

Non-Communicable Diseases Watch

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衛生防護中心
Centre for Health Protection



衛生署
Department of Health

Keep a Healthy Waistline

Key Points

- ※ Too much body fat causes obesity and increases the risk of various chronic diseases. However, it is not just the amount of body fat but also its distribution that determines disease risk associated with obesity. Excess accumulation of abdominal fat results in central obesity.
- ※ Central obesity is a growing public health problem. It is associated with metabolic and cardiovascular risk independent of body mass index. People with excess abdominal fat would have higher risks of chronic diseases (including type 2 diabetes, coronary heart disease, stroke, certain cancers, non-alcoholic fatty liver disease and gallbladder disease), mental health problems (such as depression and dementia), injuries (such as hip fracture), as well as greater risk of death.
- ※ For Chinese adults, central obesity is defined as waist circumference of 90 cm (~36 in) or above for men and 80 cm (~32 in) or above for women.
- ※ In Hong Kong, the prevalence of central obesity among community-dwelling people aged 15 and above increased from 28.3% in 2003 to 32.4% in 2006.
- ※ Healthy eating along with active living is the key to reduce abdominal (and overall) fat and keep a healthy waistline.

Keep a Healthy Waistline

An appropriate amount of body fat is essential to normal physiological function. Apart from being the main form of body's energy storage, fat plays an important role in regulating body temperature and keeping the body warm. It also cushions organs and acts as a source of hormones that control metabolism.¹

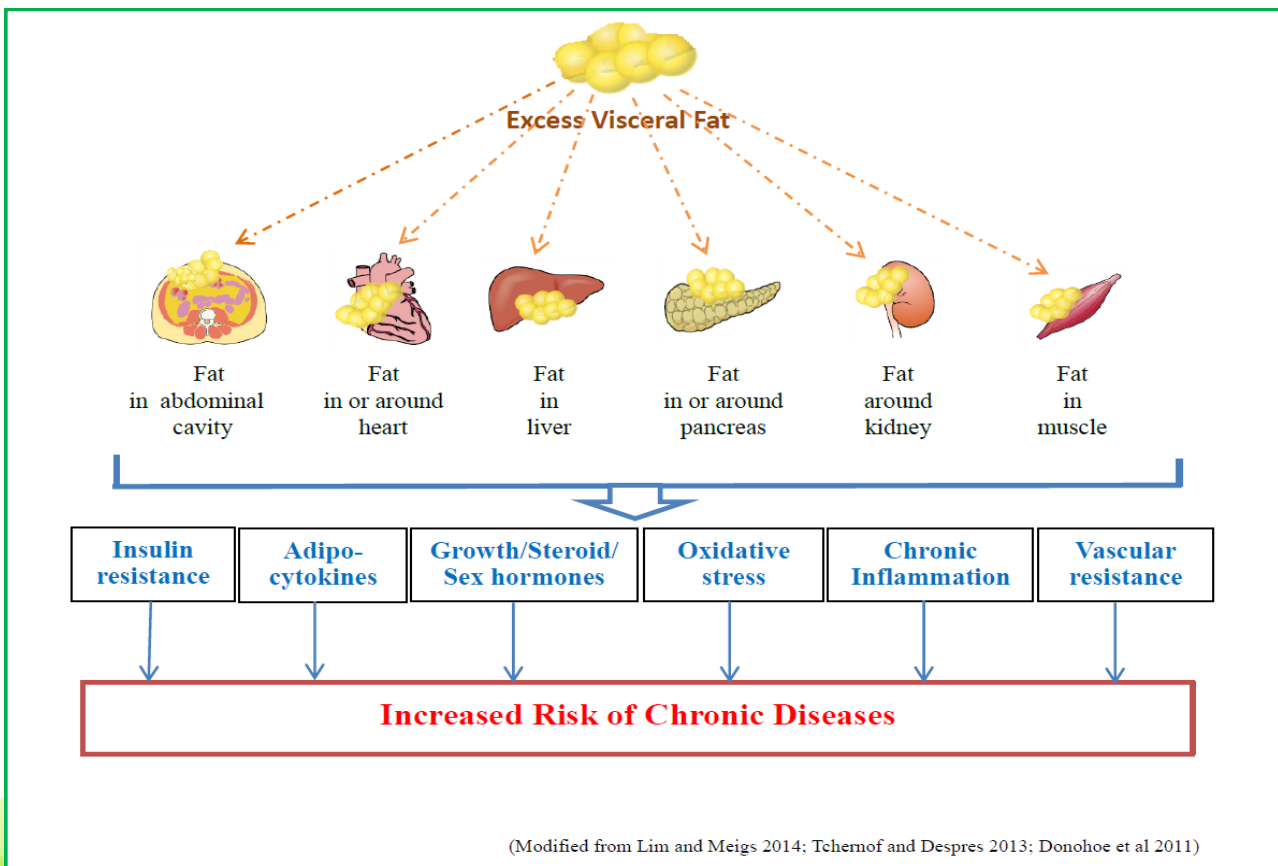
Total body fat content varies between individuals, dependent on various factors including sex, reproductive status, age and ethnicity.² For the same body mass index (BMI), females have more body fat than males. In women, increases in fat accumulation around the waist is associated with increasing parity.² Amount of body fat also tends to peak in middle or early old age.²⁻⁵ Compared with Caucasians, Asians have lower BMI but a higher body fat percentage.^{6,7} Although there is no universal agreement on an optimal body fat percentage, a range of 10% to 25% for men and 20% to 32% for women is generally considered satisfactory.⁸

While having too little body fat can compromise normal body function, too much body fat causes obesity and increases the risk of chronic diseases. Besides, it is not just the amount of body fat but also its distribution determines disease risk.⁹ According to the location of body fat, body fat can largely be subdivided into subcutaneous fat and visceral fat.¹⁰ The former is found under the skin, whereas the latter is accumulated in or around specific organs (such as the liver, heart, pancreas, kidney and muscle) or compartments of the body (such as in the abdomen, chest and pelvic cavity).^{11,12}

Biological Mechanisms Linking Excess Visceral Fat with Chronic Diseases

For any given amount of total body fat, the subgroup of individuals with excess visceral fat is at higher risk of metabolic abnormalities and chronic diseases through certain biological mechanisms (Figure 1).¹¹⁻¹³

Figure 1: Biological mechanisms of excess visceral fat on chronic disease risk¹¹⁻¹³



For instance, modulation of insulin and insulin-like growth factors, adipocytokines, sex hormones, oxidative stress or chronic inflammation are among the mechanisms linking excess visceral fat with diabetes, cardiovascular diseases and some cancers.^{12, 13} Visceral fat can also directly impair organ function, conferring additional risks on the

development of chronic diseases. For example, excess pericardial fat can reduce left ventricular function or increase the risk of atrial fibrillation, whereas fat deposition in the blood vessels of the heart can contribute to coronary atherosclerosis and heart failure.^{10, 14}

The Perils of Central Obesity

General obesity has been commonly assessed by BMI which is calculated as weight in kilograms (kg) divided by square of height in meter (m): kg/m^2 .¹² For Chinese adults living in Hong Kong, BMI 23.0 kg/m^2 or above is classified as overweight and obese. Central obesity occurs when excess accumulation of fat inside the abdominal cavity, and can be estimated by using simple anthropometric measurement (such as waist circumference or sagittal abdominal diameter) or sophisticated imaging methods (such as computed tomography or magnetic resonance imaging).¹⁴ Based on epidemiological evidence of sex-specific waist circumference and risk of metabolic complications, central obesity in adults is generally defined as waist circumference of 94 cm (~37 in) or above for Caucasian men and 80 cm (~32 in) or above for Caucasian women. For most Asian adults including Chinese, the cut-off value is 90 cm (~36 in) or above for men and 80 cm (~32 in) or above for women.^{5, 9} The larger the waistline, the greater would likely be the relative amount of abdominal fat and chronic disease risk.^{9, 15} However, central obesity does not just occur in people who are obese, but also affects people with normal BMI.

Central obesity is a growing clinical and public health problem.¹⁶ It is the most common manifestation of metabolic syndrome.¹⁷ Compared to individuals with a similar BMI, those with central obesity would have higher risks of chronic diseases, mental health problems as well as injuries (Box 1). Increased waist circumference was also associated with the risk of death after adjustment for BMI. A study of over 359 000 people aged 25 to 70 years at enrollment from 9 European countries with a mean follow-up of 9.7 years reported that risk of death among men with a waist circumference 102.7 cm or above were about twice as likely compared to men with a waist circumference below 86.0 cm. Risk of death among women with a waist circumference 89.0 cm or above was 78% higher than those with a waist circumference below 70.1 cm.¹⁸ In the United States (U.S.), a study of over 225 700 people aged 50 to 71 years also observed that people in the highest waist circumference category (118 cm or above for men; 96 cm or above for women) had an overall 68% increased risk of death compared to those in the lowest waist circumference category (below 94 cm for men; below 80 cm for women).¹⁹

Box 1: Associations of central obesity with risk of chronic diseases or injuries

Type 2 Diabetes — Central obesity is a risk factor for type 2 diabetes. A systematic review of studies from 15 cohorts observed that individuals with central obesity were 2.14 times as likely to develop the disease compared with those without.²⁰

Coronary Heart Disease (CHD) — Central obesity is an important risk factor in the development of CHD. A study of over 27 800 men and 41 500 women aged 39 to 75 years from two cohorts (the Health Professionals Follow-up Study and the Nurses' Health Study) observed that men with a waist circumference greater than 102.0 cm were 2.25 times as likely to have CHD compared to men with a waist circumference below 84.0 cm. Women with a waist circumference greater than 88.0 cm were 2.75 times as likely to have CHD compared to women with a waist circumference below 71.0 cm.²¹

Stroke — Studies also showed association between central obesity and the risk of stroke or transient ischemic attack among Western people.^{22, 23} A population-based cohort study of over 67 000 Chinese women aged 40 to 70 with anthropometric measurement taken at recruitment between 1996 and 2000 with a mean follow-up of 7.3 years observed that women in the highest category of waist circumference had 77% increased risk of stroke compared with those in the lowest category of waist circumference. More importantly, the study indicated that even in a relatively lean population, increasing levels of abdominal (and general) obesity were associated with a significant increase in the risk of stroke.²⁴

Cancer — There is convincing evidence for central obesity being a cause of colorectal cancer, endometrial cancer and pancreatic cancer.²⁵⁻²⁷ A systematic review and meta-analysis of 13 prospective studies found that individuals in the highest category of waist circumference had about 46% increased risk of colorectal cancer compared with those in the lowest category of waist circumference.²⁸ For a 10-cm increase in waist circumference, pooled analysis of 2 prospective studies observed 26% increased risk of endometrial cancer.²⁹ For pancreatic cancer, the corresponding risk increased by 11% as a meta-analysis of 5 cohort studies reported.³⁰

Non-alcoholic Fatty Liver Disease (NAFLD) — Central obesity is a key contributor to the development of NAFLD. A meta-analysis of 7 epidemiological studies found that individuals with central obesity were 2.34 times as likely to develop NAFLD compared with those without.³¹

Gallbladder Disease — Central obesity raises gallbladder disease risk. A systematic review and meta-analysis of 5 cohort studies found that 10-cm increase in waist circumference was associated with 46% increase in the risk of gallbladder disease.³²

Depression — Metabolic abnormalities and hormonal disturbances stemming from central obesity can act negatively on mood.³³ A systematic review and meta-analysis of 15 cross-sectional studies reported that individuals with central obesity had 38% increased risk of depression compared with those without.³⁴

Dementia — Central obesity in midlife increases risk of dementia, independent of diabetes and cardiovascular comorbidities. A study in U.S. followed over 6 500 middle-aged adults for an average of 36 years observed that individuals with high sagittal abdominal diameter had 98% increased risk of dementia compared with those with low sagittal abdominal diameter.³⁵

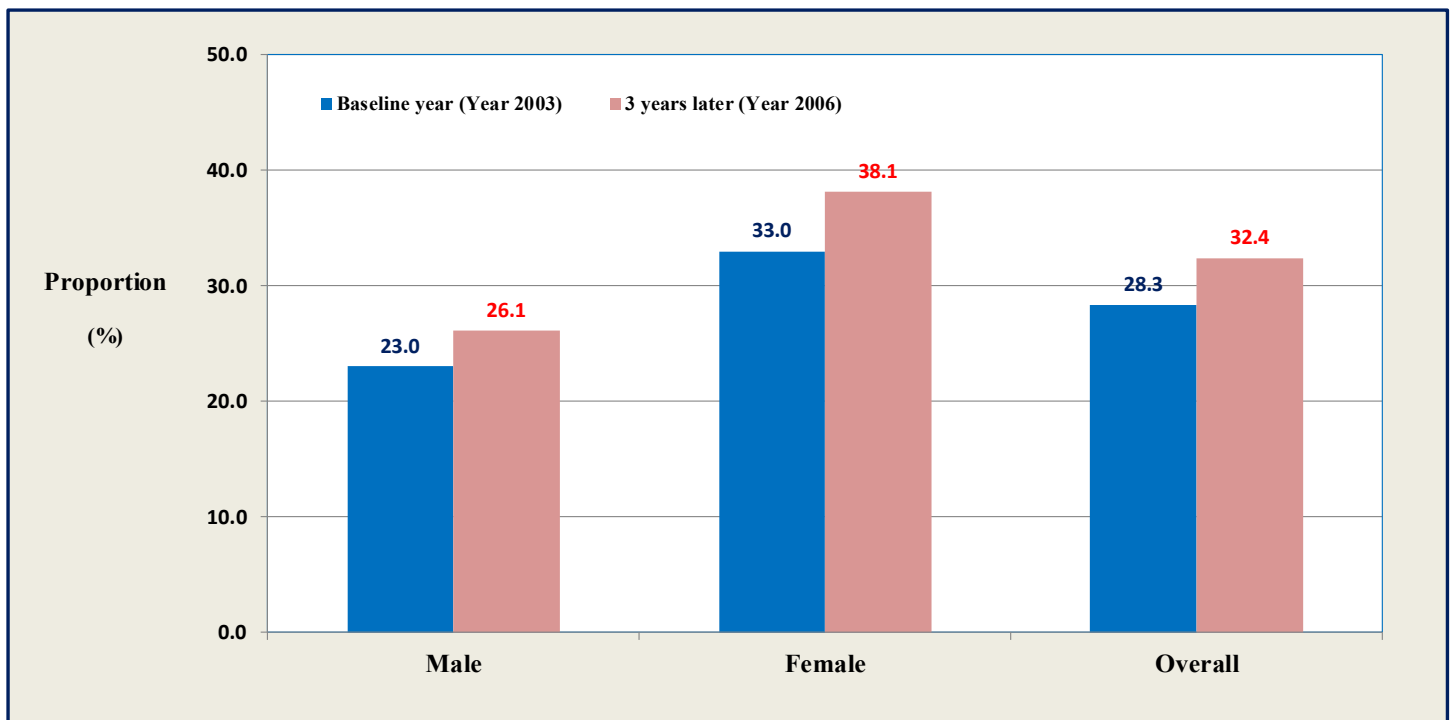
Hip Fracture — Excess accumulation of visceral fat in abdomen may have negative effect on bone strength or impair balance, and thus increases the risk of fall and injuries. In Norway, a population-based study of about 43 000 people aged 60 to 79 who were followed for a median of 8 years found that men in the highest category of waist circumference were twice as likely to have hip fracture compared with those in the lowest category. In women, the corresponding risk increased by 86%. For every 10-cm increase in waist circumference, risk of hip fracture increased 57% in men and 32% in women.³⁶

Prevalence of Central Obesity

An international survey in 2005 of about 168 100 primary care patients aged 18 to 80 years (excluded pregnant women) from 63 countries found that 56% of men and 71% of women had central obesity (waist circumference 94 cm or above for men; 80 cm or above for women).¹⁶ In the U.S., national health surveys observed that prevalence of central obesity among men (waist circumference above 102 cm) aged 20 years or above increased significantly from 37.1% in 1999/2000 to 43.5% in 2011/2012. Among women (waist circumference above 88 cm), the prevalence increased from 55.4% to 64.7% over the same period.³⁷

In Hong Kong, a cross-sectional analysis of baseline and 3-year follow-up data on waist circumference among 2 956 community-dwelling people aged 15 and above found a significant increase in the prevalence of central obesity (waist circumference 90 cm or above for males; 80 cm or above for females). Among males, the prevalence increased from 23.0% in 2003 to 26.1% in 2006. For females, the corresponding prevalence increased from 33.0% to 38.1% (Figure 2).³⁸

Figure 2: Prevalence of central obesity among community-dwelling people aged 15 and above in Hong Kong, 2003 and 2006



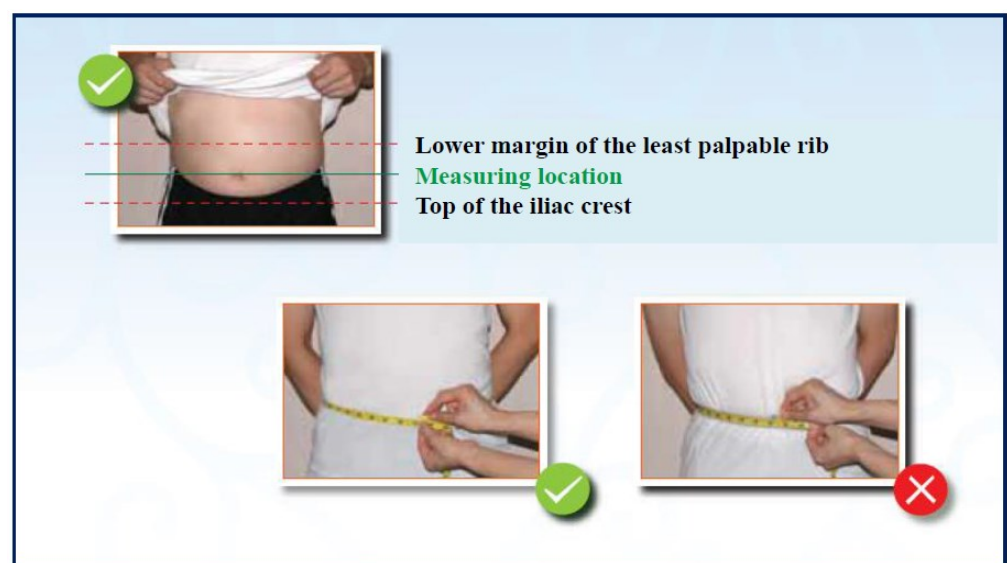
Source: Ho et al, 2015.

Aim for a Healthy Waistline

For optimal health, Chinese men in Hong Kong should keep their waist circumference below 90 cm and women should keep theirs below 80 cm irrespective of their BMI. As excess accumulation of fat inside the abdominal cavity increases the risk of a number of chronic diseases (please refer to Box 1), those with central obesity can consult their family doctor for further medical assessment and advice. Of note, waist circumference is easy to measure, but its accuracy can be influenced by many factors, including individuals' posture and

phase of respiration at time of measurement or the measuring tape's placement and tightness. To have waist circumference correctly measured, individual should wear little clothing, and stand with feet close together with arms at the side. Place the tape at the mid-point between lower margin of the least palpable rib and top of the iliac crest which is the upper margin of the bony prominence of the pelvic bone at the side (Figure 3). Besides, measurement should be taken at the end of a normal expiration.²

Figure 3:
Measurement of
waist circumference



Obesity develops when energy intake from food is greater than energy expenditure in the form of physical activity. Therefore, healthy eating along with active living is the key to reduce abdominal (and overall) fat and keep a healthy waistline. Studies showed a potential link between excess added sugar intake and visceral fat accumulation.³⁹ Daily consumers of sugar-sweetened beverages had a 10% higher visceral adipose tissue volume compared with non-consumers.⁴⁰ Thus, members of the public are advised to follow the principles of the Healthy Eating Food Pyramid and include the five basic food groups (i.e. grains; fruit; vegetables; meat along with fish, eggs and legumes; milk and milk products) and be proactive in decreasing sugar consumption. An active living can simply start with walking. A systematic review and meta-analysis of 11 randomised control trials found that walking (for 20 to 60 minutes at 2 to 7 days per week) was associated with an overall 1.51 cm reduction

in waist circumference.⁴¹ Taking frequent breaks from sitting, even for a minute, may also help reduce waist circumference. Independent of total sedentary time and moderate-to-vigorous intensity physical activity, an Australian study observed that people who took frequent breaks from sitting had smaller waistlines compared with those who did not.⁴² Apart from accumulating at least 150 minutes of moderate-intensity or an equivalent amount of aerobic physical activity throughout the week, adults are encouraged to incorporate stand-ups or small walks in sedentary activities at home, while doing deskwork in the workplace, or during travelling in motorised transport.

For more tips on healthy eating and active living, please visit the Department of Health's Change for Health webpage at <http://www.change4health.gov.hk>.

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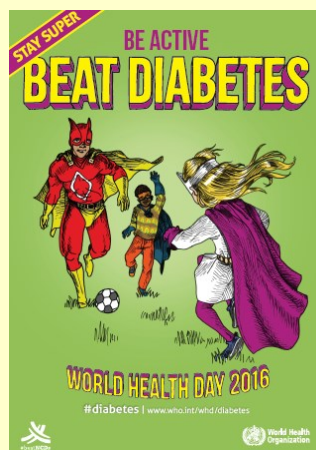
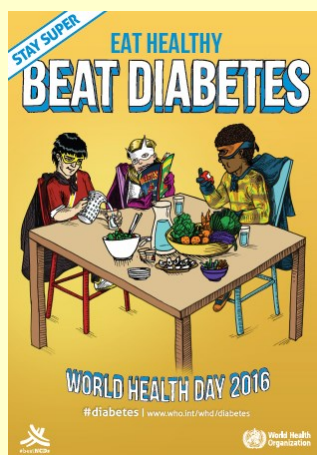


World Health Day is a global health awareness day celebrated on 7 April annually. Every year, the World Health Organization sets a different theme for the day.

This year's World Health Day has adopted the important theme of diabetes. It is because

1. The diabetes epidemic is rapidly increasing in many countries;
2. A large proportion of diabetes cases are preventable. Maintaining normal body weight, engaging in regular activity, and eating a healthy diet can reduce the risk of diabetes;
3. Diabetes is treatable. It can be controlled and managed to prevent complications;
4. Efforts to prevent and treat diabetes will be important to achieve the global Sustainable Development Goal 3 target of reducing premature mortality for non-communicable diseases by one-third by 2030.

For more information on the **World Health Day 2016: Diabetes**, please visit <http://www.who.int/campaigns/world-health-day/2016/event/en/#>.



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.

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