

# POSITION STATEMENT

## Overweight, obesity and cancer prevention



*Obesity is associated with increased risk of a number of cancers. Estimates that one in four Australian children is overweight or obese point to a substantial future increase in cancer burden.*

### Key messages and recommendations

- Obesity is defined as having a body mass index (BMI) of 30 and over; being overweight equates to a BMI of 25 to 29.99.
- Weight gain and obesity develop when energy intake from food and drink exceeds energy expenditure from physical activity and other metabolic processes.
- Obesity is a risk factor for cancer, as well as many other chronic diseases such as cardiovascular disease and type 2 diabetes.
- There is *convincing* evidence that overweight and obesity are risk factors for cancers of the colorectum, kidney, pancreas, oesophagus, endometrium and breast (in post-menopausal women).
- Excess body fat *probably* increases the risk of gallbladder cancer and there is *limited suggestive* evidence that overweight and obesity increase the risk of liver cancer. Excess body fat *probably* decreases the risk of pre-menopausal breast cancer.
- Cancer Council supports the recommendations in the National Health and Medical Research Council *Dietary Guidelines for Adults* in relation to body weight.
- Cancer Council recommends people maintain a healthy body weight within a BMI range of 18.5 to 25, and have a waist measurement less than 80cm for women and less than 94cm for men.
- To achieve and maintain a healthy weight, Cancer Council recommends regular physical activity, increased incidental activity and eating according to energy needs. Moderate portion sizes and fruit, vegetables, cereals and other low-fat foods as the basis of the diet may assist with achieving and maintaining a healthy body weight.
- Mothers are encouraged to breastfeed infants exclusively for up to six months and continue with complementary breastfeeding thereafter, as breastfeeding can help to prevent overweight and obesity in children and protect mothers from breast cancer.

## Background

Obesity is defined as having a body mass index (BMI) of 30 and over and being overweight as 25 to 29.99 (Table 1).<sup>1</sup> BMI is calculated by taking a person's weight in kilograms and dividing by their height in metres squared ( $\text{kg}/\text{m}^2$ ).

Table 1 outlines how BMI is used to calculate healthy weight.

**Table 1:** Body mass index (BMI) definitions according to the World Health Organization.<sup>1</sup>

Category	BMI ( $\text{kg}/\text{m}^2$ )
Underweight	<18.5
Healthy weight	18.5 to <25
Overweight	25 to <30
Obese	$\geq 30$

Another way to measure overweight and obesity is waist circumference, where a measurement (around the narrowest point for women or around the navel for men) 80cm and over for women or 94cm and over for men indicates being overweight (Table 2).<sup>2</sup>

**Table 2:** Waist circumference definitions according to the National Health and Medical Research Council.<sup>2</sup>

Risk of metabolic complications	Waist Circumference (cm)	
	Women	Men
Increased	$\geq 80$	$\geq 94$
Substantially increased	$\geq 88$	$\geq 102$

Weight gain and obesity develop when there is an imbalance between the energy intake from food and drink and energy expenditure from physical activity and other metabolic processes.<sup>1,3</sup>

## Obesity and the burden of disease

Obesity is regarded as a risk factor for cancer, as well as a number of other chronic diseases including cardiovascular disease and type 2 diabetes.

A high body mass accounts for 3.9% of the total cancer burden and causes an estimated 7.5% of the total burden of disease and injury in Australia.<sup>4</sup> The attributable burden of a high body mass is likely to rise in the future as the prevalence of overweight and obesity increases.

Mortality figures are higher for people with obesity, as they have a worse prognosis. A large cohort study in the USA estimated that 14% of all deaths from cancer in men and 20% of those in women could be attributed to overweight and obesity.<sup>5</sup>

## Economic costs of obesity-related cancers

In 2008, it was estimated that the health system costs alone from cancers associated with obesity were estimated to be approximately \$190 million.<sup>6</sup>

## Epidemiological evidence

The World Cancer Research Fund (WCRF) recently released a comprehensive report on food and the prevention of cancer.<sup>7</sup> The report found *convincing* evidence that excess body fat (total adipose tissue) is a risk factor for cancers of the colorectum, kidney, pancreas, oesophagus, endometrium and post-menopausal breast cancer.<sup>7</sup> It also found that excess body fat *probably* increased the risk of gallbladder cancer. There was *limited suggestive* evidence that excess body fat increased the risk of liver cancer.<sup>7</sup> However, excess body fat was also found to *probably* decrease the risk of pre-menopausal breast cancer.<sup>7</sup>

The WCRF found that abdominal fatness (central adipose tissue) was *convincingly* associated with an increased risk of colorectal cancer, and *probably* increased the risk of cancer of the pancreas, endometrium and breast (in post-menopausal women).<sup>7</sup> The WCRF also found that weight gain in adulthood *probably* increased the risk of post-menopausal breast cancer.<sup>7</sup>

**Table 3:** Proportion of cancers attributable to overweight and obesity.<sup>8-10</sup>

Cancer type	% of incidence attributed to overweight/obesity	Aspects of the association
Endometrial cancer	39%	Women with a BMI of >25 have a two- to three-fold increase in risk; limited evidence suggests risk is similar in pre- and post-menopausal women; risk is greater with upper body obesity
Oesophageal adenocarcinoma	37%	Strong association between being overweight and adenocarcinomas of the lower oesophagus and the gastric cardia, with a two-fold increase in risk in individuals with a BMI of >25; association seems greater in men than women
Renal (kidney) cancer	25%	Individuals with a BMI of >30 have a two- to three-fold increase in risk compared to those below 25; the effect is similar in men and women
Gallbladder cancer	24%	Limited evidence available but there is a suggestion of almost a two-fold risk, especially in women
Colorectal cancer	11%	Association seems greater in men than women; risk not dependent on whether person has been overweight in early adulthood or later in life
Post-menopausal breast cancer	9%	Increase in risk of 30% in women with a BMI >28 compared to those with a BMI of <21

## Why obesity and overweight cause cancer

Excess body weight may influence cancer risk because it can:

- lead to elevated levels of insulin-like growth factor 1 (IGF-1), insulin and leptin, which can promote the growth of cancer cells.<sup>7</sup> Excess body weight (particularly abdominal fatness) exacerbates insulin resistance, which leads to the pancreas producing more insulin. Hyperinsulinaemia increases the risk of colorectal and endometrial cancer, and possibly pancreatic and kidney cancer.<sup>11</sup> Increased circulating leptin levels are associated with an increased risk of colorectal and prostate cancer;<sup>12,13</sup>

- increase sex steroid hormones, including oestrogens, androgens and progesterone.<sup>7</sup> Adipose tissue is the main site of oestrogen synthesis in men and post-menopausal women.<sup>11</sup> Increased insulin and IGF-1 levels (from body fatness) result in higher oestradiol levels in men and women<sup>11</sup> and testosterone levels in women.<sup>7</sup> Higher sex hormone levels are associated with endometrial and post-menopausal breast cancer.<sup>14,15</sup> Body fatness may protect against pre-menopausal breast cancer, as obese women tend to have anovulatory menstrual cycles, leading to lower oestrogen levels;<sup>7</sup> and
- raise the inflammatory response, which can promote cancer development.<sup>7</sup> Obesity is described as a state of low-grade chronic inflammation. Adipose tissue produces pro-inflammatory factors; obese people have higher levels of tumour necrosis factor alpha (TNF- $\alpha$ ), interleukin-6 and C-reactive protein than normal-weight people.<sup>16</sup> Leptin, which can function as an inflammatory cytokine, is also higher with excess body weight.<sup>17</sup>

## Factors influencing body weight

People take in energy from food and drinks, which is used for the body's natural processes and for physical activity. People gain weight if they take in more energy than they expend, and lose weight if they take in less energy than they use. Excess energy is stored mostly as body fat.

Environmental factors are extremely important in determining health behaviours, especially those that affect body weight. However, there are many different factors that may contribute to overweight and obesity (Table 4).

**Table 4.** Factors that are linked to weight gain and obesity.<sup>3</sup>

Evidence	Decreased risk	Increased risk
Convincing	Regular physical activity	Sedentary lifestyles
	High intake of dietary fibre	High intake of energy-dense* and micronutrient-poor* foods
Probable	Home and school environments that support healthy food choices for children	Heavy marketing of energy-dense* foods and fast-food outlets
		High intake of sugar-sweetened soft drinks and fruit juices
	Breastfeeding	Adverse socioeconomic conditions
Possible	Low glycaemic index foods	Large portion sizes
		High proportion of food prepared outside the home
		"Rigid restraint" and "periodic disinhibition" eating patterns
Insufficient	Increased eating frequency	Alcohol

*\*Energy-dense and micronutrient-poor foods tend to be processed foods high in fat and/or sugars. Low energy-dense foods, like fruit, legumes, vegetables and whole grain cereals, are high in dietary fibre and water.*

In children specifically, overweight and obesity are influenced by a lack of sufficient activity and by excessive time spent in sedentary activities.<sup>18-20</sup> Poor food habits such as the consumption of sugary drinks, confectionery and high-fat foods are also contributing factors.<sup>19,20</sup>

## Breastfeeding and birth weight

The WCRF reported that being breastfed<sup>#</sup> *probably* decreases the risk of weight gain and becoming overweight or obese.<sup>7</sup> In addition, breastfeeding<sup>#</sup> *convincingly* decreases a woman's chance of developing breast cancer and there is *limited suggestive* evidence that it can decrease the risk of ovarian cancer.<sup>7</sup> Furthermore, breastfeeding is known to help protect infants against infections and other childhood diseases.<sup>7</sup>

Higher birth weights have been linked to a *probable* increased risk of breast cancer in pre-menopausal women.<sup>7</sup>

## Body weight and cancer survival

As well as a healthy body weight being associated with preventing cancer, it is also associated with preventing cancer recurrence and improving survival for people diagnosed with cancer.<sup>21</sup> There is a reasonable level of evidence that weight management and physical activity positively impacts on quality of life, cancer recurrence and overall survival for cancer survivors.<sup>22</sup> Randomised controlled trials, such as the Women's Intervention in Nutrition Study (WINS), have shown encouraging results of the effectiveness of nutrition and physical activity interventions in improving outcomes for cancer survivors.<sup>21</sup>

## Weight loss and cancer risk

Up to now we have known that excess body weight increases cancer risk, but there is a lack of evidence to suggest whether losing weight would lower cancer risk. Recent evidence indicates that weight loss in those who are overweight lowers breast cancer risk.<sup>23</sup> This is probably linked to the fall in circulating oestrogen levels seen with weight reduction.<sup>23</sup>

## Obesity in Australian adults

In Australia, obesity has more than doubled in the past 20 years.<sup>24</sup> Obesity rates rose from 7.2% in men in 1980 to 17.1% in 2000, and for women the rise was even greater, moving from 7.0% in 1980 to 18.9% in 2000.<sup>25</sup>

Between 1995 and 2004-5, the average weight of an Australian adult male rose from 80kg to 84kg, while females rose from 65kg to 68kg.<sup>26</sup> Research has confirmed that people are gaining weight faster than previous generations, with a higher number of people entering adulthood weighing more.<sup>27,28</sup> Those born later in the 20<sup>th</sup> century (Generation X) will gain weight at a faster rate than their parents did.<sup>27,28</sup>

In 2003, the Australian Institute of Health and Welfare estimated that there may be as many as 3.3 million Australian adults who are obese and 5.6 million who are overweight.<sup>29</sup>

Recent figures from the 2007–08 National Health Survey (using self-reported data) show that 56% of Australian adults are either overweight or obese.<sup>30</sup> This has increased from 1989-90 when 38% of adults were regarded as being overweight or obese.<sup>31</sup> In 2007-08, 63% of men were overweight or obese compared with 48% of women (using self-reported data).<sup>30</sup>

Overweight and obesity are higher in those living in remote areas, and lower in affluent urban areas in NSW.<sup>26</sup> It is also more common among those with a low socioeconomic status, low income, people from Southern European and Middle Eastern backgrounds and indigenous Australians.<sup>26</sup>

<sup>#</sup> Studies reporting on breastfeeding use the term with different meanings: some distinguish only between "ever" and "never", while others report results from extended and exclusive breastfeeding. However, the evidence on cancer shows that sustained, exclusive breastfeeding is protective for the mother and child.

## Obesity in Australian children

Over the last 20 years, rates of obesity in children have risen greatly in many countries, including Australia, leading some researchers to speak of an “international epidemic of obesity”.<sup>32</sup>

A study looking at weight changes among Australian children over three decades found that between 1985-1997, the prevalence of overweight and obesity combined doubled, and that of obesity trebled among young Australians, but the increase over the previous 16 years was far smaller.<sup>33,34</sup>

The NSW Schools Physical Activity and Nutrition Survey (SPANS) found in 2004 that 1 in 4 children, with 25% of boys and 23% of girls overweight or obese.<sup>20</sup> Children in Years 6-8 had some of the highest rates of overweight and obesity.<sup>20</sup> In boys, the prevalence rose from 15% among kindergarten children to 32% among Year 6 boys and then fell to 27% among secondary school boys.<sup>20</sup> In girls, the prevalence was about 20-25% in all groups except Year 4 students where it peaked at 30%.<sup>20</sup> The prevalence of overweight was higher in children with lower socioeconomic status, and children were more likely to be overweight if they came from a Middle Eastern background.<sup>20</sup>

The 2007 Australian National Children’s Nutrition and Physical Activity Survey found that 23% of children aged 2-16 years of age were overweight or obese. Overweight and obesity rates were highest among children aged 9-13 years, when prevalence peaked at 30% for girls and 25% for boys. Rates of overweight and obesity remained stable at 25% of boys aged 14-16 years, but declined to 23% of girls in this age group.<sup>35</sup>

Around 25-50% of obese adolescents remain obese in adulthood.<sup>36</sup> This means that less than half of children who are obese during childhood go on to become obese adults. However the later into adolescence overweight persists and the more severe the obesity, the greater the likelihood of persistence into adulthood.<sup>36</sup> Also the number of obese children and adolescents is growing, therefore the likelihood of overweight persisting into adulthood will increase in the future. This makes childhood obesity a priority for targeted preventive action.

## Recommendations

Cancer Council supports the recommendations in the National Health and Medical Research Council (NHMRC) Dietary Guidelines for Adults in relation to body weight.<sup>37</sup>

Cancer Council recommends people:

- Maintain a healthy body weight within a BMI range of 18.5 to 25
- Have a waist measurement less than 80cm for women and less than 94cm for men.

It is also preferable that people be as lean as possible within the healthy body weight range and avoid weight gain and increases in waist circumference throughout adulthood.

To achieve and maintain a healthy body weight, Cancer Council recommends regular physical activity, increased incidental activity and eating according to energy needs. Serving moderate portion sizes and making fruit, vegetables, cereals and other low fat foods the basis of the diet may assist with achieving and maintaining a healthy body weight.

Preventing excess weight gain in children is also a priority, as obese children have a greater risk of becoming obese adults.<sup>36</sup> Cancer Council supports the NHMRC Dietary Guidelines for Children and Adolescents, which recommend that growth should be checked regularly in young children and physical activity encouraged.<sup>38</sup>

In addition, Cancer Council supports the NHMRC Dietary Guidelines for Children and Adolescents, which recommend breastfeeding be encouraged and supported.<sup>38</sup> Cancer Council encourages mothers to breastfeed infants exclusively for up to six months and continue with complementary breastfeeding thereafter.

## Future research

More studies are needed on the association between body weight and cancer risk. In the future, there is a need for more studies that:

- Investigate further the effect of childhood obesity on long term cancer risk
- Explore and evaluate successful strategies to help people maintain a healthy body weight long term
- Determine how weight loss and weight loss methods can influence cancer risk.

## Further information

Cancer Council New South Wales  
PO Box 572 Kings Cross NSW 1340  
[www.cancercouncil.com.au](http://www.cancercouncil.com.au)  
ABN 51 116 463 846

## Contact

Hayley Griffin, Nutrition Project Officer: [hayleyg@nswcc.org.au](mailto:hayleyg@nswcc.org.au)  
Kathy Chapman, Nutrition Program Manager: [kathyc@nswcc.org.au](mailto:kathyc@nswcc.org.au)

## Acknowledgments

This position statement has been reviewed by:

- Vicki Flood
- Steve Pratt
- Simone Lee
- Lucy Smith
- Helen Dixon
- Jane Martin
- Carla Saunders

**Cancer Council Australia, GPO Box 4708, Sydney NSW 2001**  
**Ph: (02) 8063 4100 Fax: (02) 8063 4101 Website: [www.cancer.org.au](http://www.cancer.org.au)**

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