Non-Communicable Diseases Watch

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衞生防護中心 Centre for Health Protection

衞生署 Department of Health

Impact of Iodine Deficiency on Health

Key Messages

※ Iodine is an essential micronutrient required for normal thyroid function, growth and development. Persistent low iodine intake will result in iodine deficiency and associated disorders. Children, pregnant and lactating women are particularly vulnerable to iodine deficiency disorders.

※ To assess the iodine status of local school-aged children, pregnant women and lactating women in Hong Kong, the Department of Health (DH) commissioned the Chinese University of Hong Kong to conduct the Iodine Survey in 2019. Based on the survey result, the iodine status of school-aged children was classified as "adequate". For pregnant women taking iodine supplements at an average daily intake of equal to or above 150 micrograms (µg), the iodine status was also classified as "adequate". However, the iodine status of pregnant women taking iodine supplements at an average intake of less than 150 µg per day and those without supplemented iodine as well as lactating women were classified as "insufficient".

※ The Working Group on Prevention of Iodine Deficiency Disorders set up by DH and the Centre for Food Safety of the Food and Environmental Hygiene Department recommends pregnant and lactating women to take an iodine-containing supplement daily, consume a variety of iodine-rich foods (such as seaweed, kelp, seafood, marine fish, eggs, milk and dairy products), and use appropriate amount of iodised salt.

※ DH will continue to enhance public awareness about the importance of healthy eating against iodine deficiency and work in close partnership with community partners to prevent iodine deficiency among vulnerable groups.

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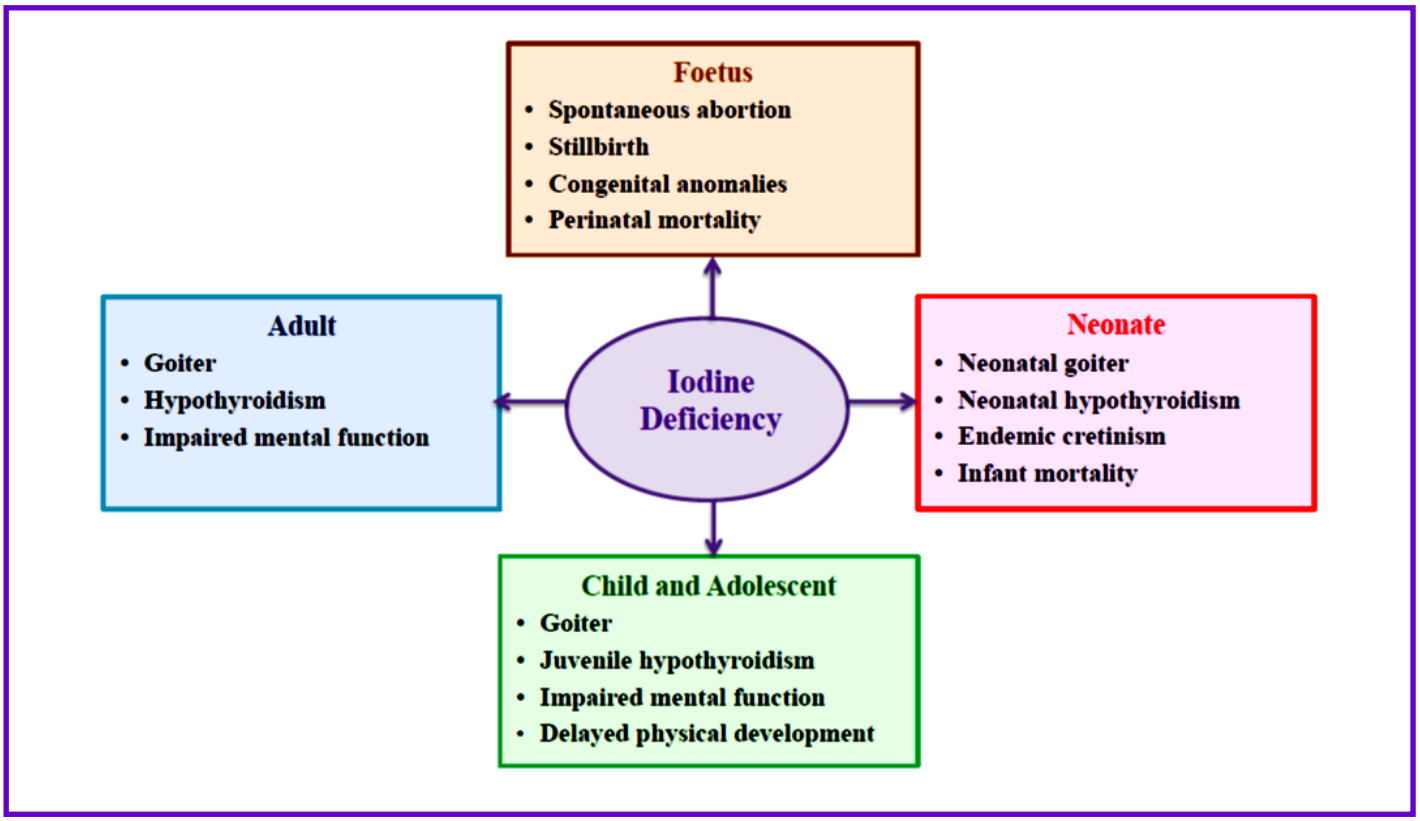
Impact of Iodine Deficiency on Health

Iodine is an essential micronutrient required for normal thyroid function, growth and development. Persistent low iodine intake will result in iodine deficiency and associated disorders. While iodine deficiency affects the health of people at all stages of life (Figure 1), the most critical period is from the second trimester of pregnancy to the third year after birth[1, 2]. Severe iodine deficiency occurring during foetal growth and neonatal development can cause irreversible brain damage and cretinism (characterised by gross mental retardation along with varying degrees of deaf mutism, spasticity, motor dysfunction and short stature).

In fact, iodine deficiency is the world's most common cause of preventable mental impairment[1, 2]. Even mild iodine deficiency during pregnancy can have long-term adverse impacts on fetal neurocognition[3, 4]. Compared to children of mothers with adequate iodine status, those of women with inadequate iodine status would be more likely to have lower intelligence and educational assessment scores[3, 5].

Figure 1: Health consequences of iodine deficiency by life stages[1, 2]



Recommended Nutrient Intake of Iodine

Depending on age and physiological status, the recommended nutrient intake for iodine ranges from 90 micrograms per day (µg/d) for preschool children 0 to 59 months to 150 µg/d for adults. During pregnancy and lactating, women's iodine requirements increase substantially to 250 µg/d to ensure adequate supply to the foetus and transfer of iodine to breastmilk (Table 1)[1, 6].

Global and Local Situation

Although substantial progress has been made towards the elimination of iodine deficiency worldwide over the past three decades, iodine deficiency is still a significant public health problem[7]. In 2019, the Global Burden of Disease Study estimated that there were about 177 million prevalent cases (115 million for females; 62.6 million for males) of iodine deficiency and 8.11 million incident cases (5.13 million for females; 2.98 million for males) globally[8].

To assess the iodine status of the three vulnerable groups, namely school-aged children, pregnant women and lactating women in Hong Kong, the Department of Health (DH) commissioned the Chinese University of Hong Kong to conduct the Iodine Survey in 2019. The Survey successfully recruited 1 023 school-aged children aged 6 to 12 years, 1 513 pregnant women and 482 lactating women from different regions of Hong Kong. While face-to-face questionnaire interviews (such as for information about participants' consumption patterns of specified iodine-rich food and iodised salt, and use of iodine-containing supplements) and spot urine iodine tests were conducted for all participants, thyroid ultrasonography for measurement of thyroid size were also performed for school-aged children[9].

Table 1: Recommended nutrient intake for iodine by age or population

Age / Population Group	Recommended Intake of iodine (µg/day)
Preschool children (0 to 59 months)	90
Children (6 to 12 years)	120
Adolescents (above 12 years) and Adults	150
Pregnant and lactating women	250

Source: World Health Organization.

School-aged Children

Among the 1 023 school-aged children aged 6–12 with valid urine samples, the median urine iodine concentration was 115 micrograms per liter (µg/L). The value was classified as "adequate" iodine intake (Table 2) according to the cut-off points (i.e. 100–199 µg/L[10]) as recommended in the World Health Organization (WHO)'s Guide. In addition, the total goitre rate assessed with body surface area-specific reference value and aged-specific reference value were 1.7% and 2.2% respectively. Both values were within the category of "none" degree for iodine deficient disorder (i.e. 0.0–4.9%[11]) according to the WHO's Guide. Thus, the iodine status of local school-aged children was classified as "adequate"[9].

Table 2: Median urine iodine concentration and iodine status of school-aged children by age group and gender

		Median urine iodine concentration (µg/L)	Iodine status
Aged 6–9	**Male**	116	Adequate
	Female	106	Adequate
	Subtotal	110	Adequate
Aged 10–12	**Male**	128	Adequate
	Female	112	Adequate
	Subtotal	120	Adequate

Source: Iodine Survey Report, 2021.

Pregnant Women

The median urine iodine concentration among the 1 509 pregnant women with valid urine samples was 134 µg/L, which was classified as "insufficient" iodine intake according to the cut-off points (i.e. below 150 µg/L[10]) as recommended in the WHO's Guide. However, there were significant differences in the median urine iodine concentrations among pregnant women with or without iodine-containing supplementation. As shown in Table 3, iodine status of pregnant women taking iodine supplements at an average daily intake of equal to or above 150 µg/d was classified as "adequate" with the median urine iodine concentration of 156 µg/L[9].

Table 3: Median urine iodine concentration and iodine status of pregnant women by usage patterns of iodine-containing supplements (excluding formula milk) over the two weeks before interview

	Median urine iodine concentration (µg/L)	Iodine status
With iodine supplementation at an average daily intake of equal to or above 150 µg/d	156	Adequate
With iodine supplementation at an average daily intake of less than 150 µg/d	132	Insufficient
Did not consume any supplement or consumed supplement without iodine	97	Insufficient

Source: Iodine Survey Report, 2021.

Lactating Mothers

Among the 479 lactating mothers with valid urine samples, the median urine iodine concentration was 65 µg/L, which was classified as "insufficient" iodine intake according to the cut-off points (i.e. below 100 µg/L[10]) according to the WHO's Guide.

Although a higher median iodine concentration was observed among lactating mothers who took iodine supplements at an average daily intake of equal to or above 150 µg/d, their iodine status were still classified as "in-sufficient' (Table 4)[9].

Table 4: Median urine iodine concentration and iodine status of lactating mothers by usage pattern of iodine-containing supplements (excluding formula milk) over the two weeks before interview

	Median urine iodine concentration (µg/L)	Iodine status
With iodine supplementation at an average daily intake of equal to or above 150 µg/d	84	Insufficient
With iodine supplementation at an average daily intake of less than 150 µg/d	71	Insufficient
Did not consume any supplement or consumed supplement without iodine	58	Insufficient

Source: Iodine Survey Report, 2021.

Prevention of Iodine Deficiency

In Hong Kong, a Working Group on Prevention of Iodine Deficiency Disorders (Working Group) was set up by DH and the Centre for Food Safety of the Food and Environmental Hygiene Department, with representatives from the Hospital Authority, the Hong Kong College of Community Medicine, the Hong Kong College of Family Physicians, the Hong Kong College of Obstetricians and Gynaecologists, the Hong Kong College of Paediatrics and the Hong Kong College of Physicians to review the local and overseas situation and scientific evidence, and to make recommendations for the local situation on the prevention of iodine deficiency disorders. From children's nutrition and health perspective, the Working Group makes the following recommendations on iodine intake for pregnant and lactating women so as to meet their daily requirement of 250 µg iodine:

- **Take an iodine-containing supplement daily**
  - Pregnant and lactating women are recommended to take iodine-containing supplements regularly and they should check the iodine content of the supplement to make sure that they have at least 150 µg iodine each day. They should seek advice from healthcare professionals if they have doubt.
  - Women with existing medical conditions or thyroid problems should consult healthcare professionals and take supplements as advised by them.
- **Consume a variety of iodine-rich foods**
  - Consume food with more iodine as part of a healthy balanced diet. Seaweed, kelp, seafood, marine fish, eggs, milk and dairy products are food with more iodine.
  - In the event that iodine supplements cannot be taken, pregnancy and lactating women may increase iodine intake from diet in order to meet the daily requirement of 250 µg iodine.
- **Use iodised salt**
  - Use iodised salt instead of ordinary table salt.
  - Pay attention to keep the overall salt intake to less than 5 grams (less than 1 teaspoon) per day.
  - As iodine content in iodised salt may be affected by humidity, heat and sunlight, iodised salt should be stored in a tight and coloured container and keep in a cool and dry place. It should be added to food just before serving.

For more information about healthy eating and nutrition, including iodine intake, during pregnancy and breastfeeding, please visit website of the Family Health Service of DH at www.fhs.gov.hk/english/health_info/class_topic/ct_woman_health/wh_nutrition.html. DH will continue to enhance public awareness about the importance of healthy eating against iodine deficiency and work in close partnership with community partners to prevent iodine deficiency among vulnerable groups.

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Non-Communicable Diseases (NCD) WATCH is dedicated to promote public's awareness of and disseminate health information about non-communicable diseases and related issues, and the importance of their prevention and control. It is also an indication of our commitments in responsive risk communication and to address the growing non-communicable disease threats to the health of our community. The Editorial Board welcomes your views and comments. Please send all comments and/or questions to so_dp3@dh.gov.hk.