



Micronutrients deficiency -2

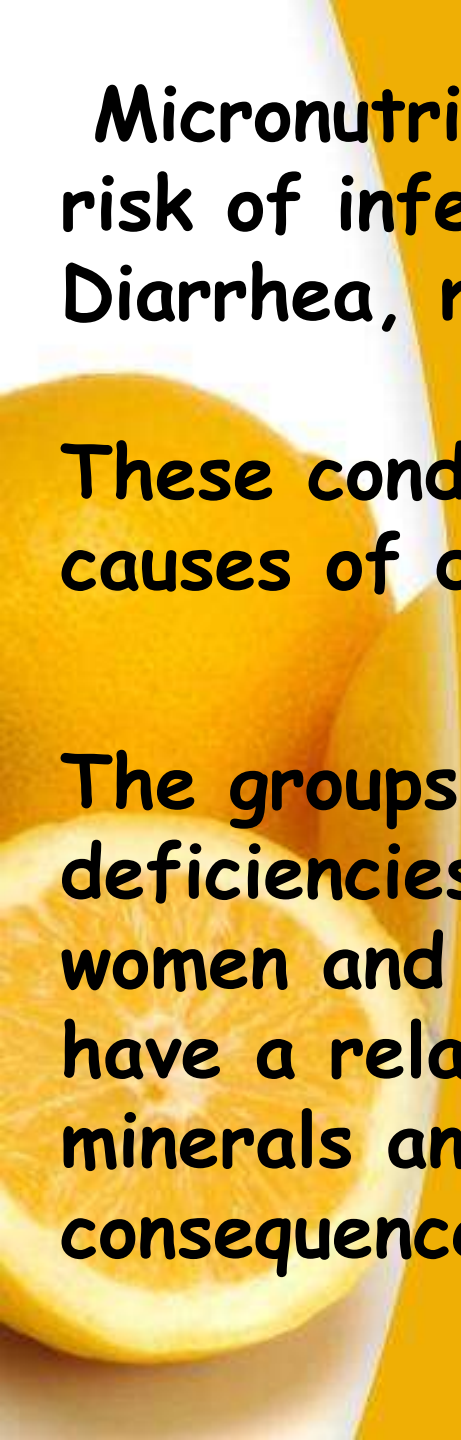
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Micronutrient deficiency

Deficiencies of micronutrients are a major global health problem.

Deficiencies in micronutrients such as iron, iodine, vitamin A, folate and zinc


At least half of children worldwide ages 6 months to 5 years suffer from one or more micronutrient deficiency, and globally more than 2 billion people are affected



Micronutrient deficiencies increase the general risk of infectious illness and of dying from Diarrhea, measles, malaria and pneumonia.

These conditions are among the 10 leading causes of disease in the world

The groups most vulnerable to micronutrient deficiencies are pregnant women, lactating women and young children, mainly because they have a relatively greater need for vitamins and minerals and are more susceptible to the harmful consequences of deficiencies.

A photograph of several whole oranges and one sliced orange on a white plate, positioned on the left side of the slide. The background is a solid yellow color.

Iodine Deficiency

Iodine Deficiency Disorders (IDD)

- Required to produce thyroid hormones that control cell metabolism,
- neuromuscular tissue growth and development, especially the fetal-perinatal brain
- Present in minute amounts (15-20 mg)
- in the body
- >90% of iodine stored in the thyroid

Iodine Deficiency Disorders refer to all of the ill-effects of iodine deficiency in a population that can be prevented by ensuring that the population has an adequate intake of iodine.



As many as 50 million infants born annually are at risk of iodine deficiency.



The effects of Iodine Deficiency Disorders:

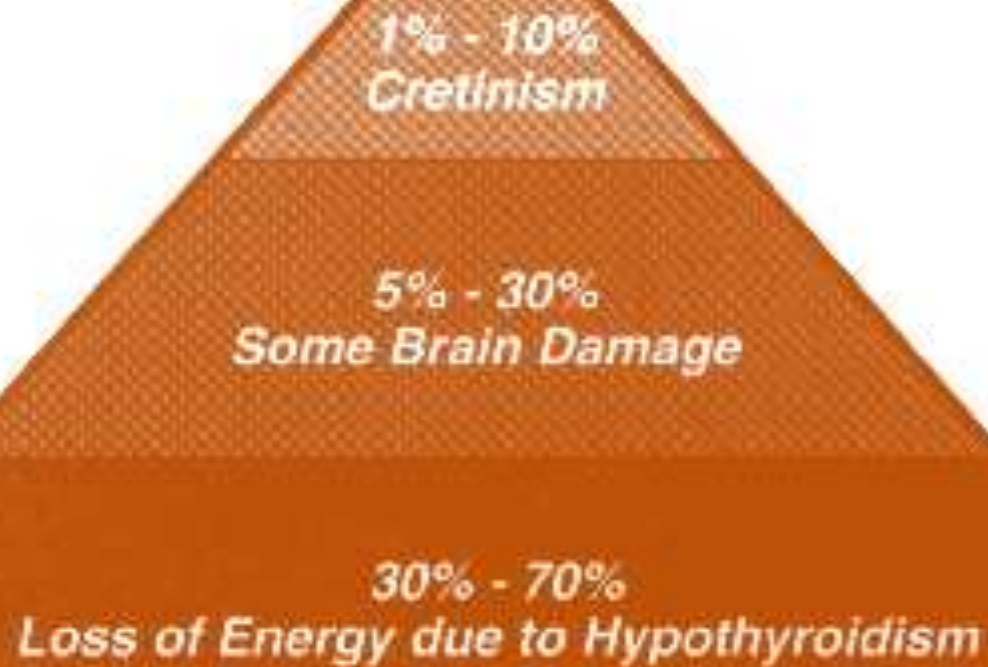
On Individuals: goiter, hypothyroidism, loss of energy. decreased fertility rate

In Pregnant Mothers: miscarriages, stillbirths and mentally retarded children.

In Children: impaired mental and physical development, mental retardation, physical deformities and cretinism. increased infant mortality

On Society: lower productivity and higher demand on social services.

Importance of the problem



The spectrum of iodine deficiency disorders, IDD

Table 1. The Spectrum of Iodine Deficiency Disorders, IDD.

Fetus Abortions	Stillbirths Congenital anomalies Increased perinatal mortality Endemic cretinism
Neonate Neonatal goiter	Neonatal hypothyroidism Endemic mental retardation Increased susceptibility of the thyroid gland to nuclear radiation
Child and Goiter	adolescent (Subclinical) hypothyroidism Impaired mental function Retarded physical development Increased susceptibility of the thyroid gland to nuclear radiation
Adult Goiter with its complications	Hypothyroidism Impaired mental function Spontaneous hyperthyroidism in the elderly Iodine-induced hyperthyroidism Increased susceptibility of the thyroid gland to nuclear radiation

Adapted from Hetzel (1), Laurberg et al. (52, 171) and Stanbury et al. (158).

Prevalence

- 1 billion persons exposed
- 200 million persons affected (goitres)
- 26 million cases of mental problems
- 6 million cases of cretinism

في العراق نقص اليود أعتبر من المشاكل الصحية العامة الهامة في ثلاث محافظات, البصرة 24.7%, بغداد 24.6%
64.7% نينوى
من النساء يعانين من نقص معتدل في اليود

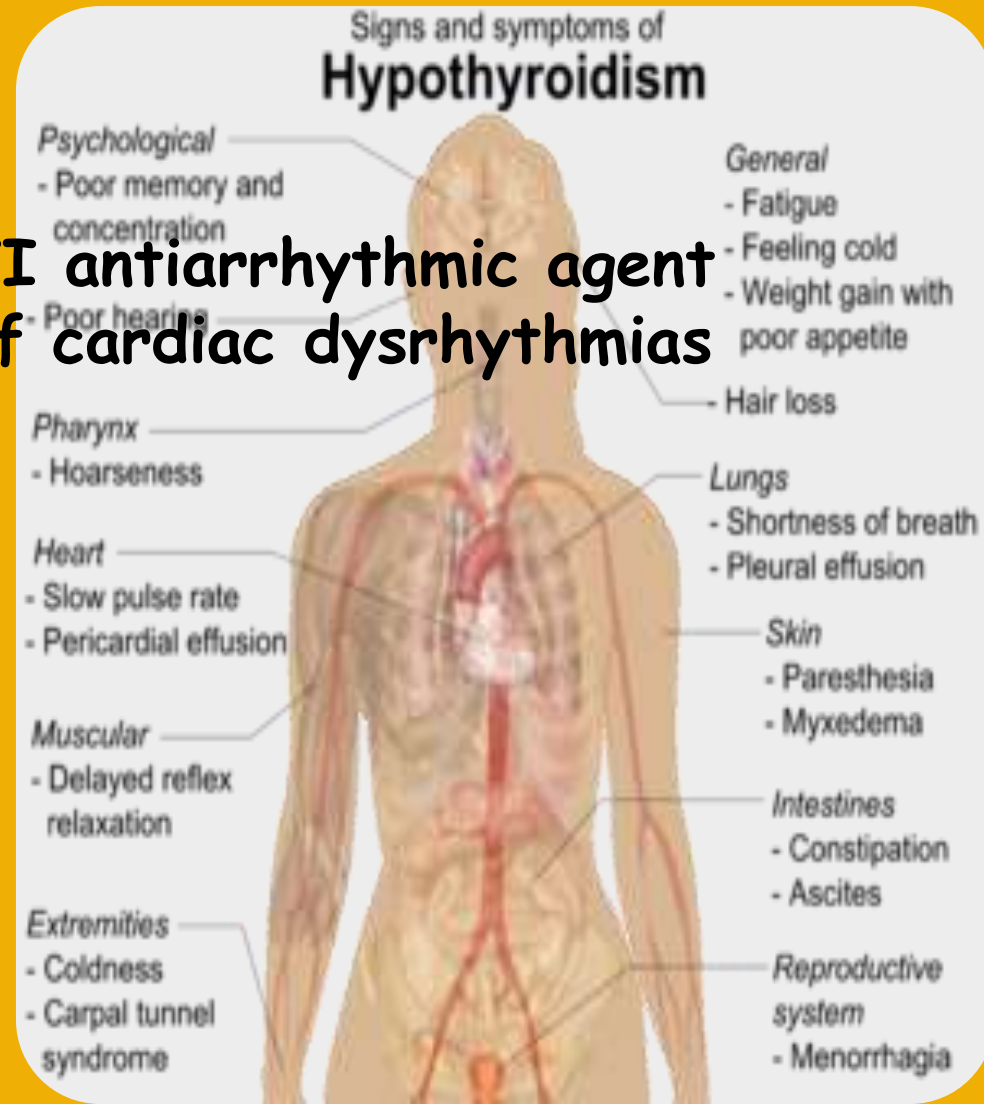
Aethiology

- Low iodine uptake. Soil dependent
 - erosion, wash away: deltas
- Goitrogens
 - Blocks uptake of Iodine at the thyroid, competitive inhibition
 - Goitrogenic foods : soybean, peanut, strawberry, pear, peach, Spinach, Broccoli, Cabbage, Cauliflower, radish.


Goitrogenic drugs and chemicals

Chemicals that have been shown to have goitrogenic effects include:

- Sulfadimethoxine
- Thiocyanate
- Amiodarone is a class III antiarrhythmic agent used for various types of cardiac dysrhythmias
- phenobarbitone



Iodine Status Assessment

- 
- ▶ Goiter classification
 - Urinary iodine concentration
 - TSH (thyroid stimulating hormone) concentration
 - Other common clinical measures:
 - Ultrasonography of thyroid volume
 - Serum concentrations: thyroxin, TBG, many other analyses

Simplified Goiter Classification

Grade

Thyroid Size

0

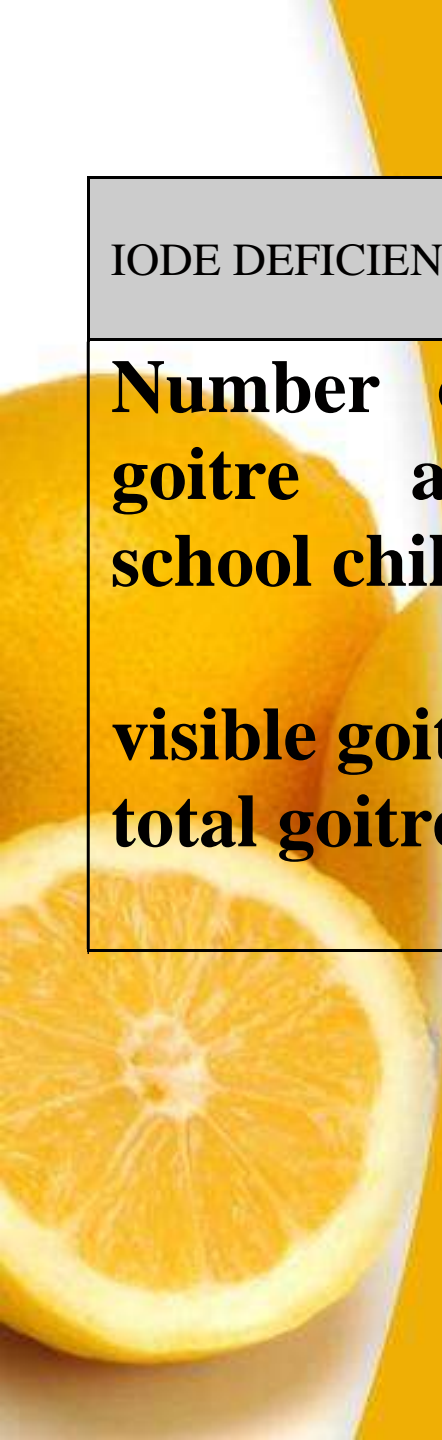
Not palpable / not visible

1

Palpable in normal position

2

Visible in normal position



IODE DEFICIENCY	SEVERE	MODERATE	MILD
<p>Number of cases of goitre among the school children (6-12)</p> <p>visible goitre</p> <p>total goitre</p>	<p>> 50 %</p> <p>> 10 %</p>	<p>20-49 %</p> <p>5-9 %</p>	<p>10-19 %</p> <p>1-5 %</p>

Indicators of iodine status at population level (WHO/UNICEF/ICCIDD, 2007)

Indicator(units)

Age Group

1-Median urinary iodine concentration($\mu\text{g} /\text{L}$)

School-age children,
adults and pregnant women

2-Goiter rate by palpation (%)
School-age children

Degree of IDD by goiter rate :

0-4.9% - None

5-19.9% - Mild

20-29.9% - Moderate

$\geq 30\%$ - Severe

3-Goiter rate by ultrasound (%)

School-age children

4-Thyroid stimulating hormone(mIU/L) Newborns

A <3% frequency of TSH values >5 mIU /L indicates iodine sufficiency in a population

5-Serum or whole blood thyroglobulin($\mu\text{g}/\text{L}$)
School-age children and adults

Reference interval in iodine-sufficient children is 4-40 $\mu\text{g}/\text{L}$

Urinary Iodine

- Reflects directly intake
- Is best to follow up programme response, goitre takes time to decrease in size
- Samples needed are smaller
- Technique is simple and not expensive
- Samples can be taken easily, cheap, acceptable and don't need conservation techniques

IDD: As a Public Health Problem

Indicator

Mod/Severe Cut-off (% of population)

Goiter grade > 0	> 20%
Median urinary iodine	< 50 $\mu\text{g/L}$
TSH > 5 m U/L blood (best in newborns)	> 20%
Thyroid volume > 97% ile	> 20%

Best IDD Indicators by Target Group

Goiter grade >0

school children

Cretinism

children / adults

Median UI ($\mu\text{g/L}$)

school children

TSH >5 mU/L blood

Neonates

Thyroid volume >97% ile

school children

Thyroglobulin (DBS)

children

RDA for Iodine

Normal dietary iodine intake is 100-150 mcg/day.

The US Institute of Medicine's (IOM's) recommended dietary allowance (RDA) of iodine is as follows:

Adults and adolescents - 150 mcg/day

Pregnant women - 220 mcg/day

Lactating women - 290 mcg/day

Children aged 1-11 years - 90-120 mcg/day

Infants - Adequate intake is 110-130 mcg/day

WHO's recommendations are similar, although the organization recommends 200 mcg/day for pregnant or lactating women and 50-90 mcg/day for infants younger than 1 year



Iodine Interventions

Universal Iodization of Salt
Iodization of other "Vehicles"
Iodized Oil Supplementation



Iodized salt

- Universally and regularly consumed
- Costs ~\$0.04/yr/person
- Simple technology

Iodized oil

- Effective in high risk groups
- Administered every 6 to 12 months

Target Group:

Women during pregnancy and 1st year post-partum; Children

When/Where:

- **IDD moderate-severe**
- **Cretinism/neonatal hypothyroidism**
- **No universal salt iodization for 1-2 yr**



Salt has been chosen for the following reasons :

1- salt is consumed by every one.

2-salt iodization is easy to implement.

3- salt iodization can be implement at a reasonable cost.

4-colour, taste, and odour of salt are not affected by iodization.

5-salt quality can be easily monitored at production , marketing, and household level.


Note :Iodized salt should be consumed within six months of purchase.



iodization of salt may not be a practical option for the sustainable elimination of IDD, at least in the short term.

other options for correction of IDD may have to be considered, such as:

- ✓ administration of iodized oil capsules every 6-18 months
- ✓ direct administration of iodine solutions, such as Lugol's iodine, at regular intervals (once a month is sufficient)
- ✓ iodization of water supplies by direct addition of iodine solution or via a special delivery mechanism.




An iodized oil supplementation program is necessary when other methods have been found ineffective or are inapplicable). Iodized oil can be regarded as an emergency measure for the control of severe IDD until an effective iodized salt program can be introduced.

IODIZED BREAD??

The sustainable elimination of IDD requires that:


- median urinary iodine levels in the target population are at least 100 $\mu\text{g}/\text{l}$ and no more than 20% of values are below 50 $\mu\text{g}/\text{l}$
- at least 90% of households are using salt with an iodine content of 15 parts per million (ppm) or more



In Iraq the iodine content in consumable salt was tested in 99.7% of MICS-4 households.

The results showed that 28% of households consume salt that contains 15 Parts Per Million (PPM) of iodine or more.

In urban areas iodine fortification was 32% in comparison with 20% in rural areas. Meanwhile, 46% of households in the sample consume non-fortified salt and 27% of households consume salt that contains less than 15 PPM.

A bowl of oranges and orange slices is visible on the left side of the slide, partially overlapping the text.

Interventions to prevent malnutrition include micronutrient supplementation, fortification of basic grocery foods, dietary modification, hygienic measures to reduce spread of infections, and promotion of breastfeeding.

Dietary modification aims to increase the consumption of vital micronutrients in the regular diet.

This is done by education and promotion of a different diet, and by improving access to micronutrient-rich and locally produced food.