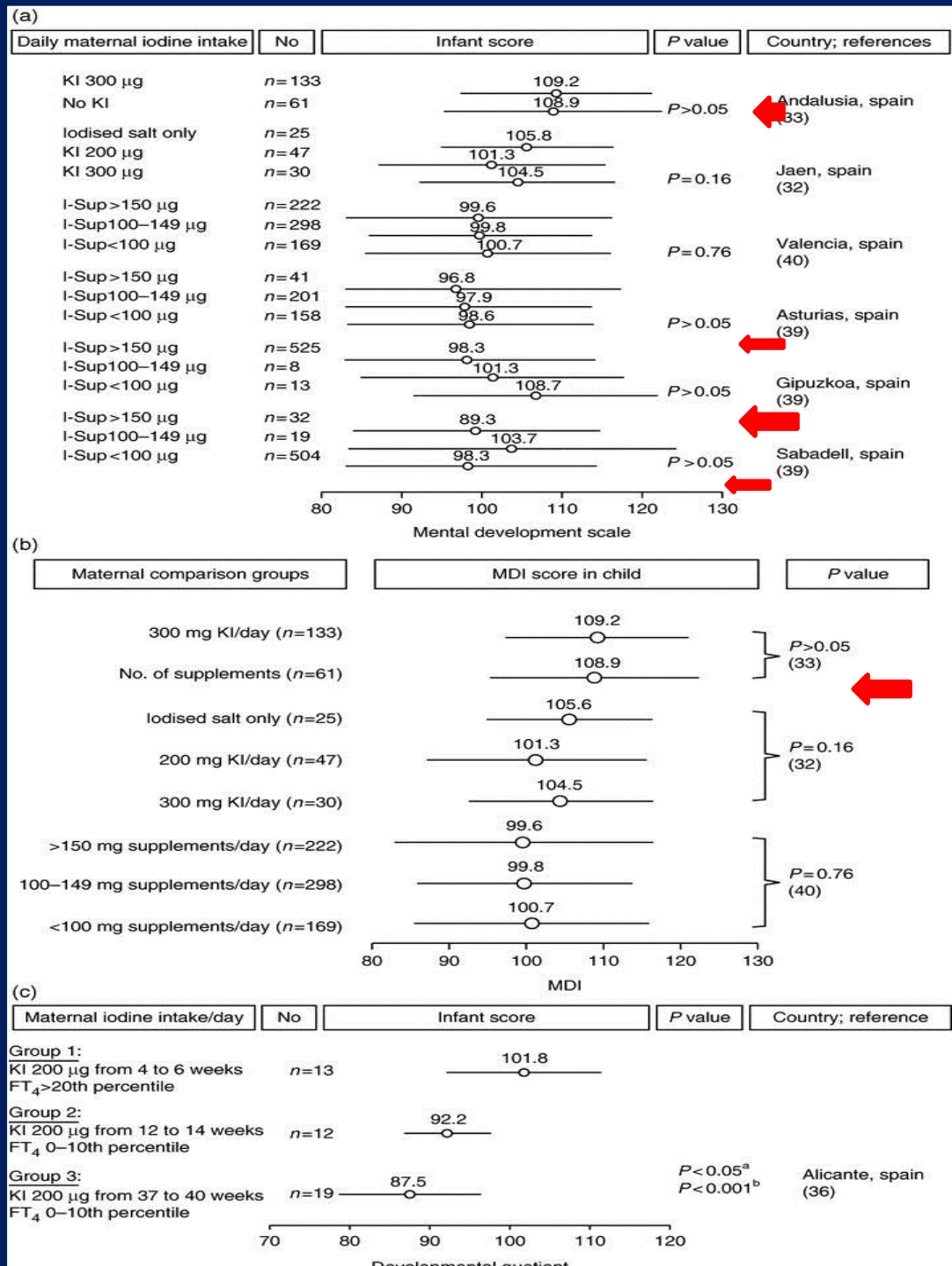
Pastorelli AA, Stacchini P, Olivieri A. **Daily iodine intake and the impact of salt reduction on iodine prophylaxis in the Italian population** Eur J Clin Nutr. 2015 Feb;69(2):211-5. doi: 10.1038/ejcn.2014.206. Epub 2014 Oct 8.

Forest plots showing effect of iodine supplementation on cognitive function (global cognitive index) in school-age children in mild-to-moderate iodine deficiency: (a) unadjusted SMD of the change from baseline.



Taylor P N et al. Eur J Endocrinol 2014;170:R1-R15

Studies investigating the effect of maternal iodine supplementation on neurodevelopmental indices in the child.



Taylor P N et al. Eur J Endocrinol 2014;170:R1-R15

European Initiatives-IGN

UK: UK Iodine Group

Activities: Advocacy, meetings, publications, research

Active research in several countries eg Belgium, Switzerland, Norway, Turkey etc

EU: Commission research call- Evaluating existing screening and prevention programmes. EUthyroid programme grant application in progress. **SUCCESS!!**

Horizon 2020 3yr grant EUthyroid

EU: Plan for iodine meeting with EU 2017

ETA: ICCIDD Satellite meeting

EUthyroid Work Packages

WP No

1 Outcome research and registry data

2 Harmonisation of national thyroid and IDD monitoring studies

3 Thyroglobulin

4 Maternal iodine status during pregnancy and neuropsychological development of the offspring

5 Health economy, health technology assessment and health policy

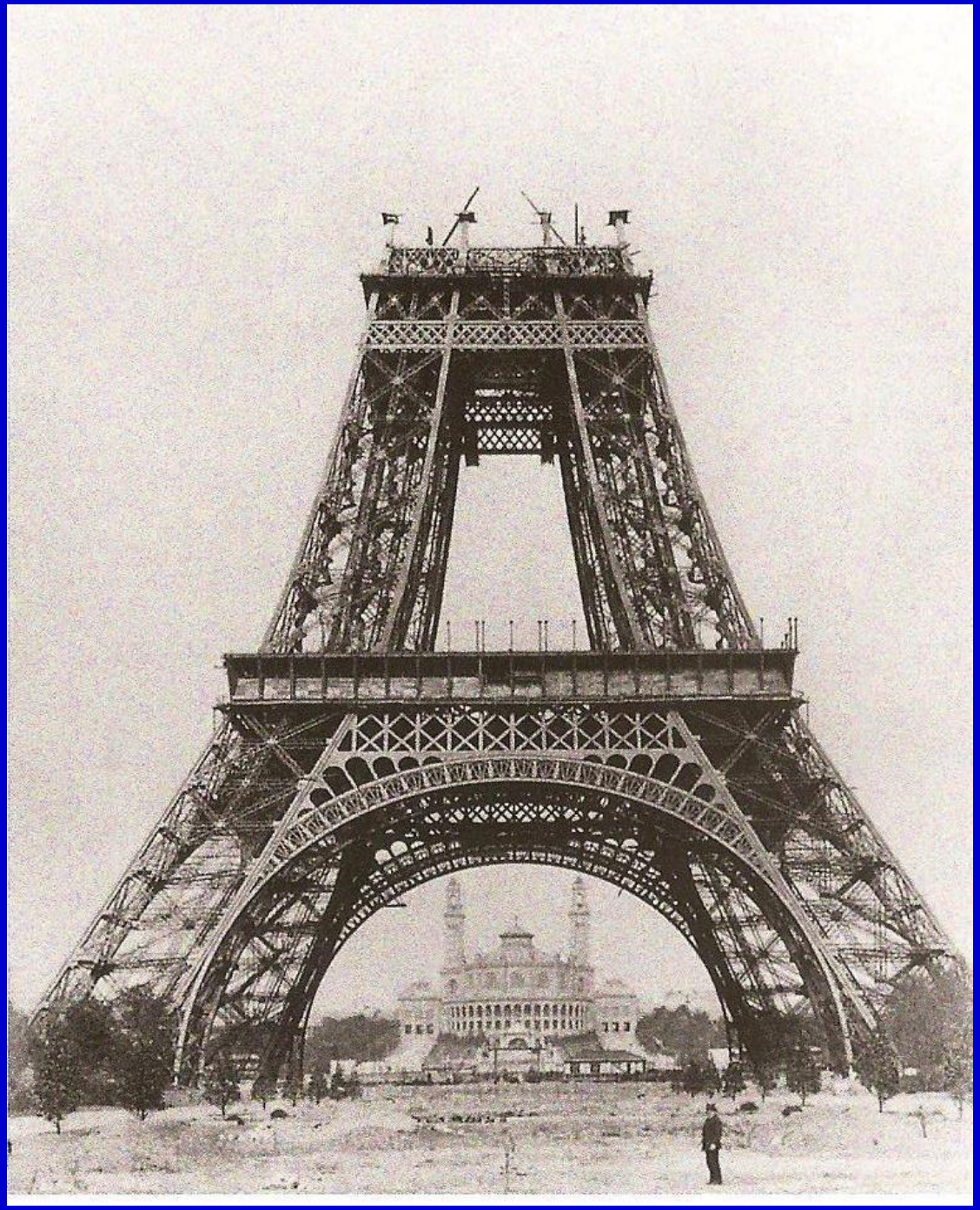
6 Dissemination

7 Management

Summary

- Discrepancies between schoolchildren and pregnant women
- Re-emerging I deficiency in industrialised countries
- Iodised salt and food industry
- Necessity to lower salt consumption

- I status is some countries is satisfactory
- Many countries have inadequate Iodine status in pregnancy
- About 400m population from 20 countries still have no/ limited access to iodised salt



Acknowledgements

National Coordinators IGN