

Fatness of children and adolescents from various socio-economic groups between 1978 and 1988

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ABSTRACT The study material contains the data on boys and girls aged from 6 to 18 years collected in the course of the Third and Fourth Anthropological Surveys carried out in Poland in 1977/78 and 1987/88. The questionnaire data (father's and mother's education and number of children in the family) were supplemented with the results of measurements of the triceps skinfold. It is assumed that the triceps skinfold is a good indicator of the nutritional status. In both studies fatness of children decreased along with a decreasing level of parents' education and with increasing family size. Triceps skinfold size was related mainly to the number of children in the family. In the decade from 1978 to 1988 a decline in social differences with regard to fatness of children coming from various socio-economic strata was observed.

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Introduction

Adults from various social groups show different levels of fatness. In many developed countries obesity is more frequent in lower social strata [GARN *et al.* 1977, SILVERSTONE *et al.* 1969], whereas in the developing countries it appears rather in groups gaining higher socio-economic status (SES) [GEORGES *et al.* 1993]. There are only a few papers investigating the relationship between the level of fatness and social factors in Poland. CHARZEWSKA [1985] and BIELICKI *et al.* [1988] stated that fatness increased along with the level of education. At the same time, in adult women the same pattern appeared [KONIAREK *et al.* 1989]. In the recent years the above-described

pattern has changed and now obesity increases monotonically when moving down the education scale [ROGUCKA, BIELICKI 1999].

The present investigation examines how changing conditions in Poland over the decade from 1978 to 1988 influenced by the diversity in the fatness of children and adolescents coming from various SES.

Data and methods

The study makes use of the massive data on the growth of children and youth aged from 6 to 18 years, collected in the Third and Fourth Anthropological Surveys, carried out in 1977/78 and 1987/88 [WALISZKO *et al.* 1980, HULANICKA *et al.* 1990]. The groups of subjects consist of 8,241 boys and 8,062 girls examined during the Third Survey and 8,173 boys and 7,959 girls studied under the Fourth

Survey, representing two opposite types of locations, various social environments and regions of Poland (Tab. 1):

Table 1. Size of samples in both urban centers in 1978 and in 1988

	Cities		Villages		Total	
	1978	1988	1978	1988	1978	1988
Boys	3853	3976	4388	4197	8241	8173
Girls	3667	4025	4395	3934	8062	7959

1) Three large cities – (population over 500,000) – randomly chosen schools in the downtown section of Warsaw, Łódź and Wrocław. The same schools were surveyed both in 1978 and in 1988;

2) All rural schools within the districts of Bystrzyca Kłodzka, Pińczów, Siemiatycze and Wolsztyn.

It should be noted that all children living in these villages were examined. Five percent of children absent on the research day, mostly for health reasons, underwent the examination at a later date.

Father's education, mother's education and number of children in the family were taken into consideration. Parents' education was distinguished into four categories: university, secondary school, basic vocational school and primary school education; the family size was defined as a number of children including the subject: one, two, three and four or more. The triceps skinfold was measured by Lange's caliper, exerting a constant pressure of 10 g/mm².

Distributions of triceps skinfold skewed to the right, so in order to approximate a normal distribution the log₁₀($x-c$) was used [KOZIEŁ & KRZEMIEN-DĄBROWSKA 1997]. The constant c , estimated experimentally, had various values for each analyzed group from every region. The Shapiro-Wilk's W test was used for assessing an approximation to

normality. This allowed us to express results in Standard Deviation Scores (SDS) and to eliminate the effects of age, sex and place of living (regions).

The analysis of variance (ANOVA) was used to determine differences between means, and $p < 0.05$ was considered significant.

Results

The impact of the mother's and father's education and number of children in the family on the fatness of children and adolescents from cities and villages was analyzed. The means of standardized values for the triceps skinfold and results of ANOVA are summarized in Table 2.

In 1978 fatness of boys and girls from cities and villages generally decreased along with the decreasing level of education of the father. Children whose fathers had university education were the fattest; the leanest were the children from lower strata of society described by this social criterion. In villages differences were the biggest, whereas in cities these differences were the smallest, and in the case of girls from cities – non-significant. After 10 years differences turned out to be smaller, except for boys living in cities. In 1988 differences in girls were non-significant in both analyzed urban centers.

In 1978 children of mothers with the lowest level of education were the leanest compared with children from upper social strata. This result was consistent across cities as well as villages, although in villages differences were bigger. In 1988, as opposed to father's education, influence of mother's education was still of great importance for the fatness of the children, especially in the case of boys.

Table 2. Means of standardized values for triceps skinfold thickness and results of ANOVA

		Boys				Girls			
		Cities		Villages		Cities		Villages	
		1978	1988	1978	1988	1978	1988	1978	1988
Father's education	university	0.08	0.01	0.27	0.11	0.05	-0.02	0.14	0.05
	secondary	0.03	0.07	0.15	0.08	-0.02	0.03	0.08	0.04
	b. vocational	-0.05	-0.05	0.10	0.02	-0.03	0.00	0.16	0.04
	primary	-0.09	-0.16	-0.05	-0.06	-0.07	0.00	-0.05	-0.04
	<i>F-ratio</i>	5.03***	5.71***	7.18***	3.79**	2.28	0.56	8.54***	1.83
Mother's education	university	0.08	-0.02	0.10	0.24	0.10	0.02	0.30	-0.02
	secondary	0.01	0.06	0.30	0.08	0.02	-0.01	0.10	0.05
	b. vocational	-0.03	-0.03	0.06	0.05	0.08	-0.02	0.20	0.07
	primary	-0.05	-0.24	-0.04	-0.07	-0.08	0.05	-0.04	-0.04
	<i>F-ratio</i>	2.73*	9.57***	11.75***	8.24***	5.01***	0.44	5.87***	3.21*
Number of children	one	0.12	0.18	0.20	0.16	0.14	0.12	0.32	0.16
	two	-0.04	-0.01	0.09	0.13	-0.04	-0.03	0.08	0.12
	three	-0.60	-0.21	0.02	-0.01	-0.28	-0.10	0.01	0.01
	four + more	-0.28	-0.31	-0.10	-0.16	-0.09	-0.11	-0.12	-0.12
	<i>F-ratio</i>	11.12***	22.71***	9.73***	21.02***	20.65***	8.37***	15.19***	13.16***

For girls the differences decreased and in cities they were non-significant.

In 1978 and 1988, thickness of triceps skinfold depended mostly on the number of siblings. Fatness decreased monotonically along with increasing size of the family. The fattest were single children; the leanest were the children having three and more siblings. This gradient was similar for boys and girls, in cities as well as in villages.

Discussion

In order to assess the fatness of children and youth the triceps skinfold measurements were performed. BOGIN & MACVEAN [1981] suggest that this skinfold is more susceptible to the common influences of SES, while the subscapular one is influenced to a greater degree by the biological effects of sex. Trunk fat plays more direct role in human physiology, especially in females and cannot yield to different environmental stresses, including nutritional deficiency.

From all the examined social factors, family size differentiated fatness of children in the strongest manner. The mean SDS of triceps skinfold decreased along with the growing family size: the larger the number of siblings the leaner the examined subjects. This gradient was identical for boys and for girls from cities and villages. CHRZANOWSKA [1992] who examined children from Kraków obtained similar results. Data from Polish pediatric clinics for obese children show that fat children come more frequently from small families than from big ones [LUSZAWSKA 1976, WOJDON-MACHAŁA & CERAŃSKA-GOSZCZYŃSKA 1977]. Also analogous data from the developed countries gathered in the 1970s showed a similar relationship between the triceps skinfold and the size of the family [WHITELAW 1971, RONA & CHINN 1982]. The triceps skinfold is one of more frequently used indicators of nutritional status [ROLLAND-CACHERA 1995]. When a family grows the amount of money available per child for food (especially

meat, dairy products, vegetables and fruit) and health care tends to decrease [*Rocznik Statystyczny* 1980,1990]. Additionally, the mother having only one child has more time to devote to care and to persuade her child to eat compared to the mother with several children [WHITE-LAW 1971]. This factor had the same weight in 1978 and in 1988, even though the living conditions in Poland changed significantly in that period (the martial law imposed in 1981, food rationing, split up of many families as a result of migration to Western Europe or North America).

The socio-economic status (SES) is most often determined by the level of the father's education. Generally speaking, the results of this study had shown that children from higher social strata, determined by the level of father's education, were fatter than the children from lower strata.

Two observations deserve particular attention. Firstly, the described differences in fatness of children resulting from the above-mentioned factor increased along with the decreasing size of urban centre. It was particularly well visible in girls in 1978, where the most significant differences were observed among girls from villages, but there were only non-significant differences in city girls. Secondly, these differences diminished after 10 years, except for boys from cities. Furthermore, father's education had no influence on thickness of the triceps skinfold in girls in both analyzed urban centers. CHRZANOWSKA [1992] received similar diversity in the case of father's education of children in Kraków. Also, children whose fathers were university graduates were more frequent patients in pediatric clinics for obese

children than their peers from other groups [LUSZAWSKA 1976, WOJDON-MACHAŁA & CERAŃSKA-GOSZCZYŃSKA 1977]. This relationship is consistent with the pattern observed in developing countries [BOGIN & SULLIVAN 1986, MUELLER 1986].

The influence of the mother's education on fatness of children shows a similar direction. In 1988, this factor was still of great significance (stronger for boys and weaker for girls: except for girls from cities, where differences were non-significant). It should be emphasized that this social factor distinguished fatness of children to a higher extent than father's education. These findings are in line with results presented in many papers. CHRZANOWSKA [1992] using the factor analysis stated that mother's education had stronger than father's education effect on fatness of children in Kraków. Also CERNERUD & ELFVING [1995] found that mother's profession had the same accuracy and usefulness when characterizing family social status, especially in recent years, when the number of housewives is on the decrease and more and more often women obtain professional education and work. One can also add that it is mostly mothers who are responsible for children's food intake.

When we compare the thickness of the triceps skinfold in 1978 and in 1988, we can see there is a consistent tendency towards the decline of social differences in the fatness of children and adolescents. It is evident particularly in the case of girls: the differences between social groups based on father's education were non-significant in 1988 in both urban centers.

In London a similar picture was observed in the post-war period. In 1949

boys coming from relatively poorer districts were shorter and lighter than boys from well-off families. Also, in 1955 the direction of this gradient was similar: in the highest social strata the means of the skinfold thickness were the largest, whereas in the lowest social strata they were the smallest [WHITELAW 1971]. A subsequent study carried out in London by WHITELAW [1971] demonstrated fundamental change of this general model. The observed gradient became reverse. Obesity occurred with significantly higher frequency in lower classes than in higher ones. These results were comparable to those obtained by Huenemann [WHITELAW 1971] who measured American boys and girls and to the results obtained in France [ROLLAND-CACHERA & BELLISLE 1986]. However, RONA & CHINN [1982] did not reveal any significant differences in the triceps skinfolds of children (in both, girls and boys) from different social classes. Nevertheless, children from two extreme groups: 1) father – unskilled manual worker, 2) father – non-manual worker – tended to be the leanest. The above-presented picture can be explained partly by the fact that parents with university education successfully prevent their children from becoming obese by engaging them in systematic physical activity, by feeding them with food of better quality, etc [RONA & CHINN 1982].

The question arises whether the decline tendency with regard to the social differences in fatness of Poles, described in this paper results from reasons similar to those occurring in Great Britain. There are no reports on diversity in physical activity levels among children coming from various social groups in Poland. It seems probable that rather than other

factors the access to standardized food resources is responsible for the similarity in the levels of fatness of children from various social groups. It is necessary to stress the specific character of the situation of families in Poland between 1978 and 1988. In the early 1980s basic food products were rationed, and the consumption of nutritionally important products decreased dramatically (especially meat and dairy products [*Rocznik statystyczny* 1980, 1990]), and they were not substituted with other nutritious products [HULANICKA *et al.* 1990]. This may lead to a conclusion that these uniform nutritional patterns observed in the early 1980s are responsible for the similarity in fatness among girls from different social groups and different places of residence. At the same time it is highly intriguing why this phenomenon did not occur in boys.

References

- BIELICKI T., Z. WELON, W. ŻUKOWSKI, 1988, *Problem nierównowartości biologicznej warstw społecznych*, Materiały i Prace Antropologiczne, **109**, 123–140
- BOGIN B., R.B. MACVEAN, 1981, *Nutritional and biological determinants of body fat patterning in urban Guatemalan children*, Human Biology, **53**, 259–268
- BOGIN B., T. SULLIVAN, 1986, *Socioeconomic status, sex, age, and ethnicity as determinants of body fat distribution for Guatemalan children*, Am. J. Phys. Anthropol., **69**, 527–535
- CERNERUD L., J., ELFVING, 1995, *Social inequality in height*, Scand. J. Soc. Med., **23**, 23–27
- CHYZANOWSKA M., 1992, *Biologiczne i społeczno-ekonomiczne determinanty rozwoju podskórnej tkanki tłuszczowej u dzieci i młodzieży*, Wydawnictwo Monograficzne, Kraków, 49
- GARN S.M., S.M. BAILEY, P.E. COLE, I.T.T. HIGGINS, 1977, *Level of education, level of income, and level of fatness in adults*, Am. J. Clin. Nutr. **30**, 721–725

- GEORGES E., W.H. MUELLER, M.L. WEAR, 1993, *Body fat distribution in men and women of the Hispanic health and nutrition examination survey of the United States: associations with behavioural variables*, *Ann. Hum. Biol.*, **20**, 275–291
- HULANICKA B., C., BRAJCZEWSKI, W. JEDLIŃSKA, T. SŁAWIŃSKA, A. WALISZKO, 1990, *City – Town – Villages*, Monografie Zakładu Antropologii PAN, Wrocław
- KONIAREK J., Z. WELON, T. BIELICKI, W. ŻUKOWSKI, 1989, *Pracownice umysłowe a robotnice – różnice w budowie ciała i stanie zdrowia*, *Materiały i Prace Antropologiczne*, **110**, 5–21
- KOZIEL S., A. KRZEMIEŃ-DĄBROWSKA, 1997, *Review of methods for transformation of skinfolds data to normality for boys and girls from 7 to 19 years old*, *Coll. Anthropol.*, **21**, 439–446
- LUSZAWSKA H., 1976, *Niektóre uwarunkowania środowiskowe występowania otyłości prostej u dzieci w wieku szkolnym*, *Pediatrics Polska*, **51**, 679–688
- MUELLER W.H., 1986, *Environmental sensitivity of different skinfold sites*, *Human Biology*, **58**, 499–506
- Rocznik statystyczny*, 1980, GUS, Warszawa
- Rocznik statystyczny*, 1990, GUS, Warszawa
- ROGUCKA E., T. BIELICKI, 1999, *Social-class contrast in the obesity among adult large-city dwellers in Poland in 1986 and 1996*, *Journal of Biosocial Science*, **31**, 419–423
- ROLLAND-CACHERA M.F., 1995, *Prediction of adult body composition from infant and child measurements*. [in:] *Body composition techniques in health and disease*, ed. P.S.W. Davies and T.J. Cole, Cambridge Univ. Press, SSHB, 36
- ROLLAND-CACHERA M.F., F. BELLISLE, 1986, *No correlation between adiposity and food intake: why are working class children fatter?*, *American Journal of Clinical Nutrition*, **44**, 779–787
- RONA R.J., S. CHINN, 1982, *National Study of Health and Growth: Social and family factors and obesity in primary schoolchildren*, *Annals of Human Biology*, **9**, 131–145
- SILVERSTONE J.T., R.P. GORDON, A.J. STUNKARD, 1969, *Social factor in obesity in London*, *Practitioner*, **202**, 682–685
- WALISZKO A., W. JEDLIŃSKA, K. KOTLARZ, D. PALUS, T. SŁAWIŃSKA, A. SZMYD, A. SZWEDZIŃSKA, 1980, *Stan rozwoju fizycznego dzieci i młodzieży szkolnej*, Monografie Zakładu Antropologii PAN, Wrocław
- WHITELAW A.G.L., 1971, *The association of social class and sibling number with skinfold thickness in London schoolboys*, *Human Biology*, **43**, 414–420
- WOJDON-MACHAŁA H., H. CERAŃSKA-GOSZCZYŃSKA, 1977, *Środowiskowe uwarunkowania nadmiaru ciężaru ciała u dzieci regionu warszawskiego*, *Pediatrics Polska*, **52**, 507–513

Streszczenie

Grubość fałdu skórno-tłuszczowego na ramieniu jest dobrym miernikiem stanu odżywienia w populacji. Badania przeprowadzono w 1977/78 oraz 1987/88. Objęły one dzieci i młodzież w wieku od 6 do 18 lat, pochodzącą z dużych miast i wsi, z różnych regionów Polski. Przeprowadzona ankieta socjologiczna dostarczyła danych na temat wykształcenia rodziców oraz liczby dzieci w rodzinie. Zarówno w 1978 jak i 1988 otluszczenie dzieci malało wraz z obniżaniem się poziomu wykształcenia rodziców a także wraz ze wzrostem liczby dzieci w rodzinie. Spośród analizowanych czynników najsilniej różnicującym otluszczenie była wielkość rodziny. W badanej dekadzie zaobserwowano tendencję w kierunku zmniejszania się różnic społecznych w poziomie otluszczenia.