

EXECUTIVE SUMMARY

There is worldwide agreement that obesity represents and remains a serious and still growing public health problem and many studies are available that address the fact that obesity-linked comorbidities such as hypertension, coronary heart disease, diabetes type 2 and depression represent the true medical as well as financial burden related to overweight and obesity for our society.

Thus, the aims of the present study were to a) assess the cost burden of adult obesity in Switzerland based on the prevalence data from the fifth Health Survey carried out in 2012, b) compare it to the cost of illness data evaluated on the basis of the previous Health Surveys from 2002 and 2007 and, c) investigate statistical interactions of possible risk factors with obesity and with respect to the most important obesity-related comorbidities using general linear regression and logistic regression model statistics.

Epidemiology of BMI

This report presents key information about overweight and obesity among the adult population (age 15 or older) in Switzerland, based on data from the five cross sectional national surveys carried out so far.

The development of overweight (BMI \geq 25) over the period between 1992 and 2012 clearly demonstrates that the part of the Swiss population suffering from overweight and obesity increased considerably over the last 20 years from 30.3% to 41.2%. This increase in excess body weight was caused by a predominant increase in the proportion of overweight individuals with BMI 25 - 29.9 by 6% (from 24.9% to 30.9%) and a concomitant increase of the obese (BMI \geq 30) population by 4.9% (from 5.4% to 10.3%). In 2012 the number of overweight men was with 1.7 Mio considerably higher than the corresponding number of overweight women (1.1 Mio). Looking at the segment of the actually obese adult Swiss (BMI \geq 30), the difference between male and female inhabitants has narrowed as approximately 327'000 obese women compare to approximately 376'000 obese men.

Health problems associated with overweight and obesity

In our first report on the burden of overweight and obesity in Switzerland in 2004, 26 diseases were identified as overweight- and obesity-related comorbidities. In the previous study in 2009 this number was slightly increased to 32 diseases indicating that additional information on the relationship between obesity and the manifestation of other diseases was reported by that year. In the present study the number of obesity-related comorbidities was reduced by one - to 31 - since kidney disease was demonstrated in the mean time to not being linked to an increased BMI.

In 2004 we were able to assign costs to 18 diseases considered as comorbidities clearly associated with obesity. In the previous study in 2009 we evaluated a smaller

number of comorbidities, i.e. 12, as cost-relevant diseases for Switzerland. In our present assessment in 2014, the number of cost-relevant comorbidities was reduced further by one (elimination of kidney disease, see above) to a total of 11 comorbidities.

Economic burden of overweight and obesity in 2012

In contrast to our first study where cost estimates of only three of the comorbidities were based on actual Swiss data, the 2009 cost evaluation did rely on seven Swiss based cost estimates, three of them (diabetes type 2, coronary heart disease and asthma) belonging to the top four with regard to cost relevance. In the present study, cost estimates of seven of the total 11 cost-relevant comorbidities were based on Swiss cost data with three of them – depression, diabetes mellitus type 2 and coronary heart disease – being part of the four most cost-generating comorbidities.

The attributable fraction of the direct overweight- and obesity-linked disease costs of CHF 3'830 Mio in the year 2007 represented about 7.3% of the total healthcare expenses in Switzerland of CHF 52.7 billions in 2006 (Federal office of statistics (BFS) 2007). In 2012, the attributable fraction of the direct overweight- and obesity-linked disease costs of CHF 4'658 Mio represent 7.2% of the total Swiss healthcare expenses of 64.6 billions (Federal office of statistics (BFS) 2013) in 2011 remaining practically unchanged with respect to our previous assessment.

From the societal point of view, the estimate of the total economic burden for overweight and obesity and associated diseases (comorbidities) has exactly tripled over the past ten years from CHF 2'648 Mio (cost basis 2001) in 2002 to CHF 5'755 Mio (cost basis 2006) in 2007, to CHF 7'990 Mio (cost basis 2011) in 2012. The contribution of overweight and obesity to these costs are approximately equal.

The exclusively obesity-linked costs (direct comorbidity costs only) of CHF 2'204 Mio represent about 0.38% of the national gross domestic product (GDP) of CHF 585.1 billions in 2011 (Federal office of statistics (BFS) 2013), a basically identical percentage when compared to the situation in 2006, i.e. exclusively obesity-linked costs (direct comorbidity costs only) of CHF 1'866 Mio representing about 0.37% of the national gross domestic product (GDP) of CHF 508 billions in 2006. According to a study published in 2008 on the health-economic burden of obesity in Europe, the estimated obesity related costs range from 0.09 to 0.61% of the total annual gross domestic income in Western European countries indicating that the economic costs of obesity in Switzerland are comparable to such estimates from other European countries.

Statistical Evaluation

Using a general linear regression analysis model on the Swiss population interviewed for the fifth Health Survey carried out in 2012, it was possible to confirm that six of the 11 obesity-linked comorbidities are indeed statistically significantly correlated to body weight. Five of them, asthma, diabetes type 2, osteoarthritis, high blood pressure and depression, representing the five most costly of these chronic comorbidities (covering 80% of all direct costs of comorbidities) were actually significantly correlated to

increased body weight. Stroke, often with fatal outcome, was negatively correlated with body weight, possibly indicating that the chances to survive a stroke decrease as body weight, respectively BMI increases.

Again using a general linear regression analysis model the interaction between physical complaints - representing general stress symptoms - and body weight were evaluated. A typical general stress symptom such as back pain/lower back pain was statistically significantly correlated with increasing body weight.

Using a logistic regression model, various factors were tested for their influence on the manifestation of diabetes type 2. BMI was most impressively linked to the occurrence of diabetes type 2 in the entire segment of the Swiss population investigated. Furthermore, participating in a dietary program for medical reasons was also an important factor in the context of diabetes type 2. On the other hand, physical activity had a moderate negative effect on diabetes, whereas consumption of a moderate-to-large amount of fish was negatively linked to diabetes in the female subsegment.

Also regarding depression, BMI was significantly linked to the occurrence of depression in the entire segment of the Swiss population investigated, i.e. as body weight increases the chances of becoming depressive clearly increases. In addition, participating in a dietary program for medical reasons was also an important factor in the context of manifestation of depression. This effect was still clearly seen after exclusion of all diabetic patients from the investigated population.

As shown by multiple linear regression, BMI was also most impressively linked to the occurrence of hypertension in the entire segment of the Swiss population investigated, i.e. as body weight increases, the chances of suffering from hypertension increases drastically. Furthermore, participating in a dietary program for medical reasons also was an important factor in the context of the manifestation of hypertension.