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Source: *Human Biology*, Vol. 40, No. 2 (May, 1968), pp. 249–259

Published by: Wayne State University Press

Stable URL: http://www.jstor.org/stable/41448902

Accessed: 05-10-2015 16:46 UTC

AGE AT MENARCHE OF GIRLS IN WROCŁAW, POLAND, IN 1966

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THIS report presents the results of a study of menarcheal age among girls from the city of Wrocław, Lower Silesia, Poland. The material was collected in 1966; it consisted of a random sample numbering 5,859 school-girls aged 116 to 211 months, and was drawn from all types of schools: elementary, general-education secondary, and vocational secondary.

Data were collected by means of the status-quo method. Probits were used to estimate the mean and other statistics.

The city of Wrocław has been settled by the Polish population during the 20 post-war years and has at present about 500,000 inhabitants. Its population is highly heterogeneous with regard to geographic origin, social background, educational status, and cultural traditions. Manual workers and people of rural origin form the largest component; about 61% of the inhabitants were born in the countryside, and only 15% in big cities. Both with regard to its ethnic composition, and to the ratio of people of rural to those of urban background, the population of Wrocław approches the general demographic structure of the whole country.

Because of this high degree of heterogeneity it was necessary to divide the sample studied into sub-groups relatively homogeneous with regard to socio-economic and cultural characteristics. The division was based on information (provided in questionnaires by the girls' parents) on education, occupation, income, place of previous residence, and time of arrival in Wrocław of both parents.

In 802 cases (13.7%) the parents refused to fill the questionnaire; these families had to be excluded from the analysis of inter-group differences, though their daughters did enter into the calculation of the mean menarcheal age of the general population.

Thus, only 5,057 families could be segregated into socio-occupational groups; still fewer (4,089) could be classified with regard to the rural-

versus-urban background, since in many questionaires the answer to the question "where did you come from?" lacked precision.

The classification based on the above-listed criteria enabled us to evaluate the influence of three different factors upon the girls' rate of maturation (menarcheal age).

The first factor—type of occupation and educational status, considered jointly—characterizes the general living standard of the family; this includes a number of variables of great importance for the child's development, such as: income, structure of the family's budget, number of children in the family (which increases with decreasing social status—cf. Piasecki, 1967), personal hygiene, and—most importantly—nutrition.

The second factor—social background—is analyzed after the influence of the first factor has been removed i. e. in groups homogeneous with regard to occupation and education. In this manner it was possible to find out whether the cultural traditions brought from the rural environment do or do not tend to inhibit the utilization by the family of various opportunities offered by the urban environment.

The third factor may be called the factor of urbanization. An assessment of its role can be obtained by comparing two groups of manual workers of rural background differing in the length of the period of their residence in the city.

RESULTS AND DISCUSSION

Mean age at menarche in Wrocław girls equals 13.21 years; it exceeds by 2.5 months the mean ascertained in Warsaw girls in 1965 (Milicer and Szczotka, 1966), a difference not very marked yet statistically significant at the 0.01 level. The later average maturation of Wrocław girls is understandable in the light of the city's high proportion of fresh immigrants from rural regions.

If we assume that the Wrocław mean approximates well the mean for the general population of Poland,—the Polish value proves strikingly similar to the 13.23 mean found for the general population of Hungary (Bottyan et al., 1963); it is, also, noteworthy that the differences between the extreme means in subgroups prove similar in both countries (9 months and 8.4 months). These facts suggest that the processes of maturation are similar in the populations of this part of Europe.

Mention must here be made of the surprisingly low mean menarcheal age of Wrocław girls recently reported by Żukowski et al. (1964). The reliability of that mean (12.6 years), must be called into question.

According to our present findings not only does the general Wrocław mean turn out to be higher by more than 7 months, but even in girls from families representing the uppermost social stratum of the city's population—mean menarcheal age exceeds by more than 3 months the figure reported by Żukowski and co-authors.

The lowest European mean on record so far is that reported by Thoma (1960) for girls from one of the residential districts of Budapest; the author states, however, that he realt with a highly selected material, since as many as 87% of subjects in his sample came from families of the intelligentia. If Thoma's finding is excluded the lowest mean so far ascertained in Europe is that yielded by the Warsaw sample (13.01); London girls (Scott, 1961) exceed it by 1 month, whereas both the Danish mean (13 years 8 months; Bojlen et al., 1954) and the Dutch mean (13.7; after de Wijn, 1966) are considerably higher. It seems that this situation can be best interpreted in terms of Tanner's hypothesis (Tanner, 1965) according to which the genetic control of the processes of maturation expresses itself in the populations of North-Western Europe in a rate of development slower than that observed in the countries of the Eastern part of the continent.

The assessment of the influence of the first factor (education and occupation) upon menarcheal age can be obtained from comparisons of the means of the 7 occupational groups distinguished (Table 1, groups no. 2-8). The division was based on the occupation and education of the father, since not all mothers hold salaried jobs, and their educational status is, on the average, lower than that of their husbands.

The lowest mean menarcheal age (12.87) was found in girls from group no. 2 (Table 1): father college-educated, mother high school or college-educated, both parents wage-earners. Daughters from group no. 3—which has the same socio-cultural characteristics, but differs from group no. 2 in that the mother holds no salaried job—mature 1 month later (12.96). It is possible that this retardation is due to a somewhat lower living standard of the families forming this group.

In the category of high-school-educated white collar workers no effect of mother's work on menarcheal age of the daughters was detected. Both the whole group of high school educated white collar workers (no. 5), and its subgroup in which both parents are known to be wage-earners (no. 4), yielded identical means, 13.6 years—i. e. 3.5 months higher than the mean of group no. 2. This is a very large difference, the more so that it occurs within a single socio-cultural stratum—that of white collar workers.

TABLE 1

Results of probit analyses of menarcheal age of Wrocław girls in 1966 in the total sample and in various socio-occupational groups

NO.	MATERIAL	N	MEAN ± SE	SD	PROBIT REGRESSION EQUATION	CHI-SQUARE	df
1.	Total sample	5859	13.21 ± 0.027	1.16	$y = 0.86 (X - 13.03) + 4.84$	29.2	14
2.	Fathers college education, mothers college or high school education, both with salaried jobs	464	12.87 ± 0.097	1.24	$y = 0.80 (X - 12.78) + 4.93$	10.5	11
3.	Group no. 2 plus families of same educational status but in which mothers have no salaried jobs	749	12.96 ± 0.073	1.17	$y = 0.85 (X - 12.88) + 4.93$	11.3	12
4.	Parents high school education, both with salaried jobs	385	13.16 ± 0.092	1.14	$y = 0.88 (X - 12.95) + 4.82$	28.6	10
5.	Parents high school education, mother without salaried job	918	13.16 ± 0.070	1.19	$y = 0.84 (X - 12.96) + 4.83$	38.7	11
6.	Mixed marriages: intellectual × manual worker	447	13.11 ± 0.092	1.12	$y = 0.90 (X - 13.01) + 4.91$	7.3	8
7.	Fathers skilled workers	1788	13.26 ± 0.049	1.13	$y = 0.89 (X - 13.06) + 4.82$	12.3	12
8.	Fathers unskilled workers	1155	13.43 ± 0.065	1.20	$y = 0.83 (X - 13.13) + 4.75$	29.6	11
9.	Parents intellectual workers, urban	607	13.03 ± 0.076	1.06	$y = 0.95 (X - 13.01) + 4.99$	10.0	10
10.	Parents intellectual workers, rural	358	13.08 ± 0.111	1.23	$y = 0.81 (X - 12.98) + 4.91$	14.1	10
11.	Intellectual workers mixed marriages (urban × rural)	502	13.16 ± 0.096	1.20	$y = 0.83 (X - 12.93) + 4.81$	15.1	10
12.	Parents manual workers, urban	383	13.27 ± 0.112	1.19	$y = 0.84 (X - 12.99) + 4.77$	16.3	12
13.	Parents manual workers, rural	1584	13.36 ± 0.054	1.14	$y = 0.88 (X - 13.06) + 4.74$	9.4	8
14.	Parents manual workers, mixed background (urban × rural)	655	13.29 ± 0.090	1.30	$y = 0.77 (X - 13.04) + 4.81$	7.4	11
15.	Manual workers of rural background settled in Wrocław prior to 1950	899	13.29 ± 0.063	1.00	$y = 0.99 (X - 13.21) + 4.93$	23.0	10
16.	Manual workers of rural background, settled in Wrocław after 1950	685	13.57 ± 0.113	1.38	$y = 0.73 (X - 12.80) + 4.44$	6.3	10
17.	Only skilled workers from group no. 15	522	13.26 ± 0.080	0.93	$y = 1.07 (X - 13.19) + 4.93$	27.7	8
18.	Only skilled workers from group no. 16	410	13.42 ± 0.133	1.28	$y = 0.78 (X - 12.74) + 4.47$	5.4	8

The same mean (even 0.5 month lower) was found in group no. 6 which represents the borderline between white collar and manual workers.

The means in all the above-considered 5 groups fall below the general Wrocław mean, whereas the two groups of manual workers yield values higher than the general mean. It is noteworthy that white collar workers with high school education are closer (with regard to menarcheal age of their daughters) to skilled manual workers (difference 1 month) than they are to the uppermost socio-economic class (difference 3.5 months). The difference between the skilled and unskilled manual workers equals 2 months. The total range of variability of the group means is 6.7 months, a strikingly high value, considerably exceeding those noted in other countries. In Denmark the difference between the two opposite extremes of the social scale is 2 months (Bojlen et al., 1954), in Indian girls from Durban—3.3 months (Kark, 1956), in England and Scotland no such differences were noted at all (quoted by Tanner, 1965). In Hungarian girls from Szeged the two opposite extremes differed by 3.5 months (Bottyan et al., 1963). Incidentally, the Hungarian results are rather surprising in that daughters of white collar workers exhibit a higher mean than do those of manual workers.

Our findings present a quite coherent over-all pattern; they confirm the strong dependence of menarcheal age upon the economic and cultural status of the family. The remarkably large discrepancies between the group means point to the existence of considerable differences in the socio-economic conditions under which the children from families belonging to different educational and occupational groups grow up.

The role of the second factor—urban versus rural background—can be evaluated by comparing the means of groups no. 9 through 14 (Table 1). The groups of rural origin display consistently higher means of menarcheal age than do the corresponding urban groups, but the differences do not exceed 1.5 months, and none of them is statistically significant.

If we invert the problem and ask how, within the groups of rural background, manual workers compare with white collar workers—we find a difference of more than 3 months (statistically significant). This finding confirms the observation that the rate of assimilation to what can be termed the "urban culture" depends upon the educational status.

The role of the third factor—that of urbanization—is revealed by the differences which appear between the groups of manual workers who took up residence in Wrocław prior to 1950 and those who arrived later (groups no. 15 to 18, Table 1).

Daughters of manual workers who came to Wrocław with the first wave of immigrants begin to menstruate at the age of 13.29. Similar means are found in other groups—no. 7, 12, and 14 (Table 1). In group no. 17—comprising only skilled workers who immigrated before 1950—the mean remains at the same level (13.26).

A very marked retardation of menarche occurs in girls from families of rural origin which took up residence in the city in later years. The

TABLE 2

Menarcheal age of rural girls from Bialostockie voivodship in 1966

AGE IN MONTHS (midpoint of class interval)	MENSTRUATING	ALL QUESTIONED	%
131.5	0	3	0
137.5	0	15	0
143.5	0	12	0
149.5	1	13	8.3
155.5	3	16	18.8
161.5	3	21	14.3
167.5	14	31	45.2
173.5	17	28	60.7
179.5	26	38	68.4
185.5	26	32	81.2
191.5	33	41	80.5
197.5	29	33	87.9
203.5	18	19	94.7
209.5	23	23	100.0
215.5	1	1	100.0
221.5	2	2	100.0

mean in this group is 13.57, thus exceeding by ca. 3.5 months the mean in the group of earlier immigrants; this difference is significant. Daughters of skilled workers belonging to this category mature 2 months earlier, the mean in this group (13.42) being equal to that in the total group of unskilled workers (group 8). The inference is that in families of rural origin the length of time which has been available for adaptation to urban conditions significantly affects the rate of maturation of the daughters.

Still, girls from the latter group, though so markedly retarded in comparison to other Wrocław girls, mature considerably earlier than do

girls born and raised in the countryside. This can be illustrated by data collected at the same time (in 1966) in 17 villages of the Białystok voivodship, North-Eastern Poland. This material was collected by school-girls, pupils in a vocational school in Białystok, in villages from which they themselves came. A total of 332 girls were questioned, and the relevant distribution is given in Table 2. As can be seen, the age of the subjects varied from 10.5 to 18.5 years. The youngest among those already menstruating was 12 years and 4 months old, the oldest among those still not menstruating—17 years and 2 months old. The mean menarcheal age yielded by this sample is 14.40 ± 0.128, with an S.D. of 1.44. The equation of the weighted regression line is $Y = 0.693$ $(X — 14.73) + 5.229$; the chi-square is 7.0796 (df = 10) which indicates an excellent fit of the probits to the empirical distribution. As the mean shows, girls born and raised in the countryside mature as many as 10 months later than do girls from the "most rural" segment of the Wrocław population. It must be noted that the Białystok voivodship belongs to the economically poorest and least developed rural regions of Poland, so that there is good reason to regard the figure 14.4 as the upper limt of the range of means of menarcheal age in Poland in 1966. An identical mean (14.43) was found among the rural population of Roumania (Cristescu et al., 1965).

Thus, the group means of menarcheal age within the Wrocław sample vary between 12.87 and 13.57 years—two values found, respectively, at the top and the bottom of the socio-economic scale; this discrepancy of 8.4 months, is much larger than analogous differences noted in nations of Western Europe.

THE PROBLEM OF HETEROGENEITY OF THE SAMPLE

The probit method has already been employed in numerous studies on menarcheal age and has always yielded a good fit of the regression line to the empirical data; this indicates that in homogeneous populations menarcheal age is a variable exhibiting normal (Gaussian) distribution. Exceptional in this respect are the Hungarian findings reported by Bottyan et al. (1963). These investigations were carried out in several localities, widely scattered all over Hungary, and the mean for the general population was calculated from *pooled* data (over 7000 subjects). There is small wonder that a material collected in this manner proved heterogeneous. Similar results can be expected in each study in which data have been drawn from groups differing in socio-

economic conditions, not to mention the possibility of some ethnic differences e. g. between various rural isolates.

Judging from what is known about the origin and composition of the population of Wrocław, one could expect a priori that a probit regression line for the whole sample would not fit the empirical data satisfactorily; this, indeed, turned out to be the case ($\chi^2 = 29.184$ at $df = 14$ which indicates a significant departure from homogeneity at 0.01 level).

It can be shown (Finney, 1952) that the high value of χ^2 is, in this case, due mainly to a deviation of probits at the extremes of the distribution. When 5% fractions have been cut off at both ends—a very good fit to the empirical data has been obtained ($\chi^2 = 6.64$; $df = 6$). It should be emphasized that this procedure, though it reduced the material to 3669 subjects, did not alter the mean (which retained its previous value of 13.21), and the standard deviation changed insignificantly (from 1.16 to 1.12). It can thus be safely assumed that the mean for the *general* population of Wrocław has been estimated correctly.

In groups homogeneous with respect to the criteria here adopted— an excellent fit has, in most cases, been obtained of the probit regression lines to the frequencies of menstruating girls (Table 2).

However, some heterogeneous groups still remain. Among the occupational groups a high degree of heterogeneity is displayed by white collar workers without college education. This seems to accord with Piasecki's (1967) observation that this particular category of white collar workers constitutes a conglomerate of mutually isolated "occupational clans" (e. g. teachers).

Another heterogeneous occupational group is the mass of unskilled manual workers. Here differences in background (rural vs. urban) play the role of an isolating barrier impeding integration. Heterogeneity of data concerning menarcheal age disappears when this group is divided into sub-groups homogeneous with regard to occupation and background.

Attention must also be drawn to the group of manual workers of rural origin who came to Wrocław prior to 1950; here distributions deviate from normality both in the group as a whole and in its segment comprising unskilled workers only. This result is surprising, particularly when one compares it with the perfect fit of probits to the empirical data in the group of manual workers who immigrated later. The most likely explanation of this effect is the marked ethnic and cultural heterogeneity of the first, post-war wave of immigrants (e. g., it contained a high proportion of Poles repatriated from various regions of the USSR);

this heterogeneity may still persist, since each group of those early immigrants, bound by common origin, tended to occupy one of the few isolated, peripheral districts which escaped destruction during the siege of Wrocław in 1945. Cultural traditions, probably including specific food habits and preferences, brought by those people from their home environments, still tend to be cultivated in such ethnic isolates. Finally, the possibility must be reckoned with that some inter-group genetic differences, too, contribute to the heterogeneity of this stratum of the population of Wrocław.

SUMMARY AND ABSTRACT

1. Mean age of menarche in the general population of Wrocław girls is 13.21 ± 0.027 years, with a standard deviation of 1.16. It is, thus, higher by 2.5 months than the mean of Warsaw girls in 1965; this difference is statistically significant.

2. Of the factors affecting the rate of maturation, the socio-occupational factor exerts by far the strongest influence. Daughters of college-educated parents exhibit the lowest mean (12.87), while those of unskilled manual workers—the highest mean (13.43). The difference between these two extreme means (6.7 months) is much greater than any such between-group difference noted so far in West-European societies.

3. Social backgrond (rural vs. urban) is of little importance—if the effect of occupational and educational status is removed. The means of menarcheal age in all occupational groups among families of rural background are only insignificantly higher than the means in corresponding occupational groups among families of urban background.

4. The effect of the length of residence in the urban environment is quite marked. In families of rural background which moved to

Wrocław prior to 1950 mean menarcheal age is 13.29, while in those which immigrated later it is 13.57. The difference is statistically significant.

5. The total range of between-group variation in means is 8.4 months. This very wide range reflects the high degree of socio-economic heterogeneity of the Wrocław population.

6. Girls from families of rural background newly-settled in the city, mature, on the average, significantly later than any other sub-group into which the sample was divided; still, they mature much earlier (on the average by 10 months) than girls born and raised in rural areas of the voivodship of Białystok (North-Eastern Poland), where the mean is 14.40 ± 0.13.

7. The heterogeneity of the whole sample and of some of its sub-groups has been partly explained by the demographic structure of Wrocław.

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