

The prevention and treatment of overweight and obesity

Summary of the advisory report by the Health Council of the Netherlands

H.C.G. Kemper^{1*}, M. Stasse-Wolthuis², W. Bosman³

¹VU Medical Centre, EMGO Institute, Vrije Universiteit, De Boelelaan 7, 1083 HJ Amsterdam, the Netherlands, tel.: +31 (0)20-444 84 07, fax: +31 (0)20-444 67 75, e-mail: hcg.kemper.emgo@med.vu.nl, ²Food and Nutritional Sciences, Udenhout, the Netherlands, ³Health Council, The Hague, the Netherlands, * corresponding author

ABSTRACT

This article presents the highlights of an advisory report on the prevention and treatment of overweight and obesity. The report, which was produced by the Health Council of the Netherlands, incorporates the most recent developments and projected scientific breakthroughs in this field.

The prevalence of overweight and obesity has taken on epidemic proportions. In the Netherlands, as elsewhere, there is a steady rise in the number of individuals suffering from overweight or obesity. Since it is associated with serious health problems, obesity (and to a lesser extent overweight) leads to increased costs for the healthcare system.

Food consumption surveys and studies on time trends in physical activity patterns have revealed that the increased prevalence of obesity is due to an increasing lack of exercise, combined with relative overconsumption. A healthy diet (including plenty of fruit, vegetables and cereal products) and at least one hour a day of moderate physical activity are recommended for the maintenance of energy balance and for the prevention of weight gain.

While genetic factors play a part in the development of overweight and obesity, environmental factors appear to be of overriding importance. The so-called 'obesogenic environment' prompts individuals to eat more and to take less exercise.

There are still no effective intervention strategies for the prevention of weight gain. However, the explosive increase in the prevalence of obesity and of its associated serious medical problems demands a common-sense approach involving preventive interventions, which are

based on modern views of health promotion. These interventions require a broad coalition of actors, in which local and national authorities, industry, the healthcare system and the population at risk must each shoulder their own share of responsibility.

The primary aim of obesity treatment should be a long-lasting weight loss of about 10%. Even this relatively small weight loss can produce significant health gains. Treatment methods must involve an integrated (lifestyle) approach, dependent on the amount of overweight involved and on the presence of comorbidity. Obesity should be treated chronically and prevention of weight regain must be part of any obesity treatment programme.

INTRODUCTION

This article is a summary of an advisory report by the Health Council of the Netherlands (Health Council of the Netherlands, publication 2003/07, 2003).¹ The report was requested by the Minister of Public Health, Welfare and Sport, who wanted an inventory of the most recent developments and projected scientific breakthroughs in the prevention and treatment of overweight and obesity.

Definition of overweight and obesity

According to the WHO definition, adults are defined as obese (or severely overweight) if they have a body mass index (BMI) of 30 kg/m² or more. Those with a BMI

value of between 25 and 30 kg/m² are considered to be overweight.²

The BMI is defined as an individual's mass (in kg) divided by the square of their height (in meters).

Increasing prevalence in the Netherlands

Throughout the world, the prevalence of overweight and obesity has taken on epidemic proportions. In the Netherlands, the steady rise (increasing prevalence) in the number of individuals suffering from overweight and obesity (figure 1) is comparable with the situation in other European countries. This increase is less pronounced than in the United Kingdom and Germany, for example. On average, 40% of Dutch adults are overweight, while 10% of the adult population is obese. It is estimated that 1 to 1.5% of adults suffer from morbid obesity (BMI ≥40).

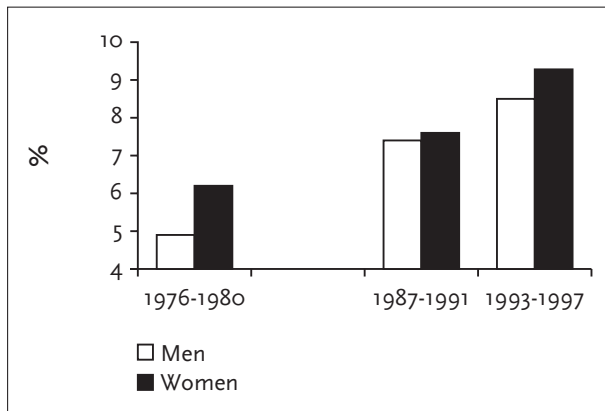


Figure 1
Long-term trends in the prevalence of obesity (BMI ≥30 kg/m²) among Dutch men and women aged 37-43⁵

The extent of the overweight epidemic is also clearly reflected in the increased prevalence of overweight during childhood. On average, 13% of boys and 14% of girls in the Netherlands are overweight.³ It seems that the most marked increase in prevalence occurs in young children above the age of three.⁴ If this trend continues, it is estimated that 15 to 20% of adults in the Netherlands will be obese by 2015.

Overweight and obesity are more common among the poorly educated, and in population groups of Turkish and Moroccan origin.

Health risks

While the health risks associated with obesity have been well documented, much less is known about those associated with moderate overweight. One of the first health effects to result from weight gain is insulin resistance, which

disrupts the normal action of insulin. Insulin resistance plays a key role in the development of metabolic syndrome. This syndrome is characterised by abdominal obesity and a number of associated metabolic anomalies, such as insulin resistance, dyslipidaemia and hypertension. These anomalies in turn form the basis for the development of disorders such as cardiovascular diseases and type 2 diabetes mellitus and its complications. These disorders are also associated with reduced physical activity and a nutritional pattern of high saturated fat, low vegetable/fruit, and low-fibre products.

Other health risks that are associated with overweight and obesity are various types of cancer, gall-bladder diseases, arthrosis, respiratory problems, gout, infertility, menstrual disorders and foetal defects. The greater the overweight, the greater the risk of such comorbidity.

Table 1 contains an estimate of the health risks to which obese adults are exposed. The relative risk ratios (RR) give a rough indication of the strength of the correlation between obesity and its associated diseases. The population attributable risks (PAR) indicate the percentage of the occurrence of other diseases, which could be prevented if there was no obesity. The table clearly shows that, in both sexes, type 2 diabetes mellitus^{5,6} is associated with the highest RRs and PARs.

Table 1
Estimated disease risk for the obese adult population, taken from international studies^{5,6}

	WOMEN PREVALENCE 9.6 %		MEN PREVALENCE 8.5 %	
	RR	PAR (%)	RR	PAR (%)
Type 2 diabetes mellitus	12.7	52.9	5.2	26.3
Hypertension	4.2	23.5	2.6	12.0
Myocardial infarction	3.2	17.4	1.5	4.1
Cancer of the colon	2.7	14.0	3.0	14.5
Angina pectoris	1.8	7.1	1.8	6.4
Gall-bladder diseases	1.8	7.1	1.8	6.4
Ovarian cancer	1.7	6.3	-	-
Osteoarthritis	1.4	3.7	1.9	7.1
Stroke	1.3	2.8	1.3	2.5

Of all the health risks deriving from obesity, the increased prevalence of glucose intolerance and type 2 diabetes mellitus is particularly worrying. Type 2 diabetes mellitus has even been reported in North American children and adolescents. This represents an ominous development, in view of the macrovascular (heart disease, stroke, limb amputation) and microvascular (kidney failure, blindness) sequelae.⁷

In addition, obesity is often accompanied by psychological and social problems, as well as a reduced quality of life. The morbidity associated with obesity (and, to a lesser extent, with overweight) leads to numerous (medicinal) treatments and additional work disability, as well as increased costs for the healthcare system.

ANALYSIS OF DETERMINANTS OF OVERWEIGHT AND OBESITY

In order to counteract the increasing prevalence of overweight and obesity, it is of the utmost importance that the causes of this epidemic be identified and understood. Important determinants of overweight and obesity have been revealed by data from studies into long-term trends in food habits and daily physical activity patterns, as well by findings concerning the influence of energy intake and energy expenditure on the energy balance. In addition, genetic, biological, psychological, social and environmental factors strongly influence the choice that individuals make with regard to diet and activity pattern.

Small changes, major consequences

For millions of years, the human race was accustomed to a hunter-gatherer lifestyle, which is characterised by high daily energy expenditure. In general, food was scarce and energy intake was attuned to eating as much as was available. Under these circumstances, the regulation of body mass was always adjusted to a low energy intake and a high expenditure of energy. On a long-term basis, the energy intake and expenditure seem to stay in balance under physiological control (figure 2).

For the past 100 years, however, a substantial part of the world's population has experienced the reverse situation, having a high-energy intake (overconsumption of energy) and low energy expenditure (physical inactivity). Where there is low energy expenditure, the energy balance is disturbed and becomes positive and as a consequence the body mass increases. In this situation, body mass can only be controlled by cognitive strategies.⁸ It appears that energy intake can only keep energy expenditure in balance when daily energy expenditure is not too low.

Over extended periods of time, even a marginally positive energy balance will lead to major changes in body weight. This means that overweight can easily develop when energy intake is only slightly higher than energy expenditure. A surplus of only 20 kcal a day over the course of one year results in a weight gain of one kilogram. This means that overweight can easily develop when energy intake only slightly exceeds energy expenditure. The increased body mass will partly compensate for the higher energy intake, since it involves an increase of about 15 kcal a day⁹ in energy expenditure, even more in obese subjects.¹⁰

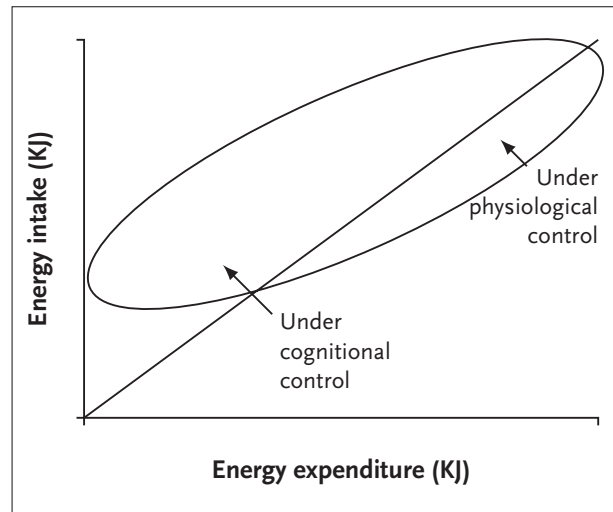


Figure 2

The relationship between energy intake and energy expenditure⁸

The line of identity (energy intake is equal to energy expenditure) is represented by the diagonal in this graph. The ellipse represents the supposed variation in individuals of energy intake and expenditure: at high energy expenditure there is more or less a balance (under physiological control), but at low energy expenditure there is a tendency to a positive energy balance (under cognitional control) leading to overweight and obesity.

Lack of exercise and relative overconsumption

National food consumption surveys reveal that there was a fall in average energy intake in the Netherlands from 1987/1988 to 1997/1998. This is illustrated in table 2, which shows the mean energy intake for the total Dutch population in three surveys held every five years between 1987 and 1998.¹¹

Mean energy intake, which was assessed by questioning individuals about their diet (food anamnesis), shows a declining trend. This applies to individuals of both sexes and all ages. Further analysis of these data showed that, over this ten-year period, nonalcoholic beverages, nuts and snacks increased their relative shares of the total energy intake.¹¹

Quantitative data on the energy expenditure of the Dutch population are scarce, and have mostly been derived from questionnaires and interviews. While food intake questionnaires are characterised by underreporting,¹² subjective physical activity measurements are prone to overreporting. Furthermore, data from questionnaires and interviews given to children below the age of 12 have limited validity. While movement counters or heart rate monitors are more objective (and more valid),¹³ they can only be used for a limited period of time.¹⁴

Table 2

Mean energy intake in the total Dutch population according the National Food Consumption Surveillance System (NFCSS)¹¹

	NFCSS 1987/1988	NFCSS 1992	NFCSS 1997/1998
Population sample	5898	6250	5958
KJ Mean	9677	9263	9241
Standard deviation	3051	2983	2931
Median	9248	8816	8858

Recent trend reports^{15,16} concluded that half of the Dutch population is inactive. One limitation of trend reports, however, is that they are mostly based on questionnaires which focus purely on more intensive activities, such as sport. Physical activity at work, commuting between school/work, and relatively low-intensity daily activities such as walking, gardening and cycling were not always included.

The only longitudinal study to be carried out in the Netherlands demonstrated a clear decrease in physical activity (42% in boys and 17% in girls) in individuals aged between 13 and 17, followed by a slower decline up to the age of 32.¹⁷

Other indications of decreased energy expenditure in the general population are the increase in modern inactive recreational activities (TV, PC, scooter, automobile) and the fact that children spend less time playing outdoors.¹⁸ In view of the increased prevalence of overweight, the extent of this decline in physical activity must more than compensate for the fall in energy intake. It therefore seems likely that the increased prevalence of overweight and obesity is due to an increasing lack of exercise, combined with relative overconsumption.

Influence of energy intake and expenditure on the energy balance

If overweight is to be prevented, it is essential that energy intake be attuned to energy expenditure. A high-fat diet carries a greater risk of overconsumption than a low-fat diet.¹⁹ The exact types of carbohydrates consumed are also important, although the way in which this affects the regulation of the energy balance is not yet fully understood. Nevertheless, there is strong evidence that the sugars contained in energy-rich drinks (especially soft drinks) can easily lead to a positive energy balance. In addition, epidemiological studies have revealed a clear connection between a low-fibre diet and the risk of overweight. Various other dietary factors can also affect energy intake, such as the energy density of the diet,²⁰ portion size,²¹ meal frequency²² and 'snacking' behaviour.²³ The diet that provides the best chance of maintaining the energy balance is one with a low energy density, and which includes plenty of fruit, vegetables and cereal products.

In terms of preventing an increase in body mass, daily exercise of moderate intensity seems to be more important than very high intensity exercise, which leads to exertion.²⁴ Activities that involve a moderate degree of exertion can be sustained for longer periods of time. As a result, these activities achieve a relatively high degree of fat oxidation. Energy expenditure by weight-bearing physical activities (such as walking, stair climbing, jumping) increases with body mass. Obese adolescents indulge in less daily physical activity than their non-obese peers, but their total energy expenditure is the same.²⁵

The current Dutch standard for healthy levels of exercise²⁶ stipulates a minimum of thirty minutes of moderate exertion for adults and sixty minutes for children and adolescents, preferably every day but on no less than five days per week. Moderately intensive activities result in an energy output of three to eight times the resting metabolic rate (3-8 MET). These recommendations are based on the preventive effect on chronic diseases such as cardiovascular diseases, COPD, and type 2 diabetes mellitus. The relative risks for these diseases in inactive subjects are three to five times higher compared with active subjects. However, recent investigations indicate that this amount and intensity of exercise does not seem to be sufficient to prevent weight gain in the general population.²⁷⁻²⁹ The Health Council's Committee feels that, in order to achieve this, individuals must engage in at least one hour of moderate physical activity a day. This is probably also sufficient to keep moderately overweight adults from becoming obese. Obese subjects must exercise for at least 60 to 90 minutes a day to ensure that any weight loss is permanent.

Obesogenic environment more important than genetic factors

The recent epidemic of overweight and obesity is very unlikely to have a genetic basis. This is because it has developed in just two generations, too short a time for significant gene mutations to take effect.³⁰ While genetic factors do play a part in the development of overweight and obesity, the influence of environmental factors appears to be of overriding importance. As yet, very few of the genes responsible for susceptibility to the development of overweight have been identified. The part played by interactions between genes or interactions between genes and lifestyle factors is also poorly understood.

Little targeted research has been carried out into the influence of specific behavioural determinants or environmental factors which underpin high-risk behaviour associated with the development of overweight (overconsumption and an inactive lifestyle). With regard to eating behaviour, it has been established that food preferences are often acquired at an early age and that preferences for energy-rich foods are easily acquired.³¹ In addition, research into eating behaviour and physical exercise has shown that many people are unaware of how much they eat and of how little exercise they take.³² Individuals must therefore develop an adequate awareness of their own eating behaviour and patterns of physical exercise. This is an essential first step in the instigation of behavioural changes. Furthermore, interactions between parents and children, role-model behaviour by parents, and rules imposed during upbringing are major factors that can affect the development of overweight in children.

There is strong evidence that various physical, economic and sociocultural factors (the so-called 'obesogenic environment') prompt individuals to eat large amounts of food and to take little exercise.³³ For example, various studies of children have found a link between the number of hours spent watching television and the development of overweight. There is a major correlation between the higher prevalence of obesity in population groups with a low socioeconomic status and environmental factors which tend to impede healthy behaviour.^{34,35}

Effective preventive intervention strategies

An intervention strategy that can effectively prevent undesirable weight gain has yet to be devised. Nevertheless, some short-term interventions have been carried out at schools in various countries and the reported results reveal a slight beneficial effect on the prevalence of overweight in children.³⁶ It is not known whether this is a short-term or long-term effect, however. The effectiveness of interventions which target environmental factors (in areas such as housing, transport systems, education, pricing and fiscal measures, and available foods) has also been too poorly studied to enable a verdict to be reached.

There has been scarcely any systematic research into the effectiveness of preventive interventions used in accordance with modern views on health promotion. The latter dictate that interventions be attuned to the specific behavioural determinants and environmental factors which underpin high-risk behaviour, and that interventions in the field of information provision and education be combined with regulations and environmental factors (so-called intervention mapping).^{37,38}

The aim of interventions must be both to increase habitual levels of daily physical activity and to reduce energy intake. The development and implementation of such intervention programmes requires a broad coalition of

actors, in which local and national authorities, industry, the healthcare system and the population must each shoulder their own share of responsibility.^{6,39,40}

Integrated approach to the treatment of obesity

According to international guidelines, the primary aim of obesity treatment should be to achieve a long-lasting weight loss of about 10%. Even this relatively small weight loss can produce significant health gains.⁴¹⁻⁴³ These international guidelines are based on a careful analysis of the strength of evidence presented in the available scientific literature on the identification, evaluation and treatment of overweight and obesity.^{44,45} Practical guidelines on obesity in children have been drawn up in much the same way.⁴⁶ A treatment protocol should also be drafted for all concerned healthcare professionals in the Netherlands, as a matter of urgency.

In international guidelines there is consensus regarding treatment criteria. Those eligible for treatment include all subjects with a BMI ≥ 30 kg/m² and those with a BMI of between 25 and 30 kg/m² and an increased health risk. This risk could be due to the presence of type 2 diabetes mellitus, hypertension, hyperlipidaemia, sleep apnoea or the central localisation of body fat. Alternatively, it could be related to a family history of increased health risk. While other moderately overweight subjects do not require special treatment, it is important to avoid further weight gains. Significant health gains can even be achieved by maintaining a constant, albeit slightly elevated body weight. All subjects with a BMI ≥ 40 kg/m² should be treated.

Dependent on the amount of overweight involved and on the presence of comorbidity, there is the option of an integrated approach. This aims to bring about changes both in terms of behaviour (diet and physical activity) and cognition, in some cases in combination with pharmacological or surgical therapy. The only effective strategy for obese children appears to be behaviour therapy in groups, in which the parents also participate.⁴⁷

On the basis of strict selection criteria, individuals with extreme overweight are eligible for medicinal or surgical treatment. Surgical treatment may be the solution in some cases of extreme obesity.^{48,49} Both treatment strategies must be used in combination with a weight management programme. There have been favourable reports about both medicinal treatment and surgical treatment, based on weight loss and improvements in terms of health risk factors and quality of life. Data on long-term results are only available for surgical treatment.⁵⁰

The major problem with current obesity treatment is that any weight loss achieved is not usually long lasting. The suspension of treatment negates its effects. This does not mean that obesity is untreatable. What it does show is that the treatment was effective but that it was terminated

prematurely. While there have been very few studies into the effectiveness of longer duration treatments (exceeding two years), some studies have described cases of long-lasting weight loss spanning periods of several years.⁸ While the treatment prospects for obese patients have improved in recent years, it should be pointed out that the beneficial results obtained only apply to a limited group of patients and then only for the duration of their treatment.

CONCLUSIONS AND RECOMMENDATIONS

The prevalence of overweight and obesity has taken on epidemic proportions: on average, 40% of Dutch adults are overweight (BMI ≥ 25) and 10% are obese (BMI ≥ 30). There is an increased prevalence of overweight in childhood, and obesity is more common in poorly educated and immigrant populations. Obesity and, to a lesser extent, overweight are associated with serious health problems and lead to increased costs for the healthcare system. The most alarming trends are the increasing prevalence of overweight and obesity in children and adolescents, and the increasing prevalence of type 2 diabetes mellitus. In addition, obese subjects run a greater risk of comorbidity with cardiovascular diseases, various types of cancer, respiratory problems, infertility, etc. Furthermore, obesity is often accompanied by psychological and social problems, as well as a reduced quality of life.

Over extended periods of time, overweight can easily develop when the energy balance is only slightly positive. There are clear indications of a substantial decline in the level of daily physical activity among the population of the Netherlands in recent years. There has also been a fall in average energy intake. It therefore seems likely that the increased prevalence of overweight and obesity is due to an increasing lack of exercise, combined with relative overconsumption. The prevention of overweight requires a good balance between the intake and expenditure of energy. Relatively small increases in energy expenditure, combined with relatively small decreases in energy intake can prevent weight gain. A daily food intake, which includes plenty of fruit, vegetables and cereal products (with a low energy density), together with at least one hour of moderate physical activity, provides the best chance of maintaining the energy balance and preventing weight gain. Obese subjects must exercise for at least 60 to 90 minutes a day to ensure that any weight loss is permanent.

While genetic factors play a part in the development of overweight and obesity, they can not account for the present

epidemic. Psychological, social and environmental factors are more likely determinants. There is strong evidence that the so-called 'obesogenic environment' prompts individuals to eat more and to take less exercise.

An intervention strategy that can effectively prevent weight gain has yet to be devised. However, in view of the explosive increase in the prevalence of obesity and of its associated serious medical problems, the Committee feels that development of preventive intervention programmes based on a common-sense approach should be given high priority. These preventive interventions should be based on modern views on health promotion, combining interventions in the field of information provision, regulations and environmental factors. Interventions should be attuned to the specific behavioural determinants and environmental factors which underpin high-risk behaviour in the target population, and should be aimed at increasing habitual levels of daily physical activity and reducing energy intake. The development and implementation of such intervention programmes requires a broad coalition of actors, in which local and national authorities, industry, the healthcare system and the population must each shoulder their own share of responsibility.

Obesity treatment should be targeted on a realistic weight loss. The primary aim should be to achieve a long-lasting weight loss of about 10%. Even this relatively small weight loss can produce significant health gains. Dependent on the amount of overweight involved and on the presence of comorbidity, an integrated (lifestyle) approach is needed, aimed at bringing about changes both in terms of behaviour (diet and physical activity) and cognition, in some cases in combination with pharmacological or surgical therapy. The only effective strategy for obese children appears to be behaviour therapy in groups, in which the parents also participate. While treatment prospects for obese patients have improved, it must be realised that the beneficial results obtained only apply to a limited group and then only for the duration of their treatment. Accordingly, obesity should be chronically treated and prevention of weight regain must be part of any treatment programme. A treatment protocol should also be drafted for all concerned healthcare professionals in the Netherlands, as a matter of urgency.

In view of the complexity and severity of the obesity problem, further research is required in many subfields, such as monitoring the prevalence of obesity in relation to long-term trends in energy intake and expenditure; the individual and social causes of overweight and obesity; the interaction between genetics and environment; product development; improvements of the obesogenic environment aimed at increasing physical activity and decreasing energy

intake; well-designed, effective preventive interventions; and long-term, effective treatment methods. In both the primary healthcare system and the child healthcare system, priority should be given to research into the efficacy of early identification and preventive intervention in moderately overweight adults and children, where there are additional risk factors, such as metabolic syndrome.

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The full report, with an executive summary in English (on which this publication is based), should be cited as follows: Gezondheidsraad. Overgewicht en Obesitas. Den Haag: Gezondheidsraad, 2003; publicatie nr. 2003/7. It can be downloaded from www.gr.nl.

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