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Age at menarche of girls as an indicator of the socio-political changes in Poland

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Abstract

An extensive study of maturation of girls in the huge industrial agglomeration in Upper Silesia was carried out in 1981 by Bielicki, Waliszko, Hulanicka and Kotlarz. A similar study was repeated in the region ten years later, in 1991. Our aim is to report on the changes in growth of children in this area between 1981 and 1991 on the bases of these two studies. We are able to demonstrate that maturation in the children is heavily influenced by very significant inequalities in social and economical conditions in the region. Since the Polish population is ethnically homogeneous and the sample is very large, the influence of social differences on maturation is very apparent.

Résumé

Des recherches approfondies sur la puberté des filles d'une grande agglomération industrielle ont été réalisées en Haute Silésie (Pologne) en 1981 par Bielicki, Waliszko, Hulanicka et Kotlarz. Dix ans plus tard, en 1991, des recherches analogues ont été menées dans la même région. Notre but était d'observer les changements du développement des enfants durant cette période sur base de ces deux études. Nous montrons que le processus pubertaire est fortement influencé par l'inégalité significative des conditions sociales et économiques existant dans cette région. Etudiée à partir d'une population polonaise homogène du point de vue ethnique et d'un échantillon très vaste, l'influence des différences sociales sur la maturation des filles est apparue très nettement.

INTRODUCTION

In this paper we report on some new and still only preliminary results concerning the relation of the mean age at menarche to various socio-economic factors. The population investigated had undergone severe socio-political changes prior to our study. These created conditions enabling us to observe the evolution of various social characteristics affecting menarcheal age and to provide perhaps the first evidence, based on such a large sample, to support the hypothesis of Burrel *et al.* (1961) and Liestol (1982). The hypothesis says that the first years of life are of the utmost importance for the tempo of growth of a child.

A very comprehensive study was performed in 1981 (Bielicki *et al.*, 1986) in the three big cities: Katowice, Bytom and Sosnowiec located in the Upper Silesia region, south-west Poland. The study revealed a significant delay in the average age at menarche as compared with the other big cities in Poland. Moreover between 1978 and 1988 the secular trend toward greater average body height and earlier average maturation of children, which prevails in Europe, was reversed or halted in some regions of Poland (cf. e.g. Laska-Mierzejewska and Luczak, 1993; Hulanicka *et al.*, 1990; Hulanicka and Waliszko, 1992).

In our view the extreme socio-economic and environmental conditions in the Upper Silesia region should have an exacerbating effect on the general tendency of the delayed menarcheal age observed in Poland. Our presumption was based also on health statistics available for this region. In this region, there were numerous reports on very high morbidity and mortality (eg. Koszarowski, 1992; Bielicki *et al.*, 1992; Wagrowska *et al.*, 1992). This prompted us to repeat the same investigation of the population of Upper Silesia in the year 1991, as the one performed in 1981.

We would like to add that the region of Upper Silesia, inhabited by 3.5 million people, is also one of the most polluted areas in Europe. Steel mills, mines and coking plants, mostly built before World War I are located in a middle of densely inhabited areas. 98% of the coal and coke, 52% of the steel and 32% of the electricity produced in Poland come from this region.

Such a concentration of heavy industry is also related to a specific social structure of the population, where workers are the predominant social class in the area.

MATERIAL

In 1981 and again in 1991 all the girls aged from 9 to 15 in the three biggest cities in Upper Silesia-Katowice, Bytom and Sosnowiec were investigated (23 000 girls in 1981, 32 000 in 1991). This was done by having all school-aged girls, with the assistance of their teachers and parents, fill in questionnaires inquiring about the child's date of birth, family size, parental education and occupation, income and housing condition. Girls were also asked about the menarche. This information was collected by the *status quo* method.

Specifically, yes/no answers were collected to the question: "do you menstruate?" from which mean age at menarche was assessed, and other parameters of distribution of this trait in the population were determined by the probit method with regard to the frequency of "yes" answers in respective age groups.

Parental education and occupation groups were categorized similarly both in 1981 and in 1991. Their description as presented in the Bielicki *et al.* (1986) paper, is repeated in table 1, where also number of girls examined is included. Occupational ranking was based mainly on the general standing and the prestige of the groups examined. The method of ranking of occupational classes in Poland was worked out by Slomczynski and Kacprowicz in 1979. The only difference is that: the occupational group of communist party managers (nomenklatura), relatively sizable in 1981, had vanished before 1991, and the group of private entrepreneurs had grown substantially. Consequently we could not use these groups for comparison. As in 1981 only the subjects who live with both parents were included.

Our preliminary analysis uses only 1991 data concerning girls from Katowice, the rest of the huge material being still processed. The sample is still very large: 12 713 subjects, and we think that it is legitimate to use it as a good representation of the whole group (32 000 subjects).

RESULTS

As is shown in figure 1, contrary to our expectation there was no change in mean menarcheal age in Katowice in the last decade. In comparing results of the 1991 study with those of the 1981 one we see that there was no deceleration of the age at menarche of girls from this area. The mean menarcheal age in 1991 in Katowice is 13.10 (1.06 S.D). However the distance between the age at menarche of the girls from Warsaw, who are the earliest maturers in Poland, and the girls from the region investigated has increased in the last ten years. This distance is not as big as in the case of girls from other Polish cities, towns and villages; their age at menarche is on average later now than it was in 1978 (Hulanicka and Waliszko, 1992).

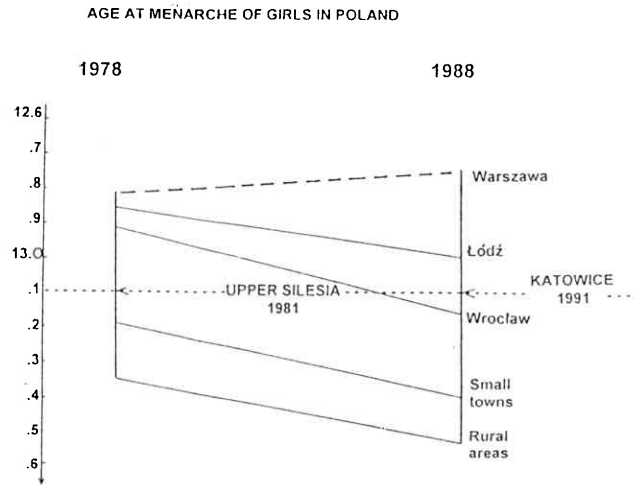

Figure 1: Menarcheal age of girls in 1981 in Upper Silesia and in 1991 in Katowice. Also data from Hulanicka *et al.* (1990) concerning other locations in Poland are presented.

The next step of our investigation was a more detailed examination of the age at menarche of girls coming from different social groups. Here the comparison of 1981 and 1991 samples reveals important facts.

The occupation of father was taken as one of the differentiating factors. Both in 1981 and 1991 the mean age at menarche of the girls whose fathers belonged to "better" occupational groups was significantly earlier than the average for the whole region. However in 1991 this tendency appeared to be stronger: girls from "better" social classes who matured earlier than average in 1981 matured even earlier in 1991.

On the other hand, in 1981 and in 1991 various groups of workers had daughters maturing later or at the same age as the average. Again this tendency appeared to be stronger in 1991 than in 1981.

	Categories	Upper Silesia 1981 N	Katowice 1991 N
Education of father	1. University	2356	2002
	2. High school (general or vocational 4-5 grades)	4879	3291
	3. Vocational (3 grades)	7171	4878
	4. Elementary (8 grades)	5004	967
Education of mother	1. University	1509	1691
	2. High school (general or vocational 4-5 grades)	6021	4583
	3. Vocational (3 grades)	5165	3513
	4. Elementary (8 grades)	6714	1343
Number of children in a family	1. Subject is an only child	4362	1796
	2. 2 children	10614	6368
	3. 3 children	2910	2213
	4. 4+ children	1523	734
Occupation of father	1. Professionals (lawyers, medical doctors, teachers etc.)	551	652
	2. Engineers (technical specialists with polytechnic education)	1264	748
	3. Technicians and clercs (technical specialists with secondary school education)	2824	1288
	4. Police officers	428	172
	5. Foremen (skilled manual workers in a position of brigade leaders)	824	140
	6. Craftsmen (owners of a small private, run by family business)	550	505
	7. Skilled workers I (machine tool operators, welders, turners, employed in big industrial plants)	3469	1440
	8. Skilled workers II (electricians, construction workers, truck drivers ect.)	3798	1119
	9. Coal miners (working underground, not including technicians)	3986	2120
	10. Unskilled workers (pavers, janitors, unskilled construction workers ect.)	926	307

Table 1: Categories of SES characteristics of families of girls.

The only occupational group of families with very late maturing daughters in 1981 which changed significantly in this respect in 1991 was the group of coal miners (fig. 2).

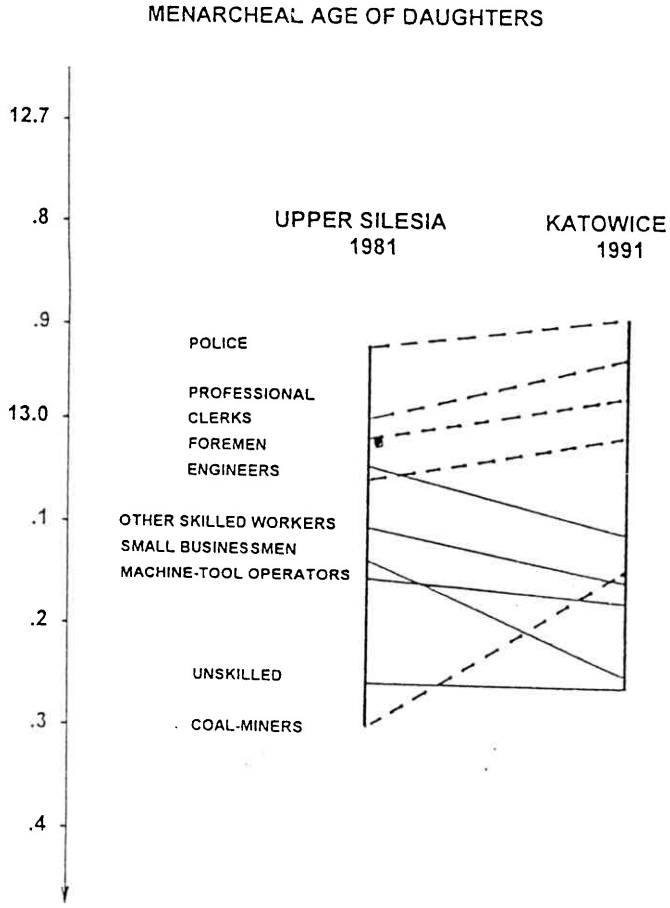

Figure 2: Changes in menarcheal age of girls between 1981 and 1991 according to occupation of girl's fathers.

We should also mention that in this population some social changes have been noticed. Of all the differences between the generation of the parents of girls investigated in 1981 and those of 1991, two are of prime importance to us: the educational level has gone up and the family structure has changed. The number of families with 2 or 3 children has increased, while the number of those with one child has decreased. Also the number of families with 4 or more children as well as the number of fathers and mothers with only elementary school education has decreased considerably (fig. 3). It is remarkable that the girls from the latter two groups matured much later in 1991 than in 1981.

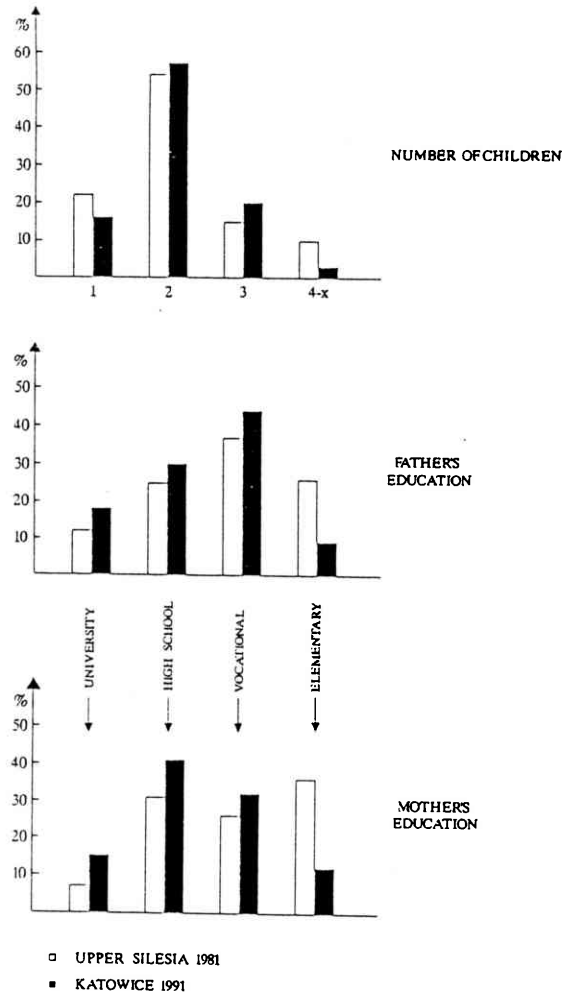

Figure 3: Socio-economic structure of families in 1981 and in 1991.

The distance between the average age at menarche of girls from extreme categories of family size: 1 child and 4 or more children was greater in 1991 than in 1981, 0.55 and 0.38 respectively. The same is true about the extreme categories of parental education, 0.28 and 0.24 for father's education, 0.39 and 0.19 for mother's education respectively (fig. 4).

To clarify further the relation of the menarcheal age of girls to a number of socio-economic characteristics of their families we proceeded in the same way as in our study of the 1981 material (Bielicki *et al.*, 1986). For each occupational group its rank-order (among the 10 groups considered) was determined with regard to each of the following criteria: 1. mother's education, 2. father's

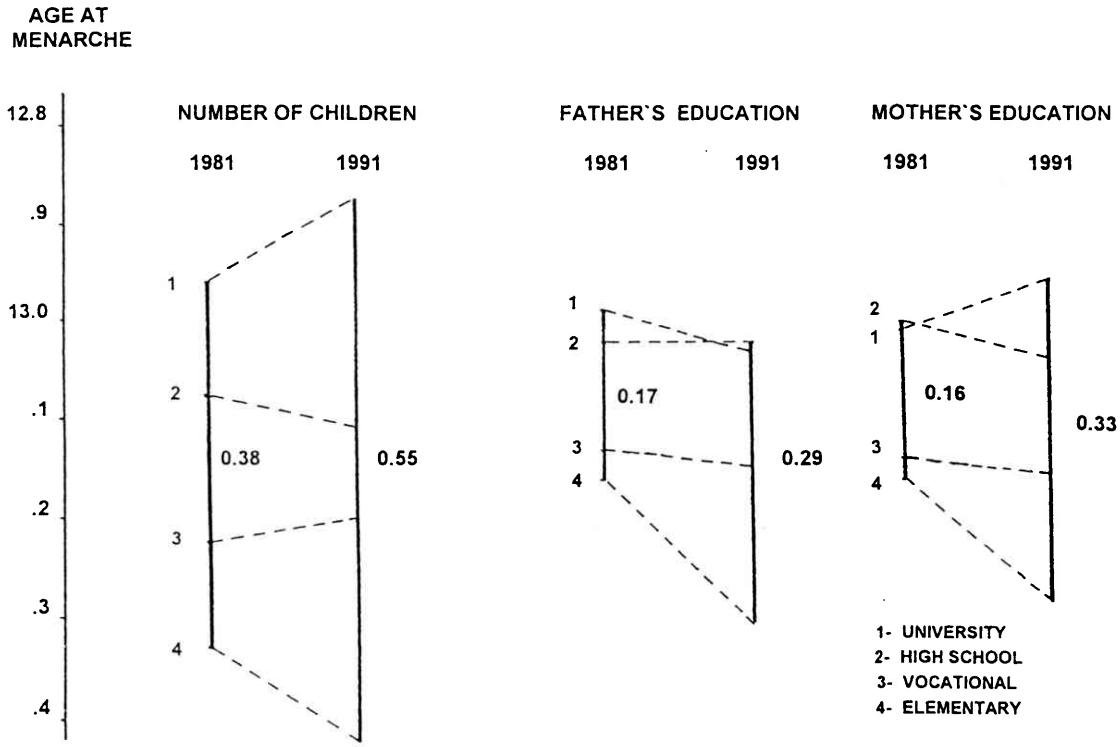

Figure 4: Age at menarche of girls according to parental education and family size (differences between extreme categories are counted in years).

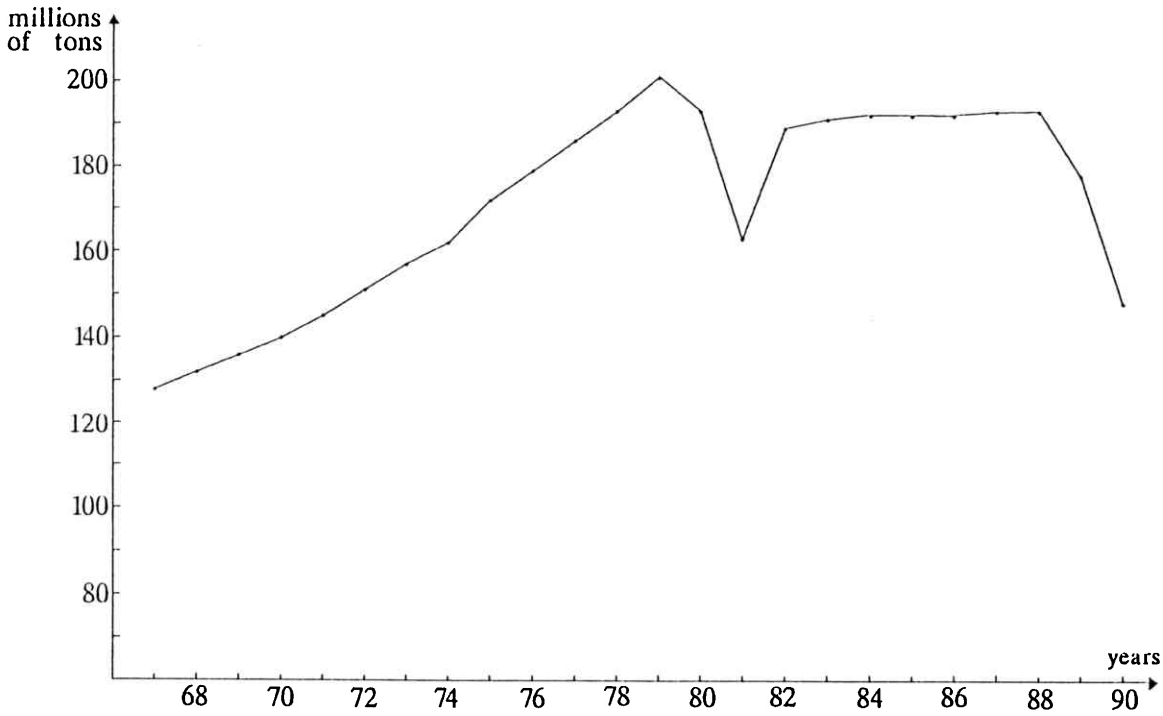

Figure 5: Coal production in Poland between 1967 and 1990 (in millions of tons). Smoothed curve on the basis of empirical data,presented as points. (Roczniki Statystyczne, 1968–1990).

education, 3. family income, 4. family size. Subsequently, the arithmetic mean of the four ranks was calculated for each occupational group. This measure was considered as a rank in socio-economic status (SES). As in the 1981 sample, the mean menarcheal age of the girls tends to decrease with the increasing ranking of the socio-economic status of the occupational group of their families (table 2).

DISCUSSION

As in the 1981 age at menarche of girls and the index of the family position on the SES scale are strongly related. The better the SES, the higher the level of education, the smaller the size of the family, the better the housing and living conditions of a family, the earlier the age at menarche of the girls in our sample.

The surprising fact that the mean age at menarche of girls from Upper Silesia did not change during the decade 1981–1991 does not reflect very substantial changes in the rate of growth in children of the region during the decade.

We can think of only one explanation of this fact: social inequalities have risen in the population. In better social groups the mean menarcheal age has decreased, at the other end of the social "ladder" it has been delayed substantially. This is precisely what we observed.

Up to the end of the seventies in Poland the relative improvement of living conditions caused the acceleration of the mean time of menarche in the population. In the last decade, however, despite the rising level of education and decreasing size of families in Upper Silesia, this tendency has not occurred.

What we did observe is an increasing social differentiation in the population. In fact, in the group of people with at least a secondary school education and consequently, with higher SES, the girls matured earlier on average in 1991 than in the preceding decade. On the other hand, delayed mean menarcheal age of the girls from numerous families with lower educational levels and consequently less successful professionally shows that their standard of living was lowered during the decade ending in 1991. Moreover, the distance between the extreme groups selected on the basis of several social factors increased significantly in 1991. However it is worth remarking that the number of people with only an elementary education was very small. The general trend towards an increase in the level of education in society means that 90% of the people in the area have obtained at least a vocational education. The distance of the remaining 10% to the better social groups might have increased as well because biologically weaker and frailer people form a larger part of this group.

As in the previous findings, the daughters of policemen and professionals mature earliest. In 1991 the daughters of unskilled workers matured the latest, as did the daughters of miners in 1981.

During the 1981–1991 decade the group of coal miners changed the order with the respect to age at menarche of their daughters. This group moved from the bottom position in the population to the middle, the average age at menarche for this group having decreased by 0.16 of a year. This is a very significant progress in the tempo of growth of coal miners' daughters during the decade. Here we can see an effect of a socio-political action performed in the seventies by the communist party in Poland; since the end of World War II the Polish economy has been based on coal production and its export (the coal production in Poland is shown on figure 5). To secure high coal production, investments in the Upper Silesia region were started as early as the fifties and large scale immigration from the rural areas of Poland was encouraged. Those poorly educated people were provided with very high wages. In the sixties it was around 150% of the average wage for all the people employed in the state-owned industry. To increase coal production in the seventies miners were provided with various privileges such as special shops, special health care, vacation houses in the best resort areas etc. Their wages went up to 200% at the end of seventies (Roczniki Statystyczne 1968–1990). Although the general educational level of the miners did not grow any faster than that of the other groups of workers, the higher standard of living of coal miners which culminated in the late 70 brought about the acceleration of their daughters' growth, which revealed itself in their age at menarche in 1991.

Our results suggest that the improvement of the standard of living of coal miners was carried out at the expense of other workers, also very nu-

Occupational group	Age at menarche		Mother's education (1)		Father's education (2)		Family income (3)		Family size (4)		
	Mean	Rank	%	Rank	%	Rank	%	Rank	%	Rank	Mean rank
Professionals	12.93 .08	2	90	1	99	1.5	76	1	83	1	1.1
Engineers	13.01 .08	4	80	2	99	1.5	76	2	81	2	1.9
Technicians	12.97 .05	3	45	4	19	5	59	4	79	4	4.3
Police	12.89 .15	1	43	5	63	3	57	5	80	3	4.0
Foremen	13.10 .13	5	21	8.5	6	7	46	7	76	6	7.1
Machine tool operators	13.17 .05	8	23	7	5	9.5	29	9	73	7	8.1
Other skilled workers	13.15 .06	7	25	6	6	7	29	8	69	8	7.3
Coal miners	13.14 .05	6	21	8.5	6	7	47	6	68	9	7.6
Unskilled workers	13.23 .12	9	12	10	5	9.5	18	10	62	10	10.0
Craftsmen	13.24 .09	10	52	3	33	4	67	3	78	5	3.8

Table 2: Age at menarche of girls from Katowice examined in 1991 and SES characteristics of their families according to occupational groups of their fathers.

(1) Mother with at least secondary education; (2) Father with at least secondary education; (3) Monthly at least 750,000 zl/capita; (4) Only one or two children in a family.

merous in this region, as the slowdown of the tempo of growth of their daughters suggests. The age at menarche of the daughters of all the workers in the area with the exclusion of the daughters of coal miners showed the same delay in the average menarcheal age (13.2 in 1981 and 13.4 in 1991) as we were able recently to observe in other Polish cities (Hulanicka and Waliszko, 1992).

The privileged status of the coal miners started to erode at the beginning of the eighties and stopped some time before the end of the decade — a process which, with scarce job opportunities for their wives, had brought real poverty to this social group in Poland by the year 1990. Still, the relative affluence of parents in the second half of the seventies and early eighties meant that their children born in the late seventies matured faster.

This supplies us with a strong argument for the already mentioned hypothesis suggested by Burrel, Healy and Tanner in 1961 and by Liestol in 1982, that the first years of life are the most important for the tempo of growth of a child.

Finally we would like to stress one more point. The tendency towards an increase in the gap between the tempo of growth of girls from affluent social strata and girls from poorer groups is in striking contrast with the results from western European countries, where the trend toward an earlier age at menarche is observed more in the lower social strata (eg. Tanner 1973 and Roberts 1977 in Britain, Lingren 1976 in Sweden, Brundtland *et al.* 1980 in Norway, Vercauteren in Belgium 1984, Danker-Hopfe in Germany 1986).

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