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Excess weight in the canton of Zurich, 1992–2009: harbinger of a trend reversal in Switzerland?

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Summary

BACKGROUND/OBJECTIVE: In Switzerland, as in most developed countries, there has been a growing prevalence of excess weight in recent decades. However, within the country there may be regional variations. We investigated whether the trends in excess weight prevalence in the largest urban region differed from that in the rest of German Switzerland (GS).

METHODS: We used individual data from four nationally representative Swiss Health Surveys (1992–2007) and from one survey conducted in the Canton of Zurich (ZH) in 2009. All studies used self-reported height and weight (18–74 years, N = 41 628). Prevalence rates of excess weight (BMI ≥ 25 kg/m^2) were age standardised and population weighted. Odds ratios (OR: normal vs. excess weight) were obtained with weighted multivariable logistic regression.

RESULTS: The prevalence of excess weight was lower in ZH than in GS, with increasing differences over time. In GS, OR increased in men (p trend 1992–2007 <0.001) and stagnated in women. In contrast, in ZH, OR stagnated in men and decreased in women (p trend 1997–2009 = 0.005). Within ZH, compared to the capital city, OR were higher in men in the less privileged part of the Metropolitan Area (p = 0.046) and in women not living in the Zurich Metropolitan Area (p = 0.049).

CONCLUSION: In ZH, the prevalence of excess weight stagnated in men and decreased after having reached a peak in 1997 in women. This is the first study showing a decrease in Swiss adults, a population with internationally low excess weight prevalence. There is room for speculation whether ZH is a harbinger of the future situation in other regions of Switzerland and possibly other developed countries.

Key words: *obesity; overweight; excess weight; decreasing prevalence; canton of Zurich; Switzerland; trends*

Introduction

Worldwide, the prevalence of excess weight (overweight or obesity, BMI ≥25 kg/m^2) is increasing [1, 2]. The increase is particularly marked in developing countries [2]. In contrast, some developed countries show first indications of stagnation [1]. However, this occurs chiefly in countries with high prevalence, e.g. in the US, where 68% of the population have excess weight [1]. Hence the observed stagnation could simply be due to saturation, with only a few individuals remaining who could potentially become overweight.

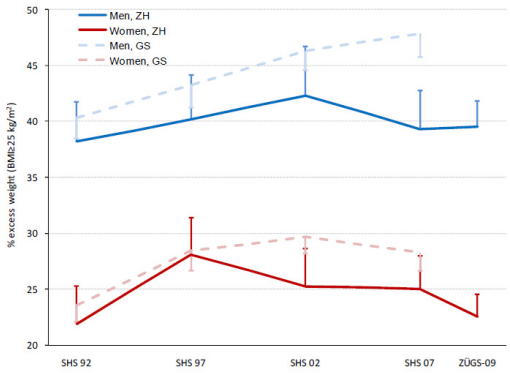
A focus on regional trends and variations within a nation may be worthwhile. This could disclose prevention potential in regions with higher prevalence, or provide hints about possible future developments in other parts of the country. If merely national figures are looked at such valuable information could be missed. In Switzerland, regional variations in the prevalence of excess weight have been reported previously in children [3, 4]. Studies in adults are rare, their samples are not representative and their results inconsistent [5]. In this country the national prevalence of adult excess weight increased between 1992 and 2007 [6]. However, the increase slowed recently in women [6]. With 1.4 million inhabitants the canton of Zurich (ZH) is the canton with the largest population and the economic centre of Switzerland [7]. The population is mainly urban [7]. For ZH, recent representative population data are available and this additional measurement point in time affords further information on whether the slowdown in the increase of excess weight prevalence on the national scale could be the beginning of a trend reversal.

In this study we assessed the change in prevalence of excess weight between 1992 and 2009 in ZH and compared it with the respective results from the rest of German Switzerland (GS). We also analysed geographical variation within ZH. For these purposes we used self-reported data from adults participating in the four Swiss Health Surveys (SHS: 1992/3, 1997, 2002, and 2007) and a survey on obesity conducted in ZH in 2009.

Participants and methods

Swiss Health Survey (SHS)

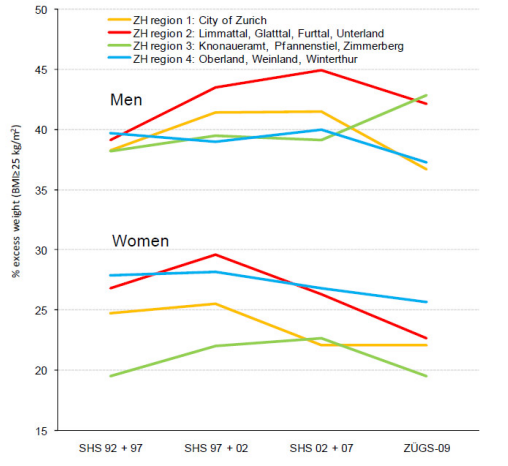
Data from 1992 to 2007 stem from the four cross-sectional, nationwide SHS [8, 9]. The SHS is conducted every five years, targets the general population of Switzerland aged ≥15 years and living in private households. The survey provides representative information on health-related behaviour and attitudes, as well as healthcare utilisation. For each survey eligible subjects were chosen by stratified random sampling (based on telephone registry) of all private households with landline phones. Within each household contacted, one member was randomly selected for computer assisted telephone interview (CATI). The nationally representative surveys were conducted in 1992/93 (total n = 15 288), 1997 (n = 13 004), 2002 (n = 19 700), and 2007 (n = 18 760). The population included in our analyses is shown in table 1.



SHS: Swiss Health Survey; ZÜGS-09: Zürcher Übergewichtsstudie 2009; ZH: canton of Zurich; GS: German Switzerland except for ZH

Figure 1

Age standardised and population weighted prevalence (% with 95% confidence interval) of excess weight by region and sex, 1992–2009, men and women aged 18–74 years (n = 41628).



SHS: Swiss Health Survey; SHS 92+97: mean of SHS 1992/39 and SHS 1997; SHS 97+02: mean of SHS 1997 and SHS 2002; SHS 02+07: mean of SHS 2002 and SHS 2007; ZÜGS-09: Zürcher Übergewichtsstudie 2009 ZH: canton of Zurich;

Figure 2

Age standardised and population weighted prevalence (%) of excess weight by region in the canton of Zurich, by survey and sex, men and women aged 18–74 years (n = 10761).

Canton of Zurich (ZH)

ZH is situated in the northern part of Switzerland. With 1.4 million inhabitants (2009) this canton is the largest economic centre in the country [7]. The population can be regarded as predominantly urbanised, and 23.3% of it are foreign nationals [7]. Since there are various academic centres in ZH, the educational level of the population is expected to be above average. The canton can be partitioned into four regions: 1: City of Zurich (capital city); 2: Limmattal, Glatttal, Furttal, Unterland (the less privileged part of the Zurich Metropolitan Area); 3: Knonaueramt, Pfannenstiel, Zimmerberg (the more privileged part of the Zurich Metropolitan Area); 4: Oberland, Weinland, Winterthur (neither capital city nor Zurich Metropolitan Area).

Zürcher ÜberGewichtsStudie (ZÜGS-09)

The ZÜGS-09 was commissioned by the cantonal health authorities and designed by the University of Zurich Institute of Social and Preventive Medicine, the Institute of Mass Communication and Media Research of the University of Zurich, and DemoSCOPE (market research institute, http://www.demoscope.ch). The ZÜGS-09 was designed to assess body weight and attitudes towards lifestyles relevant for a healthy weight. Sampling procedures were the same as in the SHS. Overall, 4250 persons aged between 15 and 74 agreed to participate and to report height and weight. Persons were interviewed between 8 July and 10 August 2009 by DemoSCOPE.

Measurement of excess weight

All data were self-reported. The following questions were asked to assess height (cm) and weight (kg): “Could you tell me how tall you are without shoes?”; “How heavy are you without clothes?”. BMI was calculated as weight divided by height squared (kg/m^2). Excess weight (BMI ≥25 kg/m^2) and normal weight (BMI 18.5–24.9 kg/m^2) were defined according to the World Health Organization criteria [10]. We also assessed obesity (≥30 kg/m^2), but the number of obese persons was too small to provide interpretable results.

Statistical analysis

Because of other criteria for excess weight below age 18, we restricted our analysis to age range 18–74 and excluded individuals with missing weight or height. We calculated counts, means and prevalence rates (with 95% confidence intervals). To account for variations in age structure between surveys (e.g., due to ageing of the population between 1992 and 2009), prevalence rates and means were standardised for age (5-year age categories, population of Switzerland in the year 2000 as reference). All results were also population weighted using weights provided with each of the four SHS or weights derived from the ZH population in 2000 (stratified for age, sex and region). Due to the small number of ZH men and women participating in the SHS, we decided to pool data of two SHS (92+97, 97+02, 02+07) and use their mean (fig. 2). Pooling resulted in a more comparable number of participants for each measurement point. Another advantage of pooling was that the interval between the last two measurement points more closely resembled that between the other points (i.e., 4.5

and 5 years instead of 2 years between 2007 and 2009). Because of pooling, persons participating in SHS 97 and 02 were counted twice in this analysis.

To better assess changes in excess weight prevalence in ZH and GS over surveys, age categories and ZH regions, population weighted multivariable logistic regression models for excess weight (vs. normal weight) were used. Statistical significance (p-values in table 2) of differences between ZH and GS were calculated by including interaction terms (region*survey) in the model. Significance of trends over surveys was obtained by comparing the model with and without the linear survey variable using a likelihood-ratio test. Analyses were performed with Stata 11.0 (Stata Corp, Texas, USA).

Results

Table 1 provides an overview of the populations included in our study. Figures are population weighted. The sample size for ZH was larger in SHS 07 than in SHS 92, 97 and 02. This was mainly due to oversampling in the capital city. The number of participants in ZÜGS-09 was more than twice that of the average number of participants in the SHS. Except for the SHS 07's over-proportional participation in the capital city, the proportional distribution of participants over the four ZH regions is quite comparable. The increase in mean age over surveys was in line with the ageing of the population (comparable in GS and ZH). Differences between GS and ZH were also small with respect to mean year of birth.

Figure 1 illustrates the prevalence of excess weight by sex in ZH (solid lines) and GS (faded dashed lines) between 1992 and 2007/9. In ZH men the prevalence peaked in 2002, while in GS men the prevalence was still growing. In 2007 the difference between ZH and GS men reached statistical significance (i.e. the 95% confidence intervals do not overlap). The prevalence peak in ZH women was reached earlier (1997) than in ZH men and in GS women (2002). Correspondingly, the greatest difference between ZH and GS was earlier in women (2002) than in men (2007).

Figure 2 shows the change in prevalence in the four regions of ZH in men and women (for the SHS, means of two surveys were used). Except for Knonaueramt-Pfannenstiel-Zimmerberg, the prevalence in men peaked in 2002/2007, while in women the peak was earlier (1997/2002). In women the prevalence rates decreased thereafter continuously.

Table 2 shows the results of the adjusted logistic regression. Odds of having excess weight vs. being normal weight are given by sex and region. Statistical significance of regional differences (ZH vs. GS) and of trends over surveys are given separately. In ZH excess weight prevalence did not significantly change between 1992 and 2009 in men (p trend = 0.371) but decreased between 1997 and 2009 in women (p trend = 0.005). In GS by contrast, there was a significant increase between 1992 and 2007 in both sexes (p trend <0.001). However, prevalence peaked in GS women in 2002, whereas it continued to increase in GS men up to 2007. The differences in excess weight between GS and ZH tended to increase over time, particularly in men (i.e., in 1992 p difference = 0.542, in 2007 p difference

Table 1
Counts and population weighted means and medians by survey, 1992–2009, men and women aged 18–74 years (n = 41628).

	Swiss Health Survey (SHS)				
	SHS 92	**SHS 97**	**SHS 02**	**SHS 07**	**ZÜGS-09**
Study year	1992–93	1997	2002	2007	2009
Original* coverage	Switzerland	Switzerland	Switzerland	Switzerland	Canton of Zurich
Original* participation (%)	71	60	64	66	58
Original* sample size ZH (n)	1814	1578	1630	2422	4250
Original* sample size GS (n)	8182	6469	11167	9158	
Included men ZH (n)	773	644	654	980	1997
Included men GS (n)	3378	2647	4605	3566	
Included women ZH (n)	884	759	790	1127	2166
Included women GS (n)	4076	3117	5185	4280	
ZH region 1 (n)	512	442	399	828	1059
ZH region 2 (n)	382	351	375	433	1083
ZH region 3 (n)	355	266	271	372	799
ZH region 4 (n)	405	336	397	474	1222
ZH region missing (n)	3	8	2	0	0
Mean age ZH (years)	43.6	43.8	44.8	44.8	45.4
Mean age GS (years)	42.9	43.7	44.4	44.2	
Mean year of birth ZH	1948.2	1952.7	1956.7	1961.8	1963.6
Mean year of birth GS	1948.8	1952.8	1957.1	1962.3	

ZÜGS: Zürcher Übergewichtsstudie 2009; ZH: canton of Zurich; GS: German Switzerland except for ZH

ZH regions
1: City of Zurich (capital city)
2: Limmattal, Glatttal, Furttal, Unterland (Zurich Metropolitan Area)
3: Knonaueramt, Pfannenstiel, Zimmerberg (Zurich Metropolitan Area)
4: Oberland, Weinland, Winterthur (neither capital city, nor Zurich Metropolitan Area)

* before application of inclusion criteria for our study

<0.001). The increase in excess weight prevalence over age categories was more marked in women than in men and more marked in GS than in ZH. Adjustment for year of birth attenuated the effect of age on excess weight more more markedly in ZH than in GS. Differences between ZH and GS were significant for the age group 45–74 years. The odds ratios in the less privileged district of the Zurich Metropolitan Area Limmattal-Glatttal-Furttal-Unterland (men) and in the more rural Oberland-Weinland-Winterthur (women) were significantly higher than in the capital city.

Discussion

Main results

According to the four SHS (1992–2007) and a representative survey conducted in ZH (2009), excess weight prevalence stagnated (men, since 1992) or decreased (women, since 1997) in ZH. Compared to GS, the prevalence rates in ZH were consistently lower and the increase of excess weight over time was less marked, resulting in a growing difference between ZH and GS over time. Including all available data points, there was no significant increase in excess weight in ZH between 1992 and 2009, with prevalence peaking in 2002 (men, tendency) and 1997 (women). Within ZH, in both sexes, excess weight prevalence was generally lower in the capital city than in the other parts of the canton (except for women in the wealthiest region).

Differences between GS and ZH

The variations between GS and ZH could be explained by different levels of urbanism. A similar pattern could also be found in Sweden, but with higher overall rates [11]. Lower rates in ZH than in other regions of Switzerland have been reported previously [5]. Lower excess weight prevalence in urban than in rural regions in Switzerland is not surprising. Based on measured data, prevalence rates in the second largest city (Geneva) can also be expected to be lower than the average in Switzerland [12]. Urban centres attract for-

Table 2
Population weighted odds ratios for excess weight (vs. normal weight) in the canton of Zurich and the rest of German Switzerland, by sex, 1992–2009, men and women aged 18–74 years (n = 41628).

		Men					Women				
		ZH		GS		ZH vs GS	ZH		GS		ZH vs GS
Variable	Adjustment	OR	*p*	OR	*p*	*p*	OR	*p*	OR	*p*	*p*
Survey	Age (years)										
SHS 92		1		1		0.542	1		1		0.255
SHS 97		1.10	0.406	1.18	0.006	0.200	1.53	0.001	1.31	<0.001	0.923
SHS 02		1.23	0.100	1.36	<0.001	0.129	1.28	0.060	1.42	<0.001	0.021
SHS 07		1.10	0.421	1.44	<0.001	0.001	1.28	0.049	1.31	<0.001	0.066
ZÜGS-09		1.06	0.544				1.07	0.506			
p for trend over surveys until last available survey (GS: SHS 07, ZH: ZÜGS-09)											
SHS 92-			*0.371*		*<0.001*			*0.543*		*<0.001*	
SHS 97-			*0.979*		*<0.001*			*0.005*		*0.742*	
SHS 02-			*0.616*		*0.127*			*0.128*		*0.377*	
Age (years)	Survey										
18–34y		1		1		0.202	1		1		0.730
35–44y		2.00	<0.001	2.04	<0.001	0.089	1.75	<0.001	1.82	<0.001	0.569
45–54y		3.04	<0.001	3.28	<0.001	0.155	2.24	<0.001	2.64	<0.001	0.073
55–64y		3.32	<0.001	3.84	<0.001	0.031	3.61	<0.001	4.64	<0.001	0.012
65–74y		3.13	<0.001	3.59	<0.001	0.034	4.63	<0.001	5.68	<0.001	0.103
Age (years)	Year of birth										
18–34y		1		1		0.343	1		1		0.944
35–44y		1.78	<0.001	2.01	0.002	0.052	1.52	<0.001	1.79	<0.001	0.390
45–54y		2.43	<0.001	3.14	<0.001	0.038	1.73	<0.001	2.54	<0.001	0.039
55–64y		2.43	<0.001	3.59	<0.001	0.012	2.52	<0.001	4.37	<0.001	0.002
65–74y		2.06	0.001	3.19	<0.001	0.011	2.87	<0.001	5.18	<0.001	0.007
Region	Age (years)										
ZH region 1		1					1				
ZH region 2		1.21	0.046				1.15	0.171			
ZH region 3		1.10	0.327				0.89	0.294			
ZH region 4		1.09	0.385				1.21	0.049			

ZH: canton of Zurich; GS: German Switzerland except for ZH; OR: Odds ratio; SHS: Swiss Health Survey; ZÜGS-09: Zürcher Übergewichtsstudie 2009

1: City of Zurich (capital city)
2: Limmattal, Glatttal, Furttal, Unterland (Zurich Metropolitan Area)
3: Knonaueramt, Pfannenstiel, Zimmerberg (Zurich Metropolitan Area)
4: Oberland, Weinland, Winterthur (neither capital city, nor Zurich Metropolitan Area)

ZH regions

eign nationals with a high educational level [7]. Moreover, in Switzerland, academic educational institutions are usually situated in cities. In this country, the prevalence rates of excess weight are substantially lower in persons with a high educational level than in those with a low one, and this difference is larger in women than in men [13]. This could also explain the variations found in our study within ZH. However, in elderly Swiss (aged 50–79 years), no significant difference could be found between those living in predominantly urban and predominantly rural regions, though this could be due to the small size of the study sample [14]. In Finland, rural/urban differences were attributed to social selection and social causation mechanisms i.e., heavier people tended to avoid emigration from more rural areas [15].

New phase in the obesity epidemic?

Differences between ZH and GS may relate not only to socio-demographic characteristics but also to temporal stages. When comparing the change of excess weight prevalence over time (figure 1) in women, it may be speculated that the trend in ZH anticipates that in GS. The assumption that the prevalence of adult excess weight could have peaked in Switzerland is supported by recent studies in children. These suggest that childhood obesity has stagnated or even decreased in recent years [3, 4, 16]. Projection models suggest that excess weight prevalence will stabilise in Switzerland by 2022 [17]. In contrast, cohort analyses show that a possible stagnation could only be temporary [18]. However, the decrease in excess weight prevalence in ZH women can be regarded as unique. In some other developed countries (Sweden, US) a slowdown of excess weight increase was reported but no decrease [1, 11]. Moreover, these countries have a much higher prevalence of excess weight than Switzerland. As a result, the prevalence of normal weight is lower and so there is smaller potential for a further increase. Countries with a high prevalence of excess weight automatically attain a natural upper limit [1, 11]. No population will ever reach an excess weight prevalence of 100%.

Limitations

Households not registered or exclusively using a mobile phone could not be considered in the sampling procedure for the surveys used in our study. The proportion of persons using only a mobile phone was estimated to have increased from about 5% in 1997 to 12–15% in 2006 [19]. Possibly in 2007 some 25% of persons below age 25 may have been contactable only by mobile phone [19]. The four SHS and ZÜGS-09 differed in sample size, but the assessment methods and the response rates were similar. Pooling studies of different time periods (table 2) may be critical. With population weighting and age standardisation plus adjustment for age, survey and year of birth in the models, we could to a large extent overcome age, period and cohort effects. Our prevalence rates are based on self-reported height and weight, favouring underestimation of individual BMI [20]. However, this may lead to a substantial underestimation of obesity but not of excess weight prevalence [21]. The cut-off for excess weight (BMI ≥25 kg/m^2) was much less sensitive to shifts in frequency distribution than the cut-off for obesity (BMI ≥30 kg/m^2) [20]. Moreover, trends over time are validly captured by using self-reports [21]. We could not include nationality in our models because it was not available for ZÜGS-09. However, the percentage of foreign nationals remained relatively stable over the observation period [7]. Overall, we do not expect that our results are substantially biased by the above-mentioned limitations, which hardly affect trends and relative differences as used in our study.

Conclusion

Excess weight prevalence stagnated (men) or decreased (women) in ZH, but increased or stagnated in GS. A decrease in excess weight prevalence is unique and unexpected for a developed country with internationally low rates. The trend observed in ZH over the past 17 years could be a harbinger of trends in other regions of Switzerland. Focussing on regional in addition to national trends can provide valuable information, rendering estimates of future developments more reliable. The next SHS, scheduled for 2012, will provide more information to assist in determining the validity of a possible trend reversal.

Funding / potential competing interests

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