

## Preventing Type 2 Diabetes by Lifestyle Changes

### Key Messages

- ※ Diabetes mellitus (or simply called diabetes) is a significant public health issue. While type 2 diabetes is the most common form, its development is strongly associated with an unhealthy living as well as obesity.
- ※ In Hong Kong, the Population Health Survey 2020/22 revealed that 8.5% of persons aged 15–84 had diabetes or raised blood glucose.
- ※ To reduce the risk of developing type 2 diabetes, members of the public are encouraged to live in healthy ways and make appropriate lifestyle changes that include eating a balanced diet, being physically active, refrain from alcohol drinking and no smoking. Individuals should also keep a healthy body weight and waist circumference.
- ※ Type 2 diabetes is often asymptomatic in early stages. People can be living with the disease for years and not know it. Local adults aged 45 or above are encouraged to screen for type 2 diabetes. Members of the public are encouraged to consult their family doctors if they have any questions about diabetes or relevant screening recommendations.

## Preventing Type 2 Diabetes by Lifestyle Changes

Diabetes mellitus (or simply called diabetes) is a chronic metabolic disease characterised by elevated levels of blood glucose. Type 2 diabetes is the most common form, accounting for over 95% of diabetes worldwide<sup>1</sup>. Usually occurring in adults, type 2 diabetes results from the body's ineffective use of insulin (a hormone that regulates blood glucose). Over time, the disease can cause damages to many of the body's organ systems and lead to serious complications including heart disease, stroke and kidney failure. A large international study showed that every decade of earlier diagnosis of type 2 diabetes was associated with 3–4 years of reduced life expectancy. Using death rates from the USA, among 50-year-olds, the life expectancy of those diagnosed with type 2 diabetes at age 30 was 14 years shorter than that of their peers without diabetes; among those diagnosed at age 50, life expectancy was 6 years shorter<sup>2</sup>. Since type 2 diabetes is largely preventable, this article addresses the major modifiable risk factors associated with type 2 diabetes. It also presents the prevalence of diabetes and relevant risk factors among the local population, urging members of the public to maintain vigilance against diabetes and make appropriate lifestyle changes for preventing or delaying the onset of type 2 diabetes.

### Major Modifiable Risk Factors of Type 2 Diabetes

Many factors can contribute to the development of type 2 diabetes<sup>3</sup>. While some of them are non-modifiable (such as advancing age and family history of diabetes), most behavioural and biomedical risk factors are modifiable through lifestyle changes (Box 1)<sup>4, 5</sup>.

Box 1: Modifiable risk factors of type 2 diabetes



## ***Unhealthy Eating***

- Diet plays an important role in regulating the body's metabolism.
- Epidemiological studies showed that people who consume too much ultra-processed food<sup>6</sup>, red and processed meat<sup>7</sup>, sugar- and artificially-sweetened beverages<sup>8, 9</sup>, dietary salt<sup>10</sup> or a diet high with a high glycaemic index<sup>11</sup> were more likely to develop type 2 diabetes.
- The Global Burden of Disease Study 2021 estimated that dietary risks combined accounted for 25.7% of global disability-adjusted life years (i.e. number of healthy years lost due to ill-health, disability, or early death) attributed to type 2 diabetes<sup>12</sup>.

## ***Lack of Physical Activity***

- Low physical activity or sedentary behaviours are associated with metabolic dysfunctions, including reduced insulin sensitivity<sup>13</sup>.
- An assessment of diabetic risk considering both sedentary time and physical activity reported that a higher level of total daily sitting time (7.1 hours or more per day) was associated with 13% and 11% increased risk of diabetes when not adjusted and after adjusting for physical activity levels respectively<sup>14</sup>.

## ***Smoking***

- The various toxic compounds (such as nicotine) present in cigarettes and alternative smoking products (including electronic smoking products and heated tobacco products) would impair pancreatic cells to secrete insulin and induce insulin resistance, thereby increasing the risk of developing type 2 diabetes<sup>15, 16</sup>.
- Compared with never smokers, current smokers had 21%, 34% and 57% increased risk of developing type 2 diabetes for light smoking (less than 10 cigarettes a day), moderate smoking and heavy smoking (20 or more cigarettes per day), respectively<sup>17</sup>.

## **Alcohol Drinking**

- Alcohol drinking can affect body functions and induce diabetes<sup>18</sup>.
- A study with over 400 000 participants of European ancestry reported that increased alcohol intake was associated with elevated risk of type 2 diabetes. The association was more pronounced for individuals having 14 or more drinks per week, but even 1-drink-per-week was associated with 10% increased risk of type 2 diabetes<sup>19</sup>.
- A study also found that moderate and heavy alcohol consumption were causally associated with insulin resistance and higher diabetes risk among Chinese males<sup>20</sup>.

## **Excess Body Fat**

- Overall and abdominal obesity have causal effects on insulin resistance and type 2 diabetes risk<sup>21</sup>.
- A systematic review and meta-analysis of 216 cohort studies showed that risk of type 2 diabetes would increase 72% for an increase in body mass index (BMI, a common surrogate marker of adiposity) of 5 units and 61% for a 10 centimetres (cm) larger waist circumference<sup>22</sup>.
- Being obese as the primary risk factor for type 2 diabetes worldwide, the Global Burden of Disease Study 2021 appraised that high BMI contributed to 52.2% of global type 2 diabetes disability-adjusted life years<sup>12</sup>.

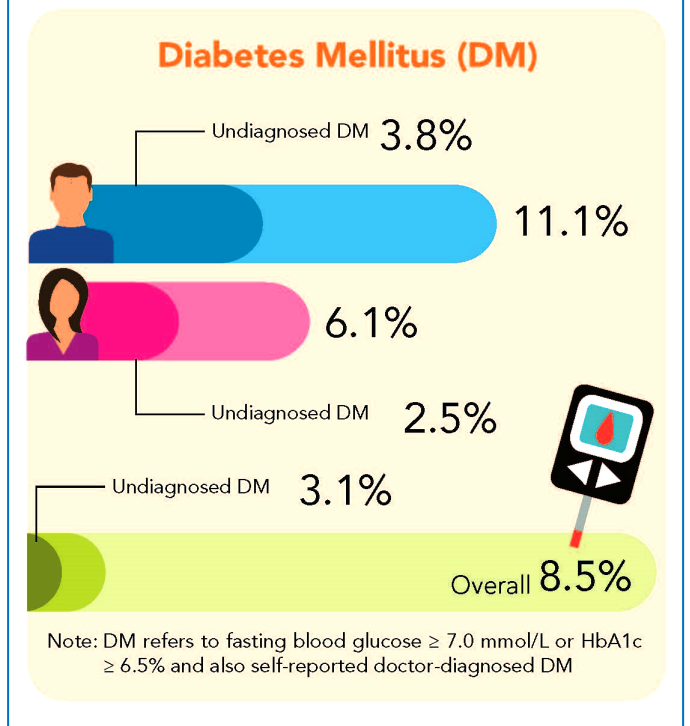
## **Metabolic Syndrome**

- Metabolic syndrome (i.e. clustering of conditions that includes central obesity, elevated blood glucose, elevated blood pressure, abnormal cholesterol or triglyceride levels) is known to increase the risk of developing type 2 diabetes<sup>23</sup>; the more the number of conditions, the higher the risk<sup>24</sup>.
- Compared with individuals without metabolic syndrome, those with metabolic syndrome are about 5 times more likely to develop type 2 diabetes<sup>25</sup>.

## Prevalence of Diabetes and Relevant Modifiable Risk Factors among the Local Population

- ◆ Diabetes is a major cause of ill-health among local population. According to the Population Health Survey (PHS) 2020-22<sup>26</sup> conducted by the Department of Health (DH), 8.5% of persons aged 15–84 had diabetes or raised blood glucose (Figure 1), including 5.4% with self-reported doctor-diagnosed diabetes and 3.1% with no self-reported history but found to have raised blood glucose or glycated haemoglobin (fasting plasma glucose greater than or equal to 7.0 millimoles per liter (mmol/L) or glycated haemoglobin (HbA1c) greater than 6.5%) by biochemical testing provided under the survey.
- ◆ Surveys also show that risk factors of type 2 diabetes are prevalent among the local population (Table 1).

**Figure 1: Prevalence of diabetes among persons aged 15–84**



**Table 1: Prevalence of risk factors associated with increased risk of type 2 diabetes**

<p><b>Unhealthy eating</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>97.9%</b> of persons aged 15 or above had inadequate consumption of fruit and vegetables according to the World Health Organization (WHO)'s recommendation of at least five servings of fruit and vegetables a day.</li> <li>● <b>51.6%</b> of persons aged 15 or above consumed processed meat and associated products at least once a week.</li> <li>● <b>83.9%</b> of persons aged 15–84 had dietary salt consumption above the WHO recommended daily limit of less than 5 grams (g) a day.</li> </ul>
<p><b>Physical inactivity</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>24.8%</b> of persons aged 18 or above had insufficient aerobic physical activity according to the WHO's definition.</li> </ul>
<p><b>Alcohol drinking</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>8.7%</b> persons aged 15 or above drank alcohol regularly (i.e. drank at least once a week), including 2.1% reported daily drinking.</li> <li>● <b>2.0%</b> persons aged 15 or above reported binge drinking (i.e. drinking at least five cans of beer, five glasses of table wines or five pegs of spirits on one occasion) at least once per month.</li> </ul>
<p><b>Smoking</b><sup>27</sup></p>	<ul style="list-style-type: none"> <li>● <b>9.1%</b> of persons aged 15 or above were daily conventional cigarette smokers.</li> </ul>
<p><b>Overweight and obesity</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>54.6%</b> of persons aged 15–84 were overweight (22.0%) and obese (32.6%) with a BMI greater than or equal to 23.0.</li> <li>● <b>37.8%</b> of persons aged 15–84 were classified as centrally obese by waist measurement (with a waist measurement 90 cm or above for men and 80 cm or above for women).</li> </ul>
<p><b>Raised blood glucose</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>1.6%</b> of persons aged 15–84 had impaired fasting glucose (or pre-diabetes as defined by biochemical testing with fasting plasma glucose between 6.1 and 6.9 mmol/L).</li> </ul>
<p><b>Raised blood pressure/ Hypertension</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>29.5%</b> of persons aged 15–84 had raised blood pressure/hypertension (with measured systolic blood pressure higher than or equal to 140 millimeters of mercury (mmHg) and/or diastolic blood pressure higher than or equal to 90 mmHg).</li> </ul>
<p><b>Raised blood cholesterol/ Hypercholesterolaemia</b><sup>26</sup></p>	<ul style="list-style-type: none"> <li>● <b>51.9%</b> of persons aged 15–84 had raised blood cholesterol/hypercholesterolaemia (with tested total blood cholesterol greater than or equal to 5.2 mmol/L).</li> </ul>



## Reducing Type 2 Diabetes Risk

Individuals can substantially lower the risk of developing type 2 diabetes through adoption of a healthy lifestyle and behavioural changes<sup>28, 29</sup>.

- ※ **Consuming a healthy diet** helps to prevent malnutrition in all its forms, including overweight and obesity<sup>30</sup>.

Key dietary recommendations to reduce the risk developing type 2 diabetes include sufficient consumption of dietary fibre with at least 5 daily servings of fruit and vegetables and choose wholegrains over refined grains; cut down on red and processed meat; and limit consumption of fats, salt and sugar<sup>30, 31</sup>.

- ※ **Regular physical activity** helps people stay at a healthy weight or lose weight. Being physically active also improves insulin sensitivity and enhances glucose uptake by the muscles, which in turn helps regulate blood glucose levels and reduce the type 2 diabetes risk<sup>5</sup>.

For substantial health benefits and prevention of non-communicable diseases, adults aged 18 or above are recommended to do at least 150–300 minutes of moderate-intensity aerobic physical activity (such as brisk walking), or equivalent amount of physical activity throughout the week. They should also reduce chair-time and replace sitting time with physical activity of any intensity including light-intensity physical activity<sup>32</sup>.

- ※ **Refrain from alcohol drinking.** There is no safe level of alcohol consumption. Alcohol use increases health risks even drinking low to moderate amount<sup>33</sup>.

Alcohol drinkers are urged to appraise their own drinking habit, realise the potential health risks from alcohol drinking and appraise the benefits of stopping alcohol consumption.

- ※ **Giving up smoking** is the first and necessary action that smokers can take to improve their health.

Current smokers should note that quitting smoking can lower the risk of developing type 2 diabetes by 30–40%<sup>15</sup> and thus they should quit immediately. For free smoking cessation tools and services, they can call the Quitline 1833 183 or visit the designated website [www.livetobaccofree.hk](http://www.livetobaccofree.hk).

※ **Maintain an optimal body weight and waist circumference.**

Local Chinese adults are urged to maintain an optimal BMI (calculated by dividing the body weight (in kg) by the square of height (in m):  $\text{kg/m}^2$ ) between 18.5 and 22.9. While men should keep their waist circumference below 90 cm, women should keep theirs below 80 cm.

Regardless of genetic risk (such as having a family history of diabetes), a study with over 550 000 Chinese adults showed that adherence to a healthy lifestyle was associated with a lower risk of type 2 diabetes. Compared to people with high genetic risk and unhealthy lifestyle, a healthy lifestyle would have a respective 57%, 66% and 75% reduced risk among people at high, middle and low genetic risk<sup>34</sup>.





## Screening for Type 2 Diabetes

- Of note, type 2 diabetes is often asymptomatic in early stages. People can be living with the disease for years and not know it. When symptoms are present, they may include increased thirst, excessive urination, increased appetite, unintended weight loss, lethargy, poor wound healing and frequent infections.
- The purpose of diabetic screening is to identify asymptomatic individuals who are likely to develop type 2 diabetes, so that early intervention or treatment can be initiated to prevent or delay disease progression and diabetic complications.
- According to the Hong Kong Reference Framework for Diabetes Care for Adults in Primary Care Settings, **local adults aged 45 or above should screen for type 2 diabetes**. If results are normal, screening should be conducted again every three years<sup>35</sup>.
- Persons who have risk factors for type 2 diabetes (such as being overweight or obese, or a family history of diabetes) should have earlier or more frequent screenings.
- However, the PHS 2020-22 revealed that less than three-fifths (59.1%) of persons aged 45 or above self-reported that they had their blood glucose checked within 3 years<sup>26</sup>. Members of the public are encouraged to consult their family doctors if they have any questions about diabetes or the relevant screening recommendations.



Early detection  
timely  
intervention

To halt the rise of diabetes, the DH will continue step up efforts in enhancing public awareness about the importance of healthy living in diabetes prevention, as well as working in close partnership with other government departments and community partners to foster a health-enhancing environment. Members of the public are urged to maintain vigilance against diabetes, choosing to live in healthy ways for reducing the risk of developing type 2 diabetes.



world diabetes day

14 November

World Diabetes Day was established in 1991 by International Diabetes Federation (IDF) and the World Health Organization in response to growing concerns about the escalating health threat posed by diabetes. Every year, World Diabetes Day campaign focuses on a dedicated theme that runs for one or more years.

For World Diabetes Day 2024–26, the theme is **Diabetes and Well-being** and the campaign will focus on:

- **Physical well-being:** the importance of physical activity and a healthy diet to reduce the risk of type 2 diabetes and manage all types of diabetes and its related complications.
- **Societal well-being:** highlighting the barriers that restrict a person living with diabetes from living a healthy and fulfilling life with their condition.
- **Mental well-being:** raising awareness of the challenges, stress and anxiety that living with a chronic condition like diabetes can bring and highlighting the importance of addressing the mental health aspects as part of a person with diabetes' management and treatment plan.

For more information about World Diabetes Day, please visit the thematic website at [worlddiabetesday.org/](http://worlddiabetesday.org/).

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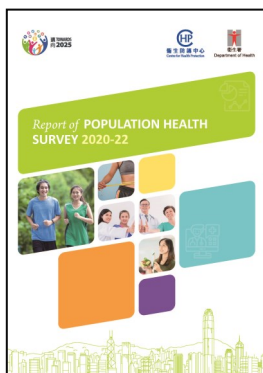
## News In Brief

### Lunch Webinar series on the Population Health Survey 2020-22: Findings and Recommendations

With an aim to share the key findings of the Population Health Survey 2020-22 on iron status, iodine status, cardiovascular risk and dietary habit among the local population, as well as relevant joint recommendations made by the Working Group on Prevention of Iron Deficiency and the Working Group on Prevention of Iodine Deficiency Disorders, Non-Communicable Disease Branch of the Department of Health organised three lunch webinars (1-2 pm) in September and October 2024. The Webinar series was well-received by the participating healthcare professionals. To view the recorded Webinar series, access the survey reports and joint recommendations, please visit the designated website at [www.chp.gov.hk/en/features/37474.html](http://www.chp.gov.hk/en/features/37474.html).



Photo — Moderator, Dr Rita HO (center) and Speakers, Dr Fherina LAM, Professor Paul POON, Dr Raymond WONG and Ms Amanda TJONG (from left to right)



#### Joint Recommendation on Iodine Intake for Members of the Public

Iodine is an essential micronutrient required for normal thyroid function, growth and development. Throughout the life course, inadequate dietary intake gives rise to iodine deficiency which may result in goitre and hypothyroidism as well as a spectrum of iodine deficiency disorders including impaired mental functioning.

**WHO ARE AT RISK?**  
The Iodine Survey (2019) and the Population Health Survey 2020-22 provided useful insights into the population's iodine intake. Other than people aged 15 to 34 years, iodine intake for older age groups was found to be insufficient. While iodine intake of school-aged children was considered adequate, that of pregnant and lactating women was insufficient except for pregnant women taking iodine-containing supplements at average daily intake equal to or above 150 µg/day.

**HOW TO MAINTAIN ADEQUATE IODINE NUTRITION?**

- 1 Consume iodine-rich foods**  
Consume food with more iodine as part of a healthy balanced diet. Seaweed, kelp, seafood, marine fish, eggs, milk, dairy products are food rich in iodine.  
When choosing iodine-rich snacks, avoid those which are high in salt or fat content.
- 2 Use iodised salt**  
Use iodised salt instead of ordinary table salt, keeping total salt intake below 5 g (1 teaspoon) per day to lower the risk of raised blood pressure.  
As iodine content in iodised salt may be affected by humidity, heat and sunlight, iodised salt should be stored in a light and coloured container and kept in a cool dry place.  
To minimise loss of iodine through the cooking process, in particular from prolonged boiling and pressure cooking, add iodised salt to food as close to the time of serving as possible.  
Persons with thyroid problems should seek medical advice regarding use of iodised salt.
- 3 Additional measures for pregnant and lactating women**  
Take iodine-containing supplements containing of least 150 µg iodine each day.  
Seek medical advice if in doubt.  
Persons with existing medical conditions or thyroid problems should consult healthcare professionals and take supplements as instructed.

For more information, please visit the Department of Health website: Thematic Report on Iodine Intake (Population Health Survey 2020-22): <https://www.chp.gov.hk/en/features/37474.html>

These recommendations will be reviewed and revised in the light of new research findings.

#### Joint Recommendation on Iron Intake for Public Particularly for Women of Reproductive Age

Iron is an essential micronutrient for red blood cell formation and cellular functions. Iron deficiency is commonly caused by inadequate iron intake, or excess blood loss due to menstruation among women of reproductive age. Progressive iron deficiency can eventually result in iron deficiency anaemia which may present as fatigue and reduced exercise tolerance.

**What is the local situation?**  
Population Health Survey 2020-22 provides useful insights into the population's iron status. Overall, the local prevalence of iron deficiency among the local population aged 15-84 and women of reproductive age (aged 15-49) was about 5.7% and 17.5% respectively. According to WHO's latest guideline in 2020, prevalence of iron deficiency ranging from 5.0-19.9% is classified as a mild magnitude of public health problem.

**HOW TO MAINTAIN ADEQUATE IRON INTAKE**

In general, adequate iron intake can be achieved by a healthy balanced diet with iron-rich food. Women of reproductive age have a higher risk of iron loss during menstruation and hence a higher daily requirement for iron. They should pay particular attention to their diet to ensure adequate iron intake.

- Consume iron-rich food**  
Eat a moderate amount of meat, fish and seafood. Animal-based iron-rich food contains haem iron which can be absorbed easily.  
Eat more dark green vegetables and beans. Plant-based iron-rich food contains non-haem iron which is less readily absorbable and its absorption is affected by other foods and drinks in the diet.  
Iron-fortified cereals are also good sources of iron.
- Consume adequate fruit and vegetables**  
Consume vitamin C-rich fruit and vegetables to enhance absorption of iron from plant sources.
- Reduce tea or coffee with meals**  
Try to avoid drinking tea or coffee within 1 to 2 hours after meals as they can reduce iron absorption. Plain water or water added with lemon is a better choice as a beverage for meals.

**Additional measures for those at higher risk of iron deficiency**  
People at risk of iron deficiency (including women of reproductive age with heavy menstrual periods, pregnant women, persons on restrictive diets, persons with gastrointestinal disorders and/or having previous gastrointestinal surgery, frequent blood donors, etc.) may seek healthcare professionals' advice on management of their health conditions and their individual needs for taking iron supplement. Please note: iron supplement with too much iron can be harmful.

These above recommendations will be reviewed and revised in the light of new research findings.  
For more information, please visit the Department of Health website: Thematic Report on Iron Status (Population Health Survey 2020-22): <https://www.chp.gov.hk/en/features/37474.html>

#### Thematic Report on Iodine Status (Population Health Survey 2020-22)

#### Thematic Report on Iron Status (Population Health Survey 2020-22)

Non-Communicable Disease Branch  
Centre for Health Protection  
Department of Health

**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](mailto:so_dp3@dh.gov.hk).

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