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Trends in body mass index and prevalence of obesity in Swedish women 1980–89

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Abstract

***Study objective*—To assess changes in the body mass index (BMI, weight (kg)/height^2 (m^2)) and in the prevalence of obesity in Swedish women during the 1980s.**

***Design*—Data from two successive cross sectional surveys were used.**

***Setting*—The whole of Sweden.**

***Subjects*—A total of 7419 women from a 1980–81 survey (response rate 84·6%) and 6306 women from a 1988–89 survey (response rate 80·3%), aged 16–84 years, and forming a representative sample of Swedish women.**

***Measurements and main results*—The results were based on self reported weight and height during interview. The mean BMI of the whole population, adjusted for age, education level, socioeconomic group, region, and nationality, increased by 0·17 kg/m^2 (p=0·0056) over the eight year period. The increase was particularly pronounced in the group aged 25–34 years (0·74 kg/m^2; p<0·0001, which corresponds to more than 2 kg for a woman 168 cm tall). The higher mean BMI was also reflected in the relative increase in the prevalence of obesity (BMI >28·6 kg/m^2) by 19% (odds ratio (OR)=1·19; 95% confidence interval (CI): 1·04, 1·37) and of the combination of overweight and obesity (BMI >23·8 kg/m^2) by 12% (OR=1·12; 95% CI 1·03, 1·23) in the whole female population.**

***Conclusions*—During the 1980s the mean BMI and the prevalence of overweight and obesity in adult Swedish women increased. An influence of the sociocultural environment on the body weight in women was stronger than that in men.**

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Obesity is a risk factor for cardiovascular disease and other medical and psychosocial problems.[1-2] It has recently been reported that even slight to moderate overweight increases the risk of coronary disease in middle aged women.[3] It has also been reported that obese people have higher mortality rates than those of average weight and lean persons.[4-5] Women are generally much more weight conscious than men and are more interested in dieting programmes, less for health than for beauty reasons.[6] These programmes are commonly available nowadays and women's magazines devote a great deal of space to dieting. This weight consciousness among women should be reflected in a decreasing mean body mass index (BMI) and a decreasing prevalence of obesity in some populations. However, the results of various investigations in the USA,[7-11] Italy,[12] Finland,[13] The Netherlands,[14] and Czechoslovakia[15] have not always confirmed these expectations, and information about Swedish women is lacking.

Earlier studies have shown a relation between the sociodemographic characteristics of women, the BMI, and the prevalence of obesity.[7 16-29] These studies, however, were mainly limited to homogeneous samples and did not cover the broad range of sociodemographic strata.

Data from two national cross sectional surveys undertaken in 1980–81 and 1988–89 were used to describe changes in the BMI and in the prevalence of obesity in Swedish women—for the whole population and separately for each 10 year age group and for different socioeconomic groups. Adjustments were made for possible differences in age, education, socioeconomic class, geographical region, and nationality between the two study periods. The relation between the sociodemographic variables, the BMI, and the prevalence of obesity is also presented. A previous paper described the findings in a similar study of Swedish men.[30]

Methods

Data from two national surveys on living conditions—Undersökning av Levnadsförhållande (ULV) 1980–81 and ULF 1988–89—were used for the analyses. These surveys were designed and conducted by Statistics Sweden (the official statistical organisation); questions about weight and height were included among approximately 200 other questions covering many aspects of living conditions. Nationally representative samples of Swedish women, aged 16–84 years and permanently resident in Sweden, were chosen for each survey.

The procedure for data collection and other study details were the same as for men and have been described.[30] The response rate for women in 1980–81 was 84·6% and in 1988–89 it was 80·3%. The BMI was computed according to the widely accepted method—that is, weight (kg) divided by the square of height (m^2).[31] To assess the prevalence of obesity among the Swedish women we used criteria recommended by the FAO/WHO/UNU expert consultation in 1985.[32] The cut off points for BMI for women were as follows:

BMI=23·8—28·6 kg/m^2—overweight (obesity grade I[33]);

BMI>28·6 kg/m^2—obesity (obesity grade II or more[33]).

STATISTICAL METHODS

The standard regression model was used in the analyses, with BMI in continous form. The

explanatory variables were used in categorical form and each variable was represented by suitably chosen dummy variables. The logistic regression model, estimated by the maximum likelihood method, was used to analyse the proportion of overweight and obesity. A more detailed description of the statistical methods is found in our analyses in the companion paper.[30] When comparing data from 1988–89 we shall sometimes use the expression 'trend'. It should be remembered, however, that only two observation points are available and we cannot say whether this is a trend in the true sense of the word.

In all the regression analyses, the actual sample values were used without any weighting of the observations.

Table I Body mass index in a nationally representative sample of Swedish women by age group, education, socioeconomic group, region and nationality for two study periods, 1980–81 and 1988–89 (mean and (SD)).

	Body mass index (kg/m²)					
	1980–81 study			1988–89 study		
Characteristics	No	Mean	(SD)	No	Mean	(SD)
Age group (y):						
16–24	1088	21·06	(2·44)	989	21·14	(2·60)
25–34	1258	21·68	(2·80)	1009	22·29	(3·15)
35–44	1157	22·64	(2·99)	1140	22·84	(3·30)
45–54	919	24·16	(3·63)	855	24·05	(3·65)
55–64	987	25·22	(3·90)	779	25·21	(3·65)
65–74	882	25·20	(3·89)	855	24·85	(3·81)
75–84	1128	24·50	(3·80)	679	24·36	(3·83)
Total 16–84	7419	23·36	(3·70)	6306	23·38	(3·68)
Education:						
Elementary school, ≤9 y	3056	23·86	(3·95)	2549	24·06	(4·00)
High school, 10–11 y	1923	22·79	(3·34)	2104	23·31	(3·51)
After high school, 12–14 y	923	22·15	(3·04)	1200	22·37	(3·12)
University, >14 y	372	21·86	(2·60)	443	22·53	(2·97)
Unspecified*	1128	24·50	(3·80)	—	—	—
Socioeconomic group:						
Manual workers	3392	23·89	(3·89)	2853	23·94	(3·82)
Junior salaried employees	1258	22·68	(3·23)	1083	23·03	(3·38)
Intermediate salaried employees	789	23·00	(3·24)	849	22·94	(3·38)
Senior salaried employees and self employed professional	384	22·05	(2·78)	387	22·85	(3·24)
Farmers	284	24·02	(3·77)	285	23·10	(3·38)
Entrepreneurs	403	25·23	(4·01)	227	25·40	(3·64)
Students	529	20·82	(2·28)	481	20·93	(2·66)
Region:						
H_1 Stockholm	1294	22·69	(3·51)	1082	22·80	(3·57)
H_2 Gothenburg and Malmö	960	23·18	(3·64)	848	23·04	(3·51)
H_3 Large municipalities	2402	23·37	(3·66)	2143	23·40	(3·64)
H_4 Southern central Sweden, excluding 1–3	1634	23·73	(3·83)	1345	23·81	(3·85)
H_5 Northern densely populated areas	610	23·59	(3·58)	465	23·43	(3·68)
H_6 Northern sparsely populated areas	519	23·93	(3·94)	423	24·00	(3·61)
Nationality:						
Native born Swedish	6584	23·39	(3·67)	5497	23·38	(3·63)
Second generation immigrants	213	21·98	(3·20)	236	22·34	(3·35)
Naturalised immigrants	305	24·28	(4·36)	310	24·41	(4·12)
Foreign nationals	306	22·77	(3·62)	257	22·99	(3·94)

* In the 1980–81 study, women older than 74 years were not asked about their education

Table II Influence of different variables on the body mass index of Swedish women (regression parameter estimates with standard errors).

Variables	Estimate	Standard error	p value
Intercept	21·32	0·13	
Study 1980–81 (ref)			
Study 1988–89	0·17	0·06	0·0056
Age group (y):			
16–24 (ref)			
25–34	0·80	0·11	0·0001
35–44	1·56	0·11	0·0001
45–54	2·77	0·12	0·0001
55–64	3·75	0·12	0·0001
65–74	3·45	0·13	0·0001
75–84	2·65	0·17	0·0001
Education:			
Elementary school, ≤9 y (ref)			
High school, 10–11 y	−0·27	0·08	0·0003
After high school, 12–14 y	−0·46	0·10	0·0001
University, >14 y	−0·72	0·16	0·0001
Socioeconomic group:			
Manual workers (ref)			
Junior salaried employees	−0·71	0·08	0·0001
Intermediate salaried employees	−0·56	0·10	0·0001
Senior salaried employees and self-employed professionals	−0·80	0·16	0·0001
Farmers	−0·50	0·15	0·0007
Entrepreneurs	0·49	0·14	0·0006
Students	−1·04	0·13	0·0001
Region:			
H_1 Stockholm (ref)			
H_2 Gothenburg	0·26	0·11	0·0154
H_3 Large Municipalities	0·41	0·09	0·0001
H_4 Southern/central Sweden, excluding 1–3	0·63	0·10	0·0001
H_5 Northern densely populated areas	0·53	0·13	0·0001
H_6 Northern sparsely populated areas	0·75	0·13	0·0001
Nationality:			
Native born Swedish (ref)			
Second generation immigrants	0·03	0·16	0·8389
Naturalised immigrants	0·67	0·14	0·0001
Foreign nationals	0·32	0·15	0·0322

(ref)=reference group

Results

EIGHT YEAR TRENDS IN MEAN BMI

The crude mean BMI of women from 1980–81 was very similar to that in the 1988–89 survey, as shown in table I. There were differences, however, between the various age groups. After adjustment for age, education, socieconomic group, region, and nationality we found a statistically significant increase in the mean BMI of 0·17 kg/m², $p<0·01$ (table II). This corresponds to a total increase of approximately 0·8% during the eight year period. For a woman with an average height of 168 cm this increase corresponds to about 0·5 kg. In the various age groups in table III we observe a significant increase in the 25–44 year age groups, the highest values being in younger women aged 25–34 years (0·74 kg/m², $p<0·0001$). Other age groups showed a very slight, but not significant, increase or even a slight decrease. An increase of 0·74 kg/m² for a woman 168 cm tall corresponds to a weight increase of more than 2 kg. In the various socioeconomic groups, women classified as senior salaried employees and self employed professionals showed the greatest increase—a

Table III Effect of time period on the body mass index (BMI) in various age groups after adjustment for the effect of education, socioeconomic group, region, and nationality. The intercept shows the mean BMI (kg/m²) for women in the reference group in 1980–81. The slope parameter shows the difference in BMI between 1980–81 and 1988–89.

Age groups (y)	Intercept	(SE)	Slope	(SE)
16–24	20·94	(0·18)	0·05	(0·11)
25–34	22·17	(0·21)	0·74	(0·13)*
35–44	23·10	(0·21)	0·35	(0·13)†
45–54	24·42	(0·27)	0·05	(0·18)
55–64	25·04	(0·29)	−0·13	(0·19)
65–74	24·62	(0·28)	−0·15	(0·19)
75–84	24·15	(0·27)	0·03	(0·21)
Total 16–84	23·76	(0·10)	0·31	(0·06)*

* $p<0·0001$; † $p<0·01$

Table IV Effect of time period on the body mass index (BMI) of Swedish women in various socioeconomic groups after adjustment for the effect of age, education, region, and nationality. The intercept shows the mean BMI (kg/m²) for an individual in the reference group in 1980–81. The slope parameter shows the difference in BMI between 1980–81 and 1988–89.

Socioeconomic groups	Intercept	(SE)	Slope	(SE)
Workers	21·25	(0·19)	0·21	(0·10)*
Junior salaried employees	20·99	(0·27)	0·15	(0·13)
Intermediate salaried employees	21·34	(0·44)	0·09	(0·16)
Senior salaried employees and self employed professionals	21·97	(0·78)	0·79	(0·22)†
Farmers	20·78	(0·72)	−0·34	(0·30)
Entrepreneurs	19·38	(1·74)	−0·04	(0·39)
All socioeconomic group	20·73	(0·11)	0·18	(0·06)‡

* $p<0·05$; † $p<0·0005$; ‡ $p<0·005$

highly significant one—in mean BMI in 1988–89 compared with 1980–81 (0·79 kg/m^2, $p<0·0005$), and they are followed by a group of manual workers (0·21 kg/m^2, $p<0·005$). Increases in other groups were smaller and not significant. The farming group showed a fairly large, although not significant, decrease in mean BMI during this period (table IV).

EIGHT YEAR TRENDS IN THE PREVALENCE OF OVERWEIGHT AND OBESITY

The prevalences of overweight or obesity (that is, with BMI >23·8 kg/m^2) and of obesity (BMI >28·6 kg/m^2) in samples of women from the 1980–81 and 1988–89 surveys are given in table V for the five sociodemographic groups separately. When adjustments were made for differences in the sociodemographic characteristics of participants in the two surveys, a 12% relative increase was observed in the prevalence of the combination of overweight and obesity. We found a 19% relative increase in the prevalence of women with BMI >28·6 kg/m^2 during the 1980s. These two relative increases are statistically significant (table VI). In absolute values the prevalence of obesity among the Swedish women increased by about 0·21%/year during the eight year period.

Tables VII and VIII show the trends observed in the different age and socioeconomic groups separately. The greatest relative increase in the prevalence of women with BMI >23·8 kg/m^2 was observed in the 25–34 year age group (odds ratio (OR)=1·60, 95% confidence interval (CI): 1·28, 2·00). The prevalence of obesity increased mainly in the same age group (OR=2·63, 95% CI: 1·56, 4·41) and then again in the age group 35–44 years (OR=1·73, 95% CI: 1·14, 2·62). Junior salaried employees had a significant relative increase in the prevalence of the combination of overweight and obesity (OR=1·25, 95% CI: 1·02, 1·53). Senior salaried employees and self employed professional women showed the largest relative increase in the prevalence of obesity, about fivefold, which is in agreement with the highest increase in the mean BMI in this socioeconomic group.

Table V Prevalence of individuals with body mass index (BMI) >23·8 kg/m^2 and with BMI >28·6 kg/m^2 in nationally representative samples of Swedish women by age group, education, socioeconomic group, region and nationality for two study periods, 1980–81 and 1988–89.

	BMI >23·8 kg/m^2(%)		*BMI >28·6 kg/m^2(%)*	
Characteristics	*1980–81*	*1988–89*	*1980–81*	*1988–89*
Age groups (y):				
16–24	11·1	12·3	1·5	1·5
25–34	17·7	23·2	2·2	4·7
35–44	27·7	30·1	4·2	5·6
45–54	46·0	44·3	10·9	11·1
55–64	59·6	60·3	17·6	16·9
65–74	62·2	58·9	16·6	16·5
75–84	54·5	50·9	14·0	12·3
Total 16–84	37·2	37·8	8·7	9·1
Education:				
Elementary school, ≤9 y	44·6	46·4	11·8	13·2
High school, 10–11 y	31·3	37·1	6·0	8·4
After high school, 12–14 y	23·0	26·2	4·5	3·7
University, >14 y	19·1	26·9	1·1	4·6
Unspecified	54·5	—	14·0	—
Socioeconomic group:				
Manual workers	43·8	44·0	11·0	12·0
Junior salaried employees	29·1	35·5	5·6	6·6
Intermediate salaried employees	33·7	31·8	6·6	7·0
Senior salaried employees and self employed professionals	23·4	29·5	1·4	5·3
Farmers	42·3	36·5	11·6	7·9
Entrepreneurs	62·0	64·5	20·1	17·2
Students	10·2	12·8	2·1	1·8
Region:				
H_1 Stockholm	29·7	32·1	6·1	6·9
H_2 Gothenburg and Malmö	36·3	35·2	7·8	8·3
H_3 Large municipalities	37·3	37·9	9·0	8·4
H_4 Southern/central Sweden, excluding 1–3	41·3	43·1	10·1	12·2
H_5 Northern densely populated areas	39·8	37·9	9·7	10·2
H_6 Northern sparsely populated areas	44·7	45·2	11·3	11·3
Nationality:				
Native born Swedish	37·7	38·0	8·7	8·9
Second generation immigrants	20·3	24·6	4·2	16·3
Naturalised immigrants	46·0	48·4	13·4	16·3
Foreign nationals	30·3	34·4	7·6	8·9

SOCIODEMOGRAPHIC TRENDS IN THE BMI AND PREVALENCE OF OBESITY

Quantitative estimates of the relation between the BMI and the prevalence of obesity on the one hand, and sociodemographic factors on the other, are presented in tables II and VI. Age is a very strong determinant of BMI in women. The highest value of the mean BMI is observed in the 55–64 year age group. In this age group overweight and obesity is almost nine times more prevalent than in the 16–24 year age group. The prevalence of obesity differs even more—obesity is more than 10 times more common in the 55–64 year age group.

An inverse relation between the level of education and the BMI is very obvious among Swedish women (table II). This trend is also clearly confirmed by a steadily decreasing prevalence of overweight and obesity (BMI >23·8 kg/m^2) and of obesity (BMI >28·6 kg/m^2) with an increasing level of education. All these decreases are statistically significant in comparison with the group with an elementary education only. The group with a university education has an approximately 60% lower prevalence of obesity and a 40% lower prevalence of the combination of overweight and obesity than the group with an elementary education.

Women entrepreneurs have the highest mean BMI value, followed by manual workers. Students, senior salaried employees, and self employed professional women have the lowest BMI values. These findings, which are based on BMI analysed as a continuous variable, are confirmed by results based on BMI treated as a categorical variable—that is the highest prevalence of the combination of overweight and obesity (BMI >23·8 kg/m^2) is found among entrepreneurs and workers and the lowest among students, senior salaried employees, and self employed professionals. The same is true of the prevalence of obesity among the Swedish women. Changes in BMI with increasing age also differ substantially between socioeconomic groups. The mean BMI of senior salaried employees and self employed professional women increases much less than among entrepreneurs: 1·5 kg/m^2 *v* 5·3 kg/m^2 in the 45–54 year age group; 2·9 kg/m^2 *v* 6·0 kg/m^2 in the 55–64 year group; 1·1 kg/m^2 *v* 6·0 kg/m^2 in 65–74 year group, respectively, compared with the BMI in the 16–24 year age group (data not shown in the tables).

There are significant differences between the mean BMI of women from the five regions in Sweden compared with those from Stockholm. Women in Stockholm have the lowest BMI, followed by Gothenburg and other large towns. The highest BMI is found among women from the sparsely populated areas in the north. These trends in mean BMI agree with trends in the prevalence of overweight and obesity. It should be

Table VI Prevalence of overweight and obesity (body mass index (BMI) >23·8 kg/m²) and obesity (BMI >28·6 kg/m²) in nationally representative samples of Swedish women by year of study, age, education, socioeconomic group, region and, nationality after adjustment for the effects of the other variables (odds ratios (OR) with 95% confidence intervals (CI)).

	BMI >23·8 kg/m²			BMI >28·6 kg/m²		
	OR	95% CI		OR	95% CI	
Study 1980–81 (ref)						
Study 1988–89	1·12	1·03,	1·23	1·19	1·04,	1·37
Age groups (y):						
16–24 (ref)						
25–34	1·79	1·48,	2·15	2·08	1·31,	3·29
35–44	2·79	2·32,	3·36	2·98	1·91,	4·65
45–54	5·26	4·36,	6·35	6·45	4·19,	9·93
55–64	8·81	7·28,	10·70	10·10	6·61,	15·5
65–74	8·61	7·10,	10·40	8·79	5·73,	13·5
Total, 75–84	5·16	4·07,	6·53	5·45	3·36,	8·84
Education:						
Elementary school, ≤9 y (ref)						
High school, 10–11 y	0·86	0·78,	0·95	0·78	0·66,	0·91
After school, 12–14 y	0·74	0·64,	0·85	0·54	0·41,	0·72
University, >14 y	0·60	0·48,	0·75	0·41	0.25,	0·68
Socioeconomic group:						
Manual workers (ref)						
Junior salaried employees	0·71	0·64,	0·80	0·62	0·51,	0·76
Intermediate salaried employees	0·75	0·65,	0·86	0·81	0·64,	1·04
Senior salaried employees and self employed professionals	0·67	0·54,	0·83	0·51	0·32,	0·81
Farmers	0·78	0·64,	0·94	0·86	0·65,	1·16
Entrepreneurs	1·37	1·14,	1·64	1·26	1·00,	1·58
Students	0·44	0·35,	0·57	0·47	0·26,	0·87
Region:						
H_1 Stockholm (ref)						
H_2 Gothenburg	1·20	1·04,	1·39	1·13	0·87,	1·46
H_3 Large municipalities	1·28	1·13,	1·44	1·23	0·99,	1·51
H_4 Southern/central Sweden, excluding 1–3	1·42	1·25,	1·62	1·50	1·20,	1·86
H_5 Northern densely populated areas	1·32	1·11,	1·57	1·41	1·07,	1·88
H_6 Northern sparsely populated areas	1·55	1·29,	1·86	1·37	1·03,	1·84
Nationality:						
Native born Swedish (ref)						
Second generation immigrants	0·92	0·71,	1·18	1·05	0·65,	1·70
Naturalised immigrants	1·35	1·12,	1·62	1·68	1·30,	2·16
Foreign nationals	1·25	1·01,	1·54	1·60	1·13,	2·28

(ref)=reference group

noted, however, that the prevalence of obesity among women is highest in southern/central Sweden, not in the northern sparsely populated areas.

Native born Swedish women and second generation immigrants have the lowest BMI, followed by foreign nationals; the highest value occurring in naturalised immigrants. This is true equally for the prevalence of the combination of overweight and obesity and the prevalence of obesity.

The multivariable regression model presented in table II, including the variables of study period, age, education, socioeconomic group, region, and nationality, explains only 19% of the variance in BMI in Swedish women (R^2=0·19).

Discussion

In discussing the results of our study, two important aspects should be borne in mind: firstly, we had a large number of nationally representative women and, secondly, we had data on many sociodemographic characteristics that made it possible to adjust for them in the analyses.

TIME TRENDS IN BMI DEVELOPMENT

A significant increase in the mean BMI was found among Swedish women during the 1980s when adjusted for age, education, socioeconomic group, region, and nationality. This increase of 0·04–0·09 kg/m² per year was limited to the 25–34 and 35–44 year age groups.

A report on American women aged 18–34 years from three successive national surveys in 1960–80 (NHES Cycle I, and NHANES I and II) indicated an increase in the mean BMI of 0·07—0·25 kg/m² per year in white and black women at all levels of income and education;[7] this was in contrast to young American men in the same age group who showed no consistent trend.[34] Using data from the same surveys, Feinleib investigated time trends in the mean BMI in women aged 35–75 years and found an increase in women up to the age of 55.[8] In the upper midwestern region of the USA during the years 1980–87, a significant secular increase in BMI, adjusted for age and education, was found in women aged 25–74 years (0·19 kg/m² per year, p<0·0001). The increase was more than twice as great as that in men from the same study.[9] In the Minnesota Heart Survey the age adjusted mean BMI of women aged 30 to 74 increased significantly by 1·7 kg/m² from 1973–87.[10]

In contrast to the American and Swedish women, some European countries showed decreasing trends in the development of obesity among women. In Italy, the mean BMI of women aged 20–59 years decreased by 2·8% (from 25·3 to 24·6 kg/m²) between 1978–79 and 1983–84 in contrast with no changes observed among men.[12] The same decreasing trend was observed in Finland, where the age adjusted mean BMI of women aged 30–59 years significantly decreased by 0·5 kg/m² between 1972 and 1982, in contrast to a noticeable increase in Finnish men during the same period.[13] In The Netherlands no change in the age adjusted mean BMI in women aged 37–43 years was observed over seven years between 1974 and 1980, again in contrast to the increase observed among men from the same study.[14]

TIME TRENDS IN THE PREVALENCE OF OBESITY

Our results show that the prevalence of obesity (BMI 28·6 kg/m²) and the combination of overweight and obesity (BMI>23·8 kg/m²) increased significantly among women. This increase, however, was significant in the 25–44 year age group only, and in some socioeconomic groups such as manual workers, senior salaried employees, and self employed professionals (BMI>28·6 kg/m²) and in junior salaried employees (BMI>23·8 kg/m²).

In white and black women in the USA aged 18–34 years between 1960 and 1980, there was a significant increase in the proportion in the overweight and obesity categories.[11] In the Minnesota Heart Health Programme the prevalence of obesity in women aged 25–74 years (defined as BMI ≥85th centile in the first year of the survey) increased by 1%/year during the period 1980–87.[9] A similar trend was observed in Czechoslovakia

Table VII Effect of time period on the prevalence of overweight and obesity (body mass index (BMI) >23·8 kg/m²) and obesity (BMI >28·6 kg/m²) in various age groups of women after adjustment for the effect of education, socioeconomic group, region and nationality (odds ratio (OR) with 95% confidence intervals (CI).)

	BMI >23·8 kg/m²		BMI >28·6 kg/m²	
Age groups (y)	OR	95% CI	OR	95% CI
16–24	1·12	0·84, 1·49	1·02	0·49, 2·11
25–34	1·60	1·28, 2·00	2·63	1·56, 4·41
35–44	1·24	1·02, 1·50	1·73	1·14, 2·62
45–54	1·01	0·83, 1·24	1·22	0·88, 1·68
55–64	1·02	0·83, 1·25	0·88	0·67, 1·14
65–74	0·93	0·76, 1·15	1·09	0·83, 1·44
75–84	0·97	0·77, 1·21	0·93	0·67, 1·28
Total 16–84	1·21	1·12, 1·31	1·24	1·08, 1·41

Table VIII Effect of time period on the prevalence of overweight and obesity (BMI >23·8 kg/m²) and obesity (BMI >28·6 kg/m²) in various socioeconomic groups of women after adjustment for the effect of age, education, region and nationality (odds ratios (OR) with 95% confidence intervals (CI)).

	BMI >23·8 kg/m²		BMI >28·6 kg/m²	
Socioeconomic group	*OR*	*95% CI*	*OR*	*95% CI*
Manual workers	1·09	0·96, 1·23	1·22	1·01, 1·46
Junior salaried employees	1·25	1·02, 1·53	1·04	0·71, 1·52
Intermediate level salaried employees	0·99	0·77, 1·26	1·27	0·81, 1·99
Senior salaried employees and self employed professionals	1·41	0·98, 2·04	5·42	1·86, 15·8
Farmers	1·02	0·66, 1·55	0·87	0·46, 1·65
Entrepreneurs	1·07	0·67, 1·71	0·77	0·44, 1·37
Students	1·50	0·94, 2·39	2·74	0·77, 9·72
All socioeconomic groups	1·12	1·03, 1·22	1·18	1·03, 1·35

where the prevalence of obesity among women aged 25–64 years increased between 1985 and 1988 from 30·2 to 33·2%.[15]

In Finland the proportion of obese women decreased in each 10 year age group from 30 to 59 years during the period 1972–82.[13] No change in the prevalence of different grades of obesity was observed in women in the Netherlands in the period 1974–80.[14]

SOCIODEMOGRAPHIC TRENDS

The relation between the variables of time of study, education, socioeconomic group, region, and nationality with BMI and the prevalence of obesity points to the influence of sociodemographic and environmental factors on body weight. The effects of these factors on BMI are more pronounced in women (R^2=0·19) than in men (R^2=0·14).[30]

The finding of a negative relation between BMI and the prevalence of obesity, which varies with education and socioeconomic group, largely agree with previous cross sectional studies of women from some industrialised countries.[16–18 21–29] It emphasises the function of body weight as an important component of social roles and expectations for women and for women's self images.

Significant differences in BMI and the prevalence of obesity between geographical regions and ethnic groups may reflect, for example, different eating and smoking habits—that is, environmental factors. It should be noted that the mean BMI and the prevalence of obesity are similar in second generation immigrants and in native born Swedish women. This contrasts with the significantly higher mean BMI and prevalence of obesity among the naturalised immigrants who have the same genetic propensity towards obesity as the second generation—an argument for the strong influence of the sociocultural and physical environments on BMI among women. A better understanding of the patterns of obesity in subpopulations and their association with specific behaviour (physical activity, alcohol drinking, smoking, etc) will promote the development of effective means for preventing and monitoring tendencies to overweight.

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