

# Obesity and its comorbidities: present and future importance on health status in Switzerland

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## Summary

**Objectives:** The objective of this study was to estimate the proportion of various diseases attributable to obesity in Switzerland in order to get a hint of its present and future importance on health status and on our health care budgets.

**Methods:** The population attributable risk (PAR) for each of 17 obesity-linked conditions was estimated as the proportion of each disease condition which is attributable to obesity. The fraction of each disease that is attributable to obesity in Switzerland was calculated using the proportion (prevalence) of obesity in Switzerland and the relative risk of suffering from a given obesity-related disease in Switzerland or comparable countries.

**Results:** With a PAR of 88.6% diabetes represents the disease with the highest proportion attributable to obesity in Switzerland. It is followed by a PAR of 26.8% for hypertension, 24.7% for oesophageal cancer and 24.4% for gallstones. PARs of 17.4% and 5.7% were estimated for coronary heart disease and depression.

**Conclusion:** Treatment of these first four diseases represents 89% of the total health care costs attributable to obesity in Switzerland. The impact the present obesity epidemic on health status as well as its social and economic consequences must be recognised.

**Keywords:** Overweight – Obesity – Comorbidities – Population attributable factor – Health implications.

“The current obesity pandemic reflects the profound changes in society over the past 20–30 years that have created an environment that promotes a sedentary lifestyle and the consumption of a high fat, energy dense diet” (IOTF 2002). Obesity is a complex phenomenon, which has social, psychological and environmental dimensions. The condition affects all age- and socio-economic groups, both men and women and is not restricted to industrialised countries.

Obesity poses a major risk for serious diet-related noncommunicable diseases, including diabetes mellitus, cardiovascular disease, hypertension and stroke, and certain types of cancer. Its health consequences range from increased risk of premature death to serious chronic conditions with a reduced overall quality of life.

The World Health Organization (WHO) began sounding the alarm in the 1990s, with a series of expert and technical consultations (WHO 1997). Health education and health promotion campaigns were also initiated to inform the general public, policy-makers, private sector planners, and medical professionals.

The obesity issue requires action by government, industry, schools, and other bodies. The challenge ahead lies in getting the balance right.

The current global obesity crisis has also been highlighted in the WHO consultation report: “Obesity: preventing and managing the global epidemic”. Throughout Europe, obesity has increased 10–50% within the past decade and up to 75% in parts of the developing world (IOTF 2003). Worldwide over a billion adults and children are overweight, (IOTF & WHO 2000) and some experts have predicted that the current generation of children are likely to have shorter life expectancies than their parents because of obesity

(House of Commons Health Committee 2004). In terms of obesity alone, the International Obesity Task Force conservatively estimated that 300 million people around the world are obese, continuing to rise in the forthcoming decades. These trends will have severe health consequences as well as presenting social and economic challenges unless urgent action is taken to address the obesity epidemic problem.

Obesity is thought to be responsible for more illness than smoking. Being significantly overweight is linked to a wide range of health problems such as, for example, diabetes mellitus type 2, coronary heart disease, hypertension, depression and more. Another worrying development is the dramatically rising prevalence and magnitude of obesity in children. Biomarkers of an increased risk of chronic diseases (e. g. cardiovascular) are already detectable in children and adolescents (Weiss et al. 2004).

From an economic perspective the impact of obesity and its comorbidities are considerable. In Switzerland, for example, the direct and indirect health care costs of (adult) obesity and obesity-related comorbidities are conservatively estimated between CHF 2.2 and 3.3 billion a year (cost basis 2001). Proportionally speaking, overweight and obesity costs are equivalent (51.1 vs. 48.9%). However, the largest proportion of total health care costs (98.4%) relate *not* to treating the primary diagnoses of overweight or obesity but to the treatment costs of underlying *related diseases* due to being overweight or obese, representing 98.4% of the total (Schmid et al. 2005).

In the following article we review the most recently published literature on the impact of obesity on the development of its comorbidities.

**Table 1** Relationship of body mass index and increased risk of death (Katzmarzyk et al. 2002)

BMI (kg/m <sup>2</sup> )	Clinical definitions	Increase in mortality risk (%)
25–29.9	overweight	16
30–34.9	obese	25
> 35	morbidly obese	296

## Health effects

### *Clinical definition of obesity*

Obesity is *generally* defined using the clinical measure of body mass index (BMI), based on height and weight. As shown in Table 1, a BMI of 25 to 29.9 is considered overweight and one of 30 or more is considered to clinically morbidly obese. Death rates are noticeably higher for people with indexes above 25.

### *Diseases associated with obesity*

Obese people are more likely to suffer from a number of serious chronic illnesses (see Tab. 2), many of which are life-limiting at an early age (Bray 2004).

Figure 1 illustrates the underlying diseases diagnosed as a *comorbid* condition known to be due to the presence of the primary condition of obesity. Obesity therefore has a profound role in the sequence or epidemiological development of other illnesses. If the incidence of obesity rises there will therefore be increased levels of diseases such as diabetes type 2, cancer, depressions and heart diseases, the big four diseases linked to the condition of obesity.

### *Obesity attributable risk for Switzerland*

#### *Population attributable fraction (PAF)*

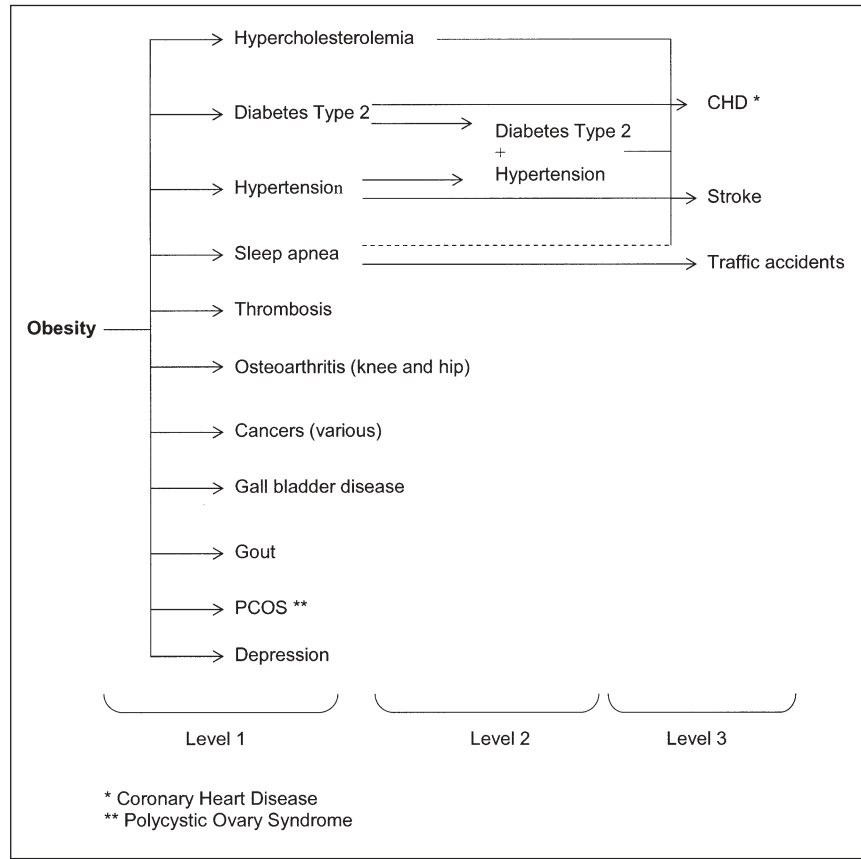
In determining the impact obesity has on morbidity and mortality it is generally accepted to calculate the fraction of

**Table 2** Relative risk of health problems associated with obesity in developed countries (IOTF 2002)

Greatly increased (relative risk >3)	Moderately increased risk (relative risk ca 2–3)	Slightly increased (relative risk ca 1–2)
Diabetes	Coronary heart disease	Cancer (breast, colon)
Gall bladder disease	Osteoarthritis (knees)	Reproductive hormone abnormalities
Hypertension	Hyperuricaemia and gout	Polycystic ovary syndrome
Dyslipidaemia		Impaired fertility
Insulin resistance		Low back pain
Breathlessness		Increased anaesthetic risk
Sleep apnoea		Foetal defects arising from maternity obesity

All relative risk estimates are approximate. The relative risk indicates the risk measured against that of a non-obese person. For example, an obese person is two to three times more likely to suffer from hypertension than is a non-obese person

**Figure 1** Comorbidities of obesity. Figure 1 illustrates the underlying diseases diagnosed as *comorbid* conditions known to be related to the presence of the primary condition of obesity. A primary comorbidity itself (level 1) may lead to a related second comorbidity (level 2) which itself may trigger a third comorbid condition (level 3)



an outcome that is attributable to obesity (the attributable fraction), using the proportion of obesity in a given population as well as the relative risk for a specific disease according to the formula below (Birmingham et al. 1999; Visscher & Seidell 2001):

$$P(RR-1)/[P(RR-1)+1] = AF_p$$

$AF_p$  is the population attributable fraction,  $P$  represents the probability of a person being overweight or obese (in a given population),  $RR$  denominates the relative risk for a specific disease (in a given population).

#### *Adult overweight and obese population in Switzerland*

In the past 15 years various studies were carried out in Switzerland to evaluate the prevalence of overweight and obesity in Switzerland. For this review the results from the latest investigation from the year 2002 were used (Bundesamt für Statistik 2003). According to this study for the year 2001, 29.4% of adults (>15 years) in Switzerland were overweight (BMI >25–30) and 7.7% were obese (BMI >30). Both men (3.3%) and women (3.4%) were about equally represented in the obese group. Combining the overweight and obese groups, a total of 37.1% of the population was

either overweight or obese which corresponds to 2.2 Mio people with increased body weight. A longitudinal comparison of several studies within the past 15 years shows that the number of overweight and obese people has risen considerably over the past 10 years.

It is important to note that the above numbers are based on a telephone survey, which may lead to a certain underestimation of body weight and an overestimation of height, respectively. Direct measurements carried out during the MONICA study in 1992/1993 resulted in a substantially higher regional prevalence of obesity than the numbers used in this review.

#### *Population attributable fractions (PAF) for Switzerland of presently known diseases linked to obesity*

Since the availability of Swiss data is limited, the relative risks of the two BMI categories for the obesity related comorbidities evaluated were extracted from the published literature using various, but most recent sources available from different countries as described below. In general, a conservative approach was followed using the lowest values whenever two or more sources were available. The above described relative risks for the obesity related comorbidities

were evaluated by two Swiss obesity experts and were appraised as realistic for Switzerland.

Hypertension, hypercholesterolemia and diabetes are all risk factors for developing coronary heart disease or to suffer a stroke. Excessive body weight represents an additional, independent risk factor. The relative risks for each of these risk factors has been described in two relevant publications (Field et al. 2001; Wilson et al. 2002).

For hypertension both studies describe a comparable relative risk of 2.1 for obese women and 2.7 for obese men.

In the case of hypercholesterolemia a relative risk of 0.9 for obese women and 1.2 for obese men (Field et al. 2001) were used since the relative risk provided by Wilson et al. (2002) based on a cut-off point off for total cholesterol considered as “too high” resulting in a too low estimate for the number of people with hypercholesterolemia.

Similarly, for the relative risk of developing diabetes type 2 the numbers provided by Field et al. (2001) were used. Again, the relative risks provided by Wilson et al. (2003) were considered as too low since the diabetes defining blood levels were higher than usual yielding estimates classified as too low. Field et al. (2001) provided an obesity related odds ratio for developing diabetes based on a total of 123 750 participants from the “Nurses’ Health Study” and the “Health Professionals Follow-up Study” which resulted in a population attributable fraction of close to 90% which, however, was considered as realistic for Switzerland by two consulted obesity experts.

In the case of coronary heart disease and stroke the relative risks from Field et al. (2001) were used for reasons of consistency, but the relative risks published by Wilson et al. (2002) and Kannel et al. (2002) lay in a comparable range.

The relative risks used for calculating the population attributable fractions in the case of neoplastic diseases were extracted from the recent publication of Calle et al. (2003). In this study more than 900 000 participants were investigated in a 16-year follow-up with respect to body weight and mortality due to death by various types of cancer. For Switzerland the population attributable factors are higher than 10% in a variety of cancers such as breast cancer, cancer of the esophagus, gall bladder, kidney and uterus for the combined overweight and obese population. The relative risk for colon cancer was also investigated by Field et al. (2001) amongst the participants from the “Nurses’ Health Study” and the “Health Professionals Follow-up Study” yielding a comparable value as described by Calle et al. (2003).

In osteoarthritis, both knee and hip joints are affected and have to be estimated separately with respect to relative risks.

A positive association between obesity and arthritis of the hip has been described by Lievense et al. (2002) with an odds ratio of approximately 2. In a more recent study in 93 000 US nurses (Karlson et al. 2003) BMI was related to relative risk for hip replacement as follows: BMI 25–29.9, RR 1.3; BMI 30–34.9, RR 1.5; BMI  $\geq$  35, RR 2.6. A stronger association between excess body weight and arthritis of the knees has been reported. In a population-based “case-control” study in the UK an “odds ratio” of 2.5 for BMI 25–29.9 and one of 6.8 for BMI  $>$ 30 was found (Coggon et al. 2001). For the PAF calculations for Switzerland “odds ratios” of 6.9 for obese women and 4.6 for obese men (Wendelboe et al. 2003) were employed yielding a population attributable fraction of 60% for combined overweight and obese conditions.

The association of depression with obesity has been recognized more recently. For this reason the number of publications offering relative risk estimates is limited. A US-based study from Alameda County in California has investigated 2000 obese persons over a period of five years (Roberts et al. 2002) for incidence of “major depressions”. It was clearly demonstrated that obesity increases the risk for becoming depressed with a relative risk of 1.8 for both obese women as well as men. Interestingly, it was also demonstrated that the reverse effect, depression causing obesity, was not observed.

Obesity is also a risk factor for developing a thrombosis. For estimating the PAF for Switzerland the relative risks from a population based Dutch “case-control” study (Abdollahi et al. 2003) were used. These data were confirmed by two other studies (Samama et al. 2000; Tsai et al. 2002).

In the case of gout no recent studies from Europe were available. For this reason a relative risk of 2.5 (for men and women) from a US publication (Bray 2004) was employed.

Young et al. (2002) describe that a significant association between sleep apnea and excess body weight has been found in a variety of studies with a higher relative risk for men compared to women. In a recent publication an “odds ratio” of 2.9 for overweight men and one of 4.4 for obese men (Schäfer et al. 2002) were described which were used for calculation a PAF of more than 60% for the male Swiss population with overweight and obesity.

Obesity is also affecting female reproductive capacity. About 15% of obese women (BMI  $>$ 28) are suffering a miscarriage compared to 11% of women with normal body weight (odds ratio of 1.4) (Pettigrew & Hamilton-Fairly 1997). In addition, obesity shows a strong correlation with the “polycystic ovary syndrome” (PCOS) with a risk that is 1.5 times higher in obese women as determined by a recent Finnish study (Laitinen et al. 2003).

**Table 3** Probability, relative risk (or odds ratio), and calculated population attributable factor (PAF) relative to normal weight for obesity associated diseases in Switzerland

Disease		P (Bundesamt für Statistik 2003)	RR/OR	Total PAF (%)	Source of RR/OR
<b>Hypertension</b>	Women – ovw	0.218	1.7	<b>26.8</b>	Field et al. 2001
	Women – obes	0.075	2.1		
	Men – ovw	0.375	1.7		
	Men – obes	0.079	2.7		
<b>Hypercholesterolemia</b>	Women – ovw	0.218	1.1	<b>6.5</b>	Field et al. 2001
	Women – obes	0.075	0.9		
	Men – ovw	0.375	1.3		
	Men – obes	0.079	1.2		
<b>NIDDM</b>	Women – ovw	0.218	4.6	<b>88.6</b>	Field et al. 2001
	Women – obes	0.075	10		
	Men – ovw	0.375	3.5		
	Men – obes	0.079	11.2		
<b>Stroke</b>	Women – ovw	0.218	1.2	<b>9.2</b>	Field et al. 2001
	Women – obes	0.075	1		
	Men – ovw	0.375	1.2		
	Men – obes	0.079	2		
<b>CHD</b>	Women – ovw	0.218	1.4	<b>17.4</b>	Field et al. 2001
	Women – obes	0.075	1.5		
	Men – ovw	0.375	1.5		
	Men – obes	0.079	2		
<b>Breast cancer</b>	Women – ovw*	0.309	1.34	<b>15.7</b>	Calle et al. 2003
	Women – obes*	0.104	1.63		
<b>Colorectal cancer</b>	Women – ovw	0.218	1.1	<b>7.6</b>	Calle et al. 2003
	Women – obes	0.075	1.33		
	Men – ovw	0.375	1.2		
	Men – obes	0.079	1.47		
<b>Esophageal cancer</b>	Women – ovw	0.218	1.49	<b>24.7</b>	Calle et al. 2003
	Women – obes	0.075	2.64		
	Men – ovw	0.375	1.76		
	Men – obes	0.079	1.91		
<b>Pancreatic cancer</b>	Women – ovw	0.218	1.11	<b>7.6</b>	Calle et al. 2003
	Women – obes	0.075	1.28		
	Men – ovw	0.375	1.24		
	Men – obes	0.079	1.34		
<b>Stomach cancer</b>	Women – obes	0.075	1.3	<b>1.9</b>	Calle et al. 2003
	Men – obes	0.079	1.2		
<b>Liver cancer</b>	Women – ovw	0.218	1.02	<b>7.3</b>	Calle et al. 2003
	Women – obes	0.075	1.4		
	Men – ovw	0.375	1.13		
	Men – obes	0.079	1.9		
<b>Prostata cancer</b>	Men – ovw	0.375	1.08	<b>4.5</b>	Calle et al. 2003
	Men – obes	0.079	1.2		
<b>Cancer of the corpus and uterus</b>	Women – ovw	0.218	1.5	<b>20.1</b>	Calle et al. 2003
	Women – obes	0.075	2.53		
<b>Gallstones</b>	Women – ovw	0.218	1.9	<b>24.4</b>	Field et al. 2001
	Women – obes	0.075	2.5		
	Men – ovw	0.375	1.4		
	Men – obes	0.079	2.3		
<b>Osteoarthritis**</b>	Women – ovw	0.218	1.44	<b>21.4</b>	Wendelboe et al. 2003
	Women – obes	0.075	1.82		
	Men – ovw	0.375	1.5		
	Men – obes	0.079	2.79		
<b>Depression</b>	W a M – obes	0.077	1.79	<b>5.7</b>	Roberts et al. 2003
<b>Gout</b>	W a M – obes	0.077	2.5	<b>10.4</b>	Lévy et al. 1995

\* only postmenopausal women (age  $\geq 50$  years), \*\* based on relative risk for hip osteoarthritis  
ovw = overweight (BMI 25–29.9 kg/m<sup>2</sup>), obes = obesity (BMI  $\geq 30$  kg/m<sup>2</sup>)

The relative risks (odds ratios) and population attributable fractions of the various diseases associated with overweight (BMI >25–30) and obesity (BMI >30) for Switzerland are shown in Table 3.

## Discussion

No country in Europe provides a satisfactory level of care for obese patients, even though an estimated 135 million people in need of medical advice on weight control (OTF 2002).

The dramatically increasing prevalence and magnitude of obesity in children is another worrying development. The number of obese children has doubled in the last two decades. In the UK one in 10 6-year-olds and one in six 15-year-olds are now obese. Projecting these figures forward by 15 years by simply maintaining the rapid acceleration of childhood obesity in the last decade, the predicted prevalence in children will be in excess of 50% (House of Commons Health Committee 2004).

In Switzerland, a recently published study (Zimmermann et al. 2004) reported the prevalence of overweight (according to CDC criteria) in six to 12 year old children was an alarming 19.1% in girls and 20.3% in boys. Corresponding figures for obesity were 5.9% for girls and 7.6% for boys. The cause for concern is twofold. Firstly, cohort studies show that obesity may track from childhood to adulthood, where morbidity is very evident. Secondly, obesity in adolescence is directly associated with increased morbidity in adult life independent of adult body weight.

Tackling the obesity epidemic requires a comprehensive and integrated strategy, based on evidence of effectiveness (House of Commons Health Committee 2004). Whilst measures that promote individual responsibility for the obesity problem are important, there is an urgent need for measures that promote *public* responsibility, with respect to:

- Preventing the shift from overweight to obesity
- Assessing and generating solutions to the problem of childhood obesity
- More effective guidelines to deal with weight management
- Measures to reduce the financial burden that obesity has on society

A major problem in tackling the obesity epidemic has been that only few strategies are based on evidence of effectiveness. The only interventions that are somewhat supported by research are surgery for the morbidly obese; drugs; and multicomponent weight loss programmes consisting of diet, exercise, and behaviour therapy (McTigue et al. 2003). Such

studies have been done in clinical settings with adults and, with the exception of surgery, have resulted in only modest weight loss in the long term. More limited research on the prevention and treatment of obesity in children suggests that school programmes may be effective (Campbell et al. 2002; Wilson et al. 2003; Weiss et al. 2004).

Regarding the comorbidities of obesity, the most dramatic impact has certainly been observed in the area of diabetes type 2. In the US, the number of diabetics is projected to rise from 11 to 29 million during the period 2000 to 2050 (Boyle et al. 2001). Extrapolated to a worldwide scale, this translates to an increase from the 200 million people suffering from diabetes in 2000 to 300 million by 2020.

A most alarming sign is the fact that type 2 diabetes which was normally associated with diabetes developing in adults – often termed adult onset diabetes – is now increasingly diagnosed in children. In the US it is estimated that up to 45% of the cases of diabetes diagnosed in children are now type 2 (Fagot-Campagna 2000). In a Canadian long-term study with patients having developed diabetes type 2 before the age of 17, it was found that seven had died, three others were on chronic dialysis, one had become blind and of 56 pregnancies followed in this cohort, only 35 (62.5%) resulted in live births (Dean & Flett 2002). Clearly, obese children developing early type 2 diabetes will have a (most likely shortened) life time to develop other severe associated comorbidities such as coronary heart disease, depressions, osteoarthritis and the like. With a PAF of 88.6% for diabetes in Switzerland, it can be safely predicted that the obesity epidemic will be followed by a diabetes epidemic in Switzerland.

As shown in this paper a considerable number of cancer deaths in Switzerland – in men and in women – are attributed to obesity. Cancer Research UK suggests that one in eight UK cancer deaths are caused by obesity (House of Commons Health Committee 2004). This clear association between obesity and cancer is hardly recognized by the public as shown by a recent survey which showed that only 3% of the UK population is aware of this fatal link between excess body weight and cancer. It can be safely assumed that the Swiss population is also not aware of this fact although the factor overweight/obesity is the main preventable risk factor for developing cancer after tobacco.

Psychological problems caused by overweight and obesity will develop into a substantial health burden. In childhood, the first problems encountered are emotional. Obese children are exposed to the consequences of disapproval of their fatness by their peers. As they grow older, the psychological consequences of obesity develop frequently from lowered self-esteem into clinical depression. The prevalence of

depression is about twice as high in obese men and women compared to normal weight people (Roberts 2003). As a consequence, obese women are more likely, by around 40%, to commit suicide than normal weight women (House of Commons Health Committee 2004). Excess weight is also often leading to prejudice in the work place, reduced job opportunities and increased likelihood to become unemployed.

Recent studies in Europe have confirmed that obesity is a risk factor for all-cause mortality (Sjöström 1992; Banegas et al. 2003). Annual deaths attributable to overweight and obesity in Europe amounted to approximately 280 000 (Banegas et al. 2003). Several studies have described an exponential relationship between increasing BMI and the risk of dying prematurely. As an example, as shown in Table 3, with a BMI >35 the mortality risk increases 3-fold. With an expected decrease in smoking, it can be anticipated that obesity will overtake tobacco as the leading cause of death in the near future (Mokdad et al. 2004).

### Summary and conclusions

The prevalence of obesity is increasing worldwide. The population in Switzerland follows this general pattern of developing excess body weight. Numerous diseases are caused or

made worse through obesity. These include type 2 diabetes, hypertension, dyslipidemia, coronary heart disease, depression, stroke, osteoarthritis, various types of cancer and obstructive sleep apnea. Due to these multiple obesity associated comorbidities, the quality of life of the obese population is markedly reduced and the risk of premature mortality is higher. The estimated mortality from obesity related diseases in Europe is approximately 280 000 annually (Banegas et al. 2003) and growing. Until 2020, mortality associated with obesity is expected to exceed that related to tobacco use.

In conclusion, obesity is becoming our worst pathogen. It is a direct effect of our present lifestyle of copious food and increasing physical inactivity. This lifestyle is evolving rapidly into a part of the culture of our children and adolescents and is firmly established within our economies. Change won't come easy. Preventive programs have yet to be put into effect before they will affect the ever rising prevalence. Effective solutions are needed urgently.

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### Zusammenfassung

#### Fettleibigkeit und Komorbidität: aktuelle und künftige Wichtigkeit des Gesundheitsstatus in der Schweiz

**Fragestellung:** Die vorliegende Studie hatte zum Ziel, den Adipositas-bedingten Anteil von Krankheiten abzuschätzen, die teilweise als direkte Folge von Übergewicht und Adipositas entstehen.

**Methoden:** Der bevölkerungsbezogene beizumessende Anteil (PAF) an 17 teilweise Adipositas-bedingten Krankheiten wurde berechnet aufgrund der Adipositas-Prävalenz in der Schweiz und dem relativen Risiko, in der Schweiz an einer solchen Krankheit zu leiden.

**Ergebnisse:** Mit einem bevölkerungsbezogenen beizumessenden Anteil von 88,6% stellt Diabetes (NIDDM) die mit Abstand wichtigste Adipositas-bedingte Krankheit dar. Mit einem PAF

von 26,8% folgt der hohe Blutdruck, mit 24,7% der Speiseröhrenkrebs und mit 24,4% das Auftreten von Gallensteinen. Für weitere Krankheiten mit hohen Folgekosten wie Herz-Kreislaufkrankungen und Depression wurden PAFs von 17,4% respektive von 5,7% ermittelt.

**Schlussfolgerungen:** Die Behandlung der Adipositas-bedingten Anteile dieser vier Krankheiten allein verschlingt 89% der gesamten durch Übergewicht und Adipositas verursachten Gesundheitskosten in der Schweiz. Es ist an der Zeit, dass die Wichtigkeit der schnell zunehmenden Adipositas-Epidemie und ihre Folgen für die Schweizer Bevölkerung erkannt wird, da die sozialen und ökonomischen Konsequenzen dieser Entwicklung unser Gesundheitssystem wohl zu sprengen vermögen.

## Résumé

### Obésité et pathologies associées: leurs impacts actuels et futurs sur l'état de santé en Suisse

**Objectifs:** Estimer les proportions de différentes pathologies associées à l'obésité de manière à obtenir un aperçu de leurs impacts actuels et futurs sur l'état de santé et sur les budgets de la santé en Suisse.

**Méthodes:** Le risque attribuable dans la population (RAP) à chacune des 17 pathologies en lien avec l'obésité a été estimé comme étant la proportion de chacune de ces pathologies attribuable à l'obésité. Cette proportion a été calculée sur la base de la prévalence de l'obésité en Suisse et sur la base du risque relatif de souffrir d'une pathologie en lien avec l'obésité en Suisse (ou dans des pays comparables).

**Résultats:** Avec un RAP de 88,6 %, le diabète obtient la plus haute proportion attribuable en Suisse. Il est suivi par l'hypertension (RAP de 26,8 %), le cancer de l'œsophage (RAP 24,7 %) et les calculs biliaires (RAP 24,4 %). Des RAP de 17,4 % et 5,7 % ont été respectivement estimés pour les maladies coronariennes et la dépression.

**Conclusions:** Le traitement de ces quatre premières pathologies représente à elles seules 89% du total des coûts de santé attribuables à l'obésité en Suisse. L'impact de l'épidémie d'obésité sur l'état de santé de même que ses conséquences économiques et sociales doivent être reconnues.

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