

# Some Aspects of Secular Changes in Hungary over the Twentieth Century

É. B. Bodzsár and A. Zsákai

Department of Biological Anthropology, Eötvös Loránd University, Budapest, Hungary

## ABSTRACT

*Growth and maturation are considered the most reliable indicators of health status. Their progression rates in turn are strongly influenced by nutrition and socio-economic status, a well-documented relationship. The pattern of the so-called positive secular changes, i.e. the increase in size and earlier maturation, fits the populations' historical model of economic development very well. The historical, political and economic changes occurring in this century in Hungary have had a remarkably strong impact. Until World War I Hungary was an agrarian part of the Austro-Hungarian Monarchy, its ethnic composition was most variegated. Both World Wars caused fundamental changes, namely in respect of post-war Hungary they were associated with marked territorial losses and considerable population mobility. In interpreting the developmental differences in the data collected before and after these wars one should take account of the important facts that, in addition to the changes in socio-economic conditions, affected the gene pool of the populations in Hungary. Over the past 100 years profound changes have occurred in the mean body size, growth rate and timing of maturation of the country's population. This paper is a brief analytic summary of the tendencies observed in adult stature, maturation and some socio-economic conditions. It also compares the cohorts of sub-populations as reflected by the reviewed reports. In summarizing the change in adult stature estimated by the data on recruits, soldiers and students of higher education, it could be stated that adult mean stature had become markedly taller in Hungary since the end of the fifties. However, any estimation of the absolute increment and the exact rate is severely biased by the variable character of the samples' representativeness. Similar problems arose in dealing with sexual maturation, because the retrospective and status-quo methods of assessment were found incomparable. Nevertheless, menarche was observed to have shifted to an appreciably younger age lately, a trend that by the end of the 20<sup>th</sup> century seemed to have reached a more or less stable level.*

---

**Introduction**

When in 1963 Tanner<sup>1</sup> suggested the regulative target-seeking model for a description of the biological regulation of human growth, his point of start may have been the generally true basic principle that adaptability is a specific trait of all living beings, for both the species and the individual. The propelling force behind this trait – acting through a self-regulating process in a perpetual interaction with the environment – is genetic potential enforcing its expression. The auxological target in it is to reach the size and growth velocity such that they come closest to those still possible in the given environment. Catch-up growth and secular changes are impressive demonstrations of that. In turn, the race-preservation target gives rise to a reproductive being which can function energetically in the possibly most stable way in the same environment.

Also the natural factors exert their influence on Man through the social ones. Thus it is a truism that social factors are of vast importance in promoting or limiting the physical growth of children. Yet, as soon as this relationship had been recognized, it became the basis on which – along with such demographical indicators as mortality, morbidity, life expectancy, birth rate, etc. – auxological data could be exploited as means for estimating the developmental level and health status of societies, and for evaluating their social and economic position. By analyzing the secular trend in demographic and auxological data one can trace the manner in which the socio-ecological position of a community has changed from generation to generation.

Relying on the Hungarian studies this paper summarizes the secular changes that took place in the growth pattern in about one hundred years. It reviews the modifications in adult stature and in the rate of maturation. By using the hypothesis

that secular phenomena depend dominantly on the environment it analyzes the respective trends in physical development in the cohorts or other birth-date related subsets of populations living under diverse socio-economic conditions<sup>2,3</sup>.

*Changes in adult stature*

Modifying size of the adult population in this century can be estimated by using the anthropometric data of »ethnic« studies, the data of recruits and of students in higher education.

Average male and female stature was found by Bartucz<sup>4</sup> to be 167.02, respectively 156.10 cm in 1938 (the only national study of adults). Other not systematic, so-called ethnic studies performed in the various regions at different times were not representative of the country's population, nevertheless they allow at least two statements. The first is that adult stature means display a decreasing gradient from the north to the south and another from the west to the east of the country. The same implies that there are regional differences. The second statement is that secular change has been positive in all these regions. However, these data fail to give a clear answer to the question if there was a change in the dif-

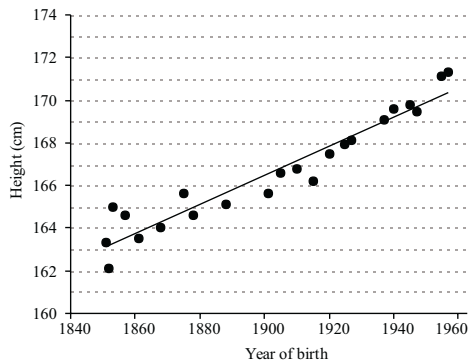


Fig. 1. The trend line fitted to the height of conscripts and soldiers ( $y = 0.0687 \times x + 35.867$ ;  $R^2 = 0.92$ ).

ference of stature between adult males and females<sup>5,6</sup>.

The earliest studies on the physical development of recruit-age young males date back to the seventies of the past century<sup>7,8</sup>. A linear trend analysis yielded an increment of nearly 7 cm in average stature in one hundred years (Figure 1).

By using a fourth-power regression polynomial, three growth phases of dissimilar rate could be discerned: the average rate of growth in stature was 0.6 mm per yr. in those born between 1840 and 1910, it was 0.75 mm per yr. in the ones born between 1910 and 1940 while it was 1.35 in those born between 1940 and 1957. Naturally, these estimates reflect the actual change in stature with a great deal of bias. One of these errors arose by pooling data of the different regions, another is due to the fact that the country's territorial area as well as the nation's ethnic composition changed considerably during these hundred years.

The not negligible regional variation in the adult stature of the ethnic studies was corroborated by the recruit data<sup>4,9,10</sup>. The regional distribution of these data spanning a period of more than a hundred years speaks for the same geographical gradients. In addition, urban populations were consistently taller than rural ones, and the average stature was always

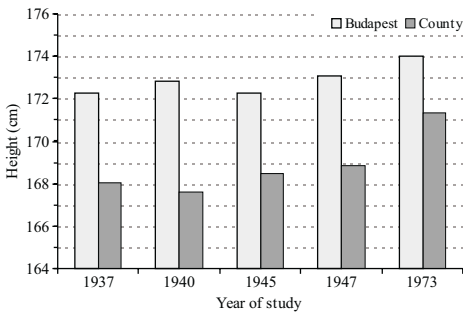


Fig. 2. Secular change in stature and urban to rural differences.

the tallest in the capital Budapest (Figure 2).

Figure 3 shows the height differences of three counties and the change that occurred in a hundred years.

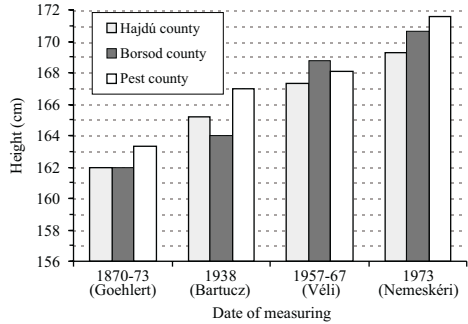


Fig. 3. Secular change in stature and regional differences.

#### The change in the stature of university and college students

Data on the average height of the groups taking part in higher education have been collected since the 1930's. The longest series of data refers to the students of Debrecen, a university town of East Hungary (Figure 4)<sup>11</sup>.

In interpreting these data one should be fully aware of the fact that before World War II university students came

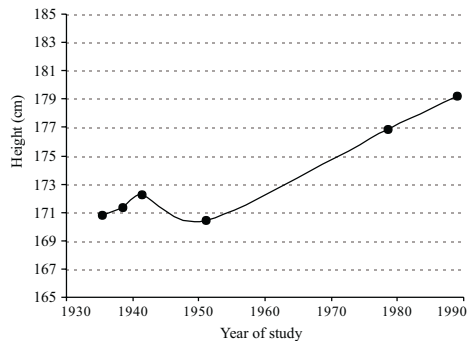


Fig. 4. Changes of mean stature in Debrecen students.

from the very thin layer of the most privileged families. After the war, however, at least up to the 1960s, the regime offered greater opportunity to the children of manual workers and peasants in getting among the more educated ranks than to ones coming from other strata of the society. Then after the 1980s, when economy suffered badly, it was again the more privileged ones that could afford university education. Another point to be noted is that the sampling frame of the respective studies was not the same in respect of age. Accordingly, one cannot decide if the decrease of 1.86 cm in mean stature between 1942 and 1951 resulted from the unfavorable economic conditions during and after World War II or else from the changed social background of the students. Anyway, both point to the inhibitory effect of adverse social background on somatic development. After the 1950s mean stature increased remarkably, the change per decade amounts to 2.31 cm when estimated by linear regression.

Summarizing the change in adult stature estimated by the data on recruits, soldiers and students of higher education, it can be stated that adult mean stature has become markedly taller in Hungary since the end of the fifties. However, any estimation of the absolute increment and the exact rate is severely biased by the variation in the samples' representative character.

*Secular change in sexual maturation*

Changes in the rate of sexual maturation used to associate to changes in stature and growth. Shifts in the maturation rate can be best followed by studying age at menarche. Reaching back to the sixties of the last century, a good number of observations are available on the average age at menarche. The early studies employed the recall method and also the sampling principles were far from uniform. The »status-quo« technique of sam-

pling and the estimation of the median age at menarche by probit analysis became the method of choice only from on the sixties. Excepting Figure 6, the present paper only deals with the tendencies obtained by the latter methods.

A decrease of 2.6 months per decade was found by using the studies<sup>10</sup> performed in 1959–1961 and extending over the whole country and the ones of 1981–1984<sup>11,12</sup>. Linear regression of the data collected in the communities of different size revealed that the shift in menarcheal age was the fastest (about 4 months per decade) in the settlements with 10,000 inhabitants or less. After the sixties this shift was nearly the same (about 2.5 months per decade) in the populations of the capital and the towns with 100–300 thousand inhabitants.

Despite the great number of studies referring to age at menarche, there are relatively few papers that covered longer time in the same settlements and thus would provide more accurate estimates for secular change. Of these few, the most remarkable are those referring to Székesfehérvár<sup>13–16</sup> (Middle-Hungary), Kaposvár<sup>17,18</sup> (South Hungary), and Körmend<sup>19</sup> (West Hungary). In Kaposvár these studies cover 40 years: the previously faster shift in menarcheal age became definitely slower since the sixties as shown in Figure 5.

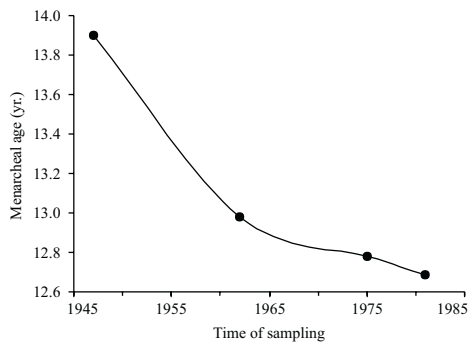


Fig. 5. Trend of menarcheal age in Kaposvár. ( $y = 0.001x^2 - 4.994x + 4951.1$ ;  $R^2 = 0.993$ ).

In Fejér, one of the industrially most developed Hungarian counties, the analysis of the data collected on menarcheal age in 1972 and 1992<sup>13–16</sup> showed that changes did not only affect median age at menarche but also its variability, which in this case became less (Figure 6). The difference between the tenth and ninetieth centiles, which for those born between 1951 and 1960 was almost 4 years, became reduced to less than 3 years for those born between 1971 and 1980. A large part or almost all of this reduction can be attributed to the decreasing frequency of late maturers.

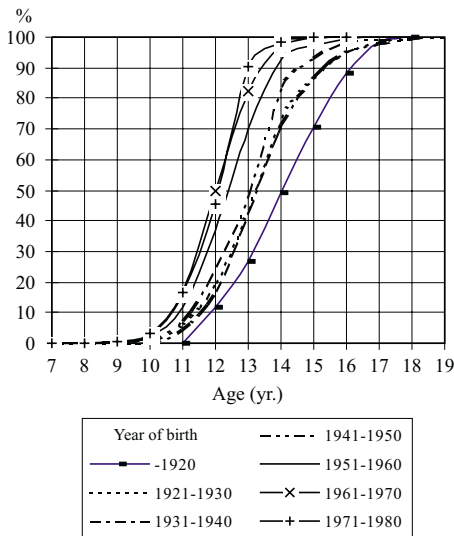


Fig. 6. The secular change in the cumulated frequencies for age at menarche.

The same samples contained data also on sibling numbers and the level of education and occupation of the parents. In the respective groups it became manifest that the change in menarcheal age resulted from two opposing tendencies. Under better socio-economic conditions the shift in the rate of maturation was slightly faster while in the disprivileged ones it became slower (Figure 7).

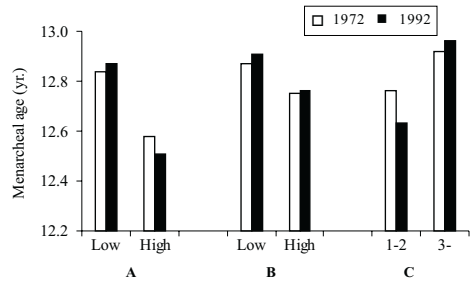


Fig. 7. Median age at menarche related to some social factors in Fejér county. (A = the father's level of education, B = the mother's level of education, C = number of siblings).

Studies referring to the age of boys at spermarche are very few (Table 1). In each of these median age was estimated by probit analysis. The results show that urban and rural habitat has a demonstrable effect on maturation and that the shift of the median towards a younger age can be evidenced in the boys as well.

### Discussion

For Hungary this century was a period of important historic, political, social and economic changes. Until World War I the country was a part of the Austro-Hungarian Monarchy, her mostly agrarian population had a variegated ethnic composition. The peace treaties divided the monarchy into independent national countries and this brought about a loss of two-thirds in territory for our country. At the same time also the ethnic composition has drastically changed. In the period between the two world wars industrialization proceeded at an increasingly faster rate that re-stratified society according to the division of labor. Disprivileged urban manual workers grew in number. After World War II further demographic changes took place because of internal migration on the one hand and on the other because of forceful expatriations of certain ethnicities. All these have led to considerable difficulty in interpreting the

**TABLE 1**  
ESTIMATES ON AGE AT SPERMARCHE IN HUNGARY

Site and author	Year of sampling	Sample size	Oigarcheal age (yr.)
Budapest, Dezső (1965) <sup>22</sup>	1965	662	13.10
Székesfehérvár, Bodzsár and Pápai (1994) <sup>18</sup>	1981	2,106	13.52± 0.12
Jászság region, Bodzsár and Pápai (1989) <sup>23</sup>	1983	712	13.77± 0.05
Hungary, Eiben and Pantó (1984) <sup>24</sup>	1981–1984		14.11± 0.09
	Urban boys	2,641	13.86± 0.10
	Rural boys		14.37± 0.11
Székesfehérvár, Bodzsár and Pápai (1994) <sup>18</sup>	1991	2,076	13.55± 0.13

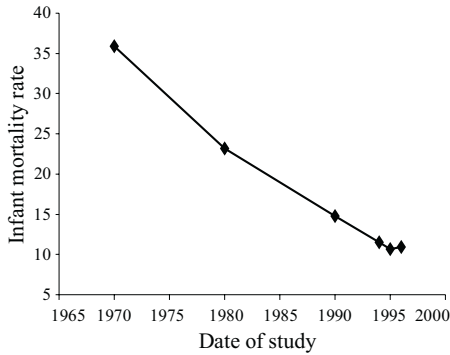


Fig. 8. Change of infant mortality per 1,000 live births.

differences in physical growth between pre- and post-war conditions. Thus, beyond the effect of economic, social and environmental factors one has to emphasize the changes that occurred in the gene pool of the populations that became to consist of almost a single ethnicity.

Industrialization and urbanization proceeded at a fast rate between the fifties and the seventies along with a marked reduction in the number of people of rural regions (internal migration). Since the late seventies approximately 60% of the population lives in towns. Although in the fifties and early sixties the majority of the adult and child population lived under hard material conditions (in particular when related to the West-European countries), nearly all of them were employed. Starvation afflicting a considerable part of the population before the war ceased. In

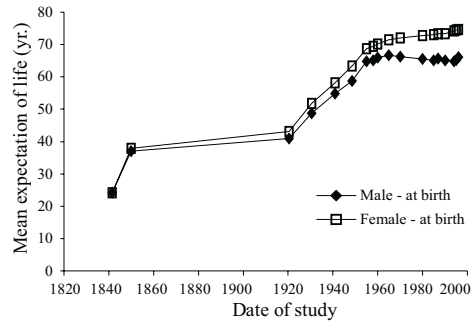


Fig. 9. Trend of life expectancy for the newborn.

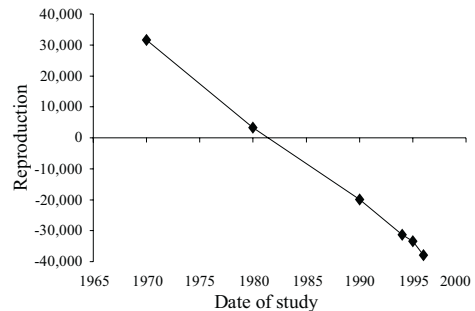


Fig. 10. Reproduction rate in Hungary.

addition, sanitary conditions and health care improved remarkably, and education became compulsory until age 16. The seventies were perceived as an economic upswing by most people.

The positive secular changes taking place in the physical development of Hungarian children are repercussions of the favorable changes in the economic

and social relationships. Although with certain regional differences (economic development was fastest in the north and west of the country), living conditions improved everywhere from the seventies. The fastest rate of child growth and development can be evidenced between the end of the seventies and the early eighties. This improvement slowed down since the middle eighties, nevertheless, the general positive trend in the developmental and growth data still continues.

Considerably better living conditions involving the entire Hungarian population are demonstrable not only in the direction of the secular changes, but also in the demographical indicators<sup>25,26</sup>. Perinatal and postnatal mortality decreased (Figure 8), life expectancy for the newborn became impressively longer (Figure 9). While in the first years of this century the mean age of males was merely 36 years and that of the females 38, by the early eighties these have almost doubled (65 and 73 years, respectively) and stay constant since then. On the other hand, reproduction rate has decreased a great deal (Figure 10).

Also dietary relationships have undergone important changes<sup>27,28</sup>. When this

century began, protein and energy intake was deficient for the majority of the population. In the seventies and eighties energy consumption (above 3200 kcal/day) resembled that of the welfare states. The composition of the diet is, however, not that favorable in respect of the fraction of fat and carbohydrates; the increase in fat consumption was particularly excessive, with the associated harms on health. One of these untoward consequences was the markedly increased incidence of obesity (about 40% of the adult population is overweight or obese). Another result is the shockingly high morbidity (and mortality) of cardiovascular diseases.

The crisis that developed in the early eighties has eventually led to a political and economic rearrangement. While freedom of thought, opinion and political liberty was greeted by everyone, economic re-structuration was associated for many with a deterioration of living conditions. Social differences in the ability to make a living became broader. What impact these changes will have on the growth pattern of children and the health status of the adult people is a point that can be answered by future studies only.

## REFERENCES

1. TANNER, J. M., *Child Development*, 34 (1963) 817. — 2. SUSANNE, C., É. B. BODZSÁR, *Patterns of secular change of growth and development*. In: BODZSÁR, É. B., C. SUSANNE (Eds.): *Secular growth changes in Europe*. (Eötvös University Press, Budapest, 1998). — 3. BODZSÁR, É. B., C. SUSANNE, *Secular growth changes in Europe: Do we observe similar trends? Considerations for future research*. In: BODZSÁR, É. B., C. SUSANNE (Eds.): *Secular growth changes in Europe*. (Eötvös University Press, Budapest, 1998). — 4. BARTUCZ, L.: *A magyar ember. A magyarság antropológiája*. (Egyetemi Nyomda, Budapest, 1938) — 5. WOLAŃSKI, N., E. KASPRZAK, *Curr. Anthropol.*, 17 (1976) 548. — 6. BODZSÁR, É. B., *Secular growth changes in Hungary*. In: BODZSÁR, É. B., C. SUSANNE (Eds.): *Secular growth changes in Europe*. (Eötvös University Press, Budapest, 1998).
- 7. KÖRÖSY, J., *Bull. Soc. Anthropol. Paris*, (1878) 12. — 8. SCHEIBER, S. H., *Archiv für Anthropologie*, 13 (1881) 233. — 9. KÁDÁR, P., *Gy. VÉLI, Anthropol. Közl.*, 15 (1971) 97. — 10. NEMESKÉRI, J., A. JUHÁSZ, B. SZABADI, *Demográfia*, 20 (1977) 208. — 11. SZÖLLŐSI, E., *Antropol. Közl.*, 39 (1998) 43. — 12. BOTTYÁN, O., Gy. DEZSŐ, O. G. EIBEN, Gy. FARKAS, T. RAJKAI, A. THOMA, Gy. VÉLI, *Anthropol. Közl.*, 7 (1963) 25. — 13. FARKAS, Gy., E. SZEKERES, I-né KALMÁR, *Egészségnevelés*, 28 (1987) 69. — 14. EIBEN, O. G., A. BARABÁS, E. PANTÓ, *Humanbiol. Budapest*, 21 (1991) 123. — 15. BODZSÁR, É. B., *Humanbiol. Budapest*, 3 (1975) 174. — 16. BODZSÁR, É. B., *Recent data to the physical development of adolescent girls*. In: EIBEN, O. G. (Ed.): *Growth and development: Physique Symp. Biol. Hung. Budapest*, 20. (Akadémiai Kiadó, Budapest, 1977). —

17. BODZSÁR, É. B., Humanbiol. Budapest, 12 (1982) 199. — 18. BODZSÁR, É. B., J. PÁPAI, Humanbiol. Budapest, 25 (1994) 245. — 19. BODZSÁR, É. B., Gy. VÉLI, Glasnik, 17 (1980) 69. — 20. KÖRNYEI, V., Gy. GYÓDI, E. GELENCSE, K. KERCSÓ, Á. SZOKOLA, Anthropol. Közl., 27 (1983) 39. — 21. EIBEN, O. G., Humanbiol. Budapest, 25 (1994) 205. — 22. DEZSŐ, Gy., Anthropol. Közl., 9 (1965) 151. — 23. BODZSÁR, É. B., J. PÁPAI, Humanbiol. Budapest, 19 (1989) 215. — 24. EIBEN, O. G. E. PANTÓ, Anthropol. Közl., 28 (1984) 193. — 25. Demográfiai évkönyv: 1998. (KSH, Budapest, 1999). — 26. ANONYMOUS: Statisztikai adatok Magyarország 1998. évi egészségügyi helyzetéről. (Népegészségügy, 1999). — 27. BÍRÓ, Gy., Népegészségügy, 75 (1994) 129. — 28. BÍRÓ, Gy., Népegészségügy, 77 (1996) 11.

É. B. Bodzsár

*Department of Biological Anthropology, Eötvös Loránd University, Pázmány P. sétány 1/c, 1117 Budapest, Hungary*

## NEKI ASPEKTI SEKULARNOG TRENDA U MAĐARSKOJ TIJEKOM DVADESETOG STOLJEĆA

### S A Ž E T A K

Rast i sazrijevanje smatraju se najpouzdanijim indikatorima zdravstvenog stanja. Stopa njihove promjene pod snažnim je utjecajem prehrane i socio-ekonomskog stanja i taj odnos je dobro dokumentiran. Uzorak takozvanog pozitivnog sekularnog trenda, odnosno, većeg rasta i ranijeg sazrijevanja, podudaran je također i s povijesnim modelom ekonomskog razvoja neke populacije. Povijesne, političke i ekonomske promjene koje se javljaju u XX. stoljeću u Mađarskoj imale su izrazito snažan utjecaj. Do prvog svjetskog rata, Mađarska je bila agrarni dio Austro-Ugarske Monarhije, te je njen etnički sastav u najvećoj mjeri šarolik. I prvi i drugi svjetski rat prouzročili su temeljne promjene, naime, u odnosu na poslijeratnu Mađarsku, oni su bili povezani s izrazitim teritorijalnim gubitcima i znatnom pokretljivošću stanovništva. U tumačenju razlika u podacima o razvoju, prikupljenim prije i nakon I i II svjetskog rata trebalo bi uzeti u obzir značaj činjenice kako je osim promjena u socio-ekonomskim uvjetima, do promjena došlo i u genskom bazenu stanovništva Mađarske. Tijekom proteklih 100 godina, duboke promjene su se pojavile u prosječnoj tjelesnoj visini, stopi rasta i vremenu sazrijevanja stanovništva. Ovaj rad pruža analitički sažetak tendencija primijećenih u visini tijela odraslog stanovništva, vremenu sazrijevanja te nekim socio-ekonomskim uvjetima. On također daje prikaz dosadašnjih istraživanja te usporedbu kohorti mjerenih pod-populacija. Sažimajući promjene u tjelesnoj visini odraslih, procijenjenoj na osnovi podataka dobivenih na ročnicima, vojnicima i studentima, može se zaključiti kako je u Mađarskoj od kraja pedesetih godina XX. stoljeća prosječna visina tijela odraslih postala značajno veća. Međutim, svaka procjena apsolutnih vrijednosti te točne stope tog porasta znatno je iskrivljena razlikama u karakteristikama reprezentativnih uzoraka. Slični problemi javljaju se prilikom proučavanja seksualnog sazrijevanja, jer se pokazalo da su rezultati dobiveni retrospektivnom i status-quo metodom – neusporedivi. U svakom slučaju, pokazalo se da se u posljednje vrijeme, menarha pomaknula u znatno mlađu dob, što je trend koji se koncem XX. stoljeća uglavnom stabilizirao.