

Changes in height in adult bulgarians from the end of 19th to the end of 20th century

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The data of body height in Bulgarians born since 1860-s to 1960s have been analyzed. Mean body height has been calculated and traced year by year. The results show that in the late nineteenth and early twentieth century, there was some deterioration in the socio-biological conditions, which is reflected in the stagnation and loss of height. In the interwar period this deterioration has been overcome and acceleration of adult height began and continued until the end of period under study. However, in this process, Bulgaria lags behind other European countries, which ahead Bulgarians in mean adult height.

Key words: anthropometric history, body height, Bulgaria, social influence on physical development

In recent decades, historical anthropometry has established itself as a method for assessing the socio-biological conditions in societies and periods with insufficient socio-economic data, such as societies with a large share of natural economy or of the informal economy etc. Based on it is examined the situation of the population of Russian and of Habsburg Empire, in the U.S. in the 19th century etc. [2, 3, 10, 11].

Material and Methods

The main sources of data for historical anthropometry are:

- a) height measurements in recruits which in many European countries have been preserved partly or completely from the 17th century;
- b) mass data from specialized anthropometric studies conducted during the 20th century [10].

In Bulgaria we have data on adult height for the period 1886-1942 (all recruits at 1897-1920 and three separate measurements at 1886, 1889 and 1942 [5, 12], and the results of four national-wide studies in 1960, 1970-71, 1980-82 and 1989-1993 [9, 13, 14, 15]).

The data of stature in recruits were discussed in details in former papers [5, 12].

The nation-wide survey of 1960 gives mean heights in one-year age groups for men and women up to 26 years. Of the investigated, 2557 men aged 19-26 years and 3483 women aged 17 to 26 years can be considered adults [13].

The survey of 1970-71 gives mean heights in one-year age groups up to 24 years and then in five-year age groups up to 55-59 years. Of the investigated, 8489 men aged 18-59 years and 7980 women aged 17-59 years can be considered as grown [14].

The study of the years 1980-82 gives mean heights in one-year age groups up to 24 years and then in five-year age groups up to 65-69 years. Of them as adults can be considered 6,279 men 17 to 69 years, and 6,086 women of the same age [15].

The materials from the National Anthropological Program (NAP) give mean height of 2419 men and 2846 women aged 30 to 40 years, unfortunately, in a common age group [9].

The height by age were transformed in height by year of birth by subtracting the age of the peak years of the survey (1981 for the study 1980-82 and 1991 for NAP).

The mean heights in five-year age groups in the survey results from 1970-71 and 1980-82 years were brought to one year age groups using the formulas:

$$h_1(a) = H(A) + (a - A) / 5 \times (H(A + 5) - H(A))$$

$$h_2(a) = h_1(a) \times 5H(A) / \sum_{k=-2}^{k=2} h_1(A + k)$$

where: **A** – central age in a five-year age group;

H – mean height in a five-year age group;

a – age (one-year age group/

h₁ – mean height in one-year age group, first approximation

h₂ – mean height in one-year age group, second approximation

Results and Discussion

The analysis of the data shows that in men born in the late 19th century and matured up to 1920 a slight downward trend in height can be observed (**FIGURE 1**). It can be explained on the basis of the decline of the Bulgarian protoindustry and animal husbandry after the Liberation, leading to a reduction in GDP and national income per capita up to 1910, followed by an even worse war period 1912 -1918 [4, 8]

For those born in the twentieth century and reached maturity in the interwar period a pronounced increase in height (acceleration) can be observed. It occurs as well in men and women (**FIGURE 2**). The data of mean height of 211 women measured by Vatev in 1899 do confirm that the reduction of the adult height in people born in the late nineteenth century also affected the women [7].

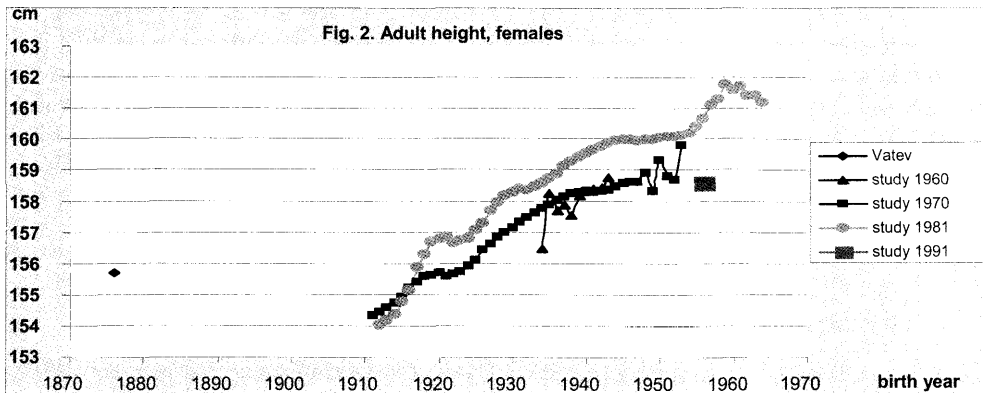
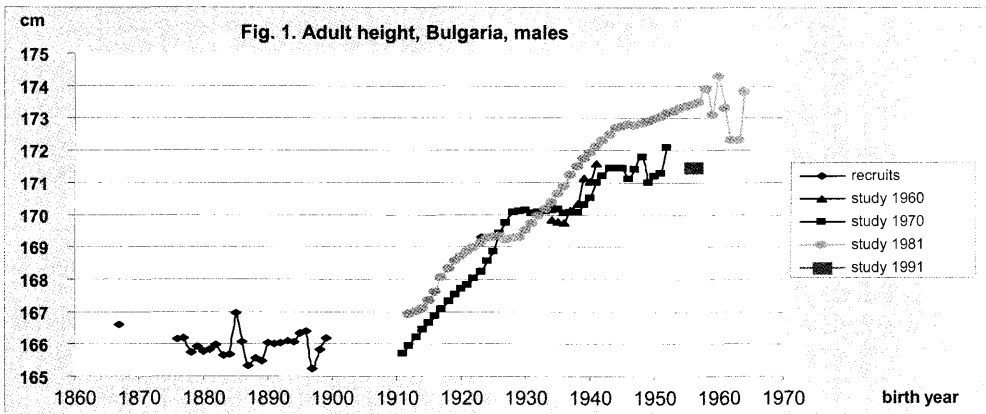
In the historical anthropometry greater adult height is associated with rising living standards and improving of the socio-biological conditions for children and adolescents. This increase in Bulgarians born in twentieth century can be connected with:

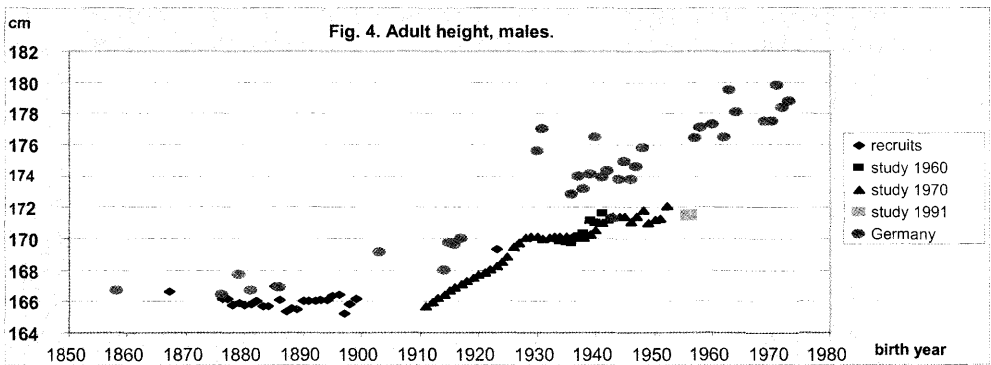
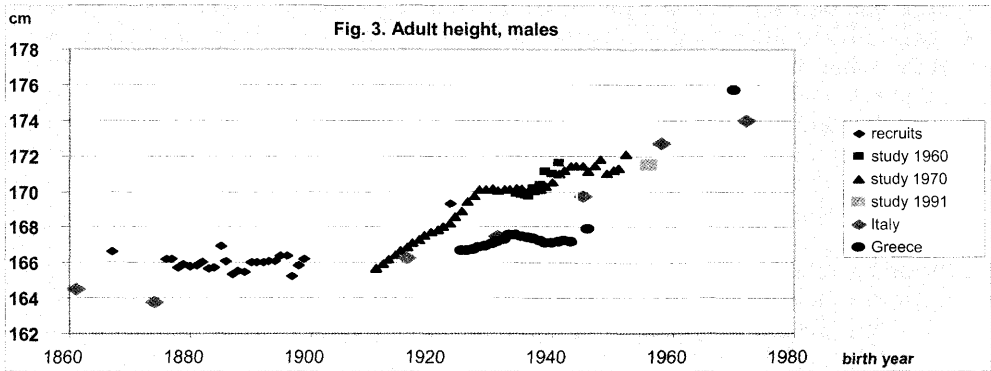
- the intensification of Bulgarian agriculture that began in the interwar period;
- the industrialization and urbanization of the country, which also began in the interwar period;
- the demographic transition – the sharp decline in fertility allows reduced number of children to receive better care; and others.

It is important to note that the acceleration of adult height, respectively, the improving of the socio-biological conditions for the development of children and adolescents began after World War I, but not after the Second World War, ie can not be associated with the social transformations after it. It is not noticeable, however, these transformations to have significantly impeded this process.

The comparison of data from different studies showed a defect of the 1980-82 national study. Although the published materials say that the survey has been carried out in the same sockets and by the same methodology as the previous 1970-71 survey [15], this is clearly not the case. As stated on earlier [6], if this was true, it would be expected the height of people over 20 years in the first study to not increase 11 years later. However such “increase” can be observed (**Fig.1, Fig.2**). Meanwhile, the results from the NAP have been published, which agreed well with the results of survey of 1970-71 year and badly with these from 1980-82 survey. Thus the measurement data from 1980-82 survey confirm the marked increase of adult height in Bulgarians born in the twentieth century, but the mean adult height in people born around 1960 has to be evaluated on the base of comparison with 1970-71 survey and of NAP – about 172 cm in males and 159 cm in females. This gives some 1 cm per 10 years growth of mean adult height – a rather moderate figure.

It is interesting to compare the data of adult height in Bulgaria and in some other countries (various data published in [1]). The comparison shows that Italy and Greece, where young people were lagging behind their Bulgarian counterparts in the early twentieth century, later catch up and get ahead of Bulgaria’s socio-biological conditions (**Figure 3**). The same is true for other relatively backward in the late 19th century, countries such as Portugal, Poland, Russia. On the other hand, the average height in





significantly more advanced Germany departs from level virtually identical to that in Bulgaria (about 166 cm (detaches and gradually surges higher (**Figure 4**).

Unfortunately, there are no representative data on mean adult height of Bulgarians born after the early 1960s, ie the main mass of the population in working and reproductive age.

Conclusion

Collected data on the mean adult height of Bulgarians of both sexes showed that in the late nineteenth and early twentieth century, there was some deterioration in the socio-biological conditions, which is reflected in the stagnation and loss of height. In the interwar period this deterioration has been overcome and acceleration of adult height began. However, in this process, Bulgaria lags behind other European countries, which ahead Bulgarians in mean adult height. Further studies are needed to trace secular changes in younger generations born after 1960.

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