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CARTOGRAPHIC METHOD FOR STUDYING SECULAR TREND IN MALE STATURE IN RUSSIA AND NEIGHBORING COUNTRIES IN THE 19-20TH CENTURIES

Introduction. *The article aims to study the regional differences in male stature during the 19-20th centuries in Russian Empire, USSR, Russia and some neighboring countries and to illustrate the observed changes in time using contemporary cartographic methods and the new source of information – the RLMS HSE dataset. We hypothesized that there are some areas with stable short and tall statures.*

Materials and methods. *We used datasets with as large number of territorial units of the country as possible, published by D.N. Anuchin, V.V. Bunak, A.L. Purundzhan. To illustrate relevant datasets, the methodology of visualization was created. To make maps comparable with each other, especially, for the territory, like the European part of Russia, we made a surface interpolation.*

Results. *We could suggest areas with more or less stable tall stature – near the Baltic Sea and Saint-Petersburg and between the contemporary cities of Kiev and Krasnodar. The area with stable short stature is situated in the middle part of Volga River – near Kazan city. Thus, the hypothesis was confirmed considering a new database. Moreover, according to the datasets, which illustrated the second part of the 20th century, the new area had appeared in Moscow and some neighboring territories. Secular changes in height for different regions and time periods were uneven, which may be connected with the different ethnic composition of the studied populations and various socioeconomic and demographic variables.*

Conclusion. *Based on contemporary cartographic methods we illustrated the general pattern of changes in male stature, the idea of the consistency of the changes in male stature and the uneven changes in values across the territory. Some areas with stable short and tall statures first discovered by Anuchin are preserved till nowadays. Our research demonstrated the idea that areas could be formed under various circumstances. However, the overall trend has stayed the same over time despite the positive secular changes.*

Keywords: stature; men; Russia; 20th century; 19th century; regional differences; secular trend

Introduction

Secular trends in stature were convincingly proved in plenty of scientific works for different Russian cities and regions based on the measurements of children, adolescents, and adults during the 20th century [Lehmann et al., 2014; Godina, 2011; Godina, Yampolskaya, 2004; Mironov, 2012; Godina et al., 2017]. The most common explanation of secular changes in body height and age of maturity is connected with improvement of quality of life, such as advance in hygiene, medical care and nutrition, the decline in morbidity and infant mortality [Tanner, 1986; Cole, 2003; Bogin, 2013]. Moreover, there is a strong positive correlation between the average body height and the key indicators of the socio-economic development of the countries. In this context, the stature itself became a popular indicator among economists to evaluate the economic development of the country in historic times. Another explanation [Bunak, 1968] of secular trends is connected with the increasing level of migration among

countries and mixture between population of different ethnicities. Such genetic exchange could lead to stronger sustainability in the population. These explanations are well accepted, but neither of them could be taken for granted. It is still an open question why the secular changes rate decreased or even stopped in most of the countries and Russia as well in the 1980's [NCD RisC, 2016]. Notwithstanding, there were no significant changes in socio-economic development. Another point that needs to be clarified is the fact that body height increased during some negative events like wars, famines, and revolutions. Some researchers hypothesized that it could be explained in terms of newly opened upward social mobility and concomitant readjustments of target height [Hermanussen, Scheffler, 2016].

However, speaking about Russia we must take into account that it is a large country with significant differentiation of climate, social, ethnic, and economic conditions. Thus, rates of secular changes and body height indicators might differ in various parts of the country, as well as the main explanation of the observed variations. Moreover, there is a version of stature heredity in different regional areas of the country. Some areas are historically considered territories where people with tall and short stature lived [Anuchin, 1889; Bunak, 1932]. And such relations seem to be stable despite all secular changes [Purundzhan, 1978].

The article aims to study the regional differences in stature among men living in Russia and neighbouring countries during the 19-20th centuries and to illustrate the observed changes in time using contemporary cartographic methods. We hypothesized that there are some areas with stable short and tall statures.

Materials and methods

In contemporary Russia there is no officially published statistical information with the anthropometric measurements of the adult population. So, to study regional differences in time some criteria for datasets should be defined. Firstly, the dataset must contain as large amount of territorial units of the country as possible. Secondly, full description of the measurement methodology and sample design should be provided. In fact, there are only four datasets that could be used to meet these criteria and fulfill the goal of the article. Three of them provide the information only for males.

Sources of information

The first suitable source of information can be found in the study made by D.N. Anuchin titled "About the geographical distribution of height of the male population in Russia (according to the data on universal military service in the Russian Empire for the years 1874-1883)" [Anuchin, 1889]. The Anuchin's dataset contains information about the height of conscripts who were born in the period from 1853 to 1863 and were 21 years old at the moment of measurement. The average values of the recruits' height are available for the 638 districts that formed 71 provinces in the Russian Empire. Although there is no information on the ethnicity of conscripts, it remains the most comprehensive study on geographical variations of men's stature in Russia until present.

The second dataset was published by V.V. Bunak 50 years later, in 1932 in his article «On the changes in height of male population in 50 years». Indicators of male body height were provided for 144 regions [Bunak, 1932]. The age of the recruits was from 18 to 22 and they were born in the period from 1906 to 1909. The dataset contains information about ethnicity of the participants. It was the last dataset that was collected and officially published under the auspices of the Russian government. Later the anthropometric measurements of conscripts in the USSR became non-available [Mironov, 2012].

The third dataset is the result of the study conducted in 1974-1975 by Anuchin Research Institute and Museum of Anthropology, Lomonosov Moscow State University, and led by A.L. Purundzhan. In that research 18-22-year-old men who were born in 37 regions of the USSR were measured. The total number of the sample was 2,988 men 18-22 years old. The collected data were grouped either for the regions in Russia and Ukraine or for ethnicity. In total there is information based on 17 ethnic groups besides Russians and Ukrainians. The main criterion for inclusion into an ethnic group was that both mother and father of the participant belonged to the same ethnicity [Purundzhan, 1978].

The last dataset was recalculated using the information from the Russian Longitudinal Monitoring Survey conducted by the research group of the Higher School of Economics [RLMS HSE] and the Ukrainian Longitudinal Monitoring Survey - ULMS [IZA, 2014]. This dataset also contains information about

the ethnicity of the participants [RLMS HSE; IZA, 2014]. We used the methodology of aggregation of self-reported data on body height only from those participants, who reported to know their exact body height. We used this information only if the participant was involved in the survey twice or more times during 1994-2016 and specified his height with the precision of 1 cm. Thus, we collected the information on male body height from 43 regions of Russia and Ukraine. The average age of the Ukrainian men in the ULMS dataset was 22-49 years [IZA, 2014]. According to the contemporary approach, the indicator of body height has stays stable till 35 years. Afterwards, the body height starts to decrease [Bogin et al., 2018]. Nevertheless, we used the information about body height of Ukrainian men in the age of 22-49 years because only in this age group the number of the participants was sufficient to consider them in the analyses of areas with tall and short stature. Presumably, the average values of male stature in the age of 22-49 years were a bit smaller than at 22-35 years.

It is worth mentioning that people are prone to overestimate their body height, especially those who have short stature and older (over 60's) [Alvarez-Torices, 1993; Kuczmarski, 2001; Niedhammer et al., 2000]. However, regular participation in the survey reduced the possibility of mistakes.

Methods

In order to illustrate all of the above-mentioned datasets, we created the following methodology. First, there was a problem connected with the changes in outer and inner administrative boundaries. The administrative borders of the country were changed several times. This process was rather extended, while the location and names of administrative centers of the areas were much more constant in time. That is why the data were represented with circles. The center of each circle had the coordinates of the administrative center of the region that existed in the period of measurements. Information about ethnicities was also illustrated with the circles. In this case, the circle had the coordinates of the center of the area where the ethnic group was located.

Moreover, the secular changes in male body height were obviously proved in many studies. During the 20th century thus, the average value of the trait was changed by 9-11 cm for the population of the European part of the country [Lebedeva et al., 2020]. That is why another objective of this study has been to make maps comparable with each other. For this purpose, the same scale for the body height indicator was implemented. All values of male stature in different time periods were divided into 9 categories, where "category 1" is the group with the smallest values of body height (below 163.5 cm) and "category 9" – with the greatest ones (178 cm and above). These categorical values were represented by the numbers in the middle of each circle in the figures 1-4. These 9 categories were grouped into three clusters – with low (167.5 cm and below), middle (from 168 to 173.5 cm), and high (above 174 cm) values of male stature. Information about these clusters was illustrated in fig.1-4 by the sizes of the circles. Callouts could help in zooming territories with a high density of circles and show the information in a more detailed manner.

Figures 1-4 were made with ArcGIS 10.7 program and base apps like ArcMap, ArcCatalog, ArcToolbox. The interpolation surface (fig.5) was made using the specialized app for working with raster data – ArcGIS Spatial Analyst for Desktop.

Results

Figures 1-4 illustrate the idea of the *general pattern of changes in male stature* on the whole territory of Russia and neighboring countries. Thus, in Figure 1 all values of stature formed the group with the lowest values (below – 167.5 cm), while in figure 4 all the territories have values higher than 175 cm. Moreover, Figures 1-4 have shown *the differentiation of the body height values across the territory*. According to Figure 1 the lowest values of male stature were found in the territory of contemporary Poland and the middle Ural area, whereas the highest ones – near the Baltic Sea, in the south of the European part of Russia (Novorosiisk, Ekaterinodar, Stavropol, Buinaksk), in Central Asia (Verny) and the Russian Far East (Vladivostok, Blagoveshchensk). A more detailed Bunak's dataset (Figure 2) in general confirmed the same pattern of male stature with one exception – in this dataset, there is no information about the territory of contemporary Poland and countries situated near the Baltic Sea.

Table 1. The sources of information and their description
Таблица 1. Источники информации и их описание

	The source of the dataset	The years of the survey	The category of people (participants)	Number of regions	Age of the participants	Ethnicity	Approximate years of birth	Mean value of male height in the sample, cm	SD for the territories
1	Anuchin D.N. About the geographical distribution of height of the male population in Russia (according to the data on universal military service in the Empire for the years 1874-1883), 1889 (in Russ.)	1874 – 1883	Recruits	71 provinces	20-21	No information about ethnicity	1853-1863	164.3	1.3
2	Bunak V.V. On the changes in height of the male population in 50 years. In: Anthropological Journal, 1932, 1, pp. 24–53. (In Russ.)[7]	1927	Recruits	144 regions	18-22	Russian and non-Russian ethic groups	1906-1909	167.4	1.6
3	Purundzhan A.L. Geographic variability of anthropometric traits in the Soviet Union. Moscow, 1978, pp. 100-155. (In Russ.)[10]	1973-1974	Men	37 regions and 17 ethnic groups	18-22	Russian and non-Russian ethic groups	1952-1956	170.5	2.0
4	Aggregated dataset based on RLMS HSE survey (Russia)	1994-2016	Men	37 regions	22-35	Russian	1961-1996	176.9	1.3
5	Aggregated dataset based on ULMS survey (Ukraine)	2003, 2007, 2012	Men	6 regions	22-49	Ukrainian	1961-1996	177.4	1.8

Apart from that, the territories with high values of body height were situated in the middle and south of the (former or modern) Ukraine (Kremenchug, Poltava, Kharkov), in Central Asia (Chimkent, Alma-Ata, Frunze) and the Russian Far East (Vladivostok). Territories with low values were situated near the Volga River, in the middle part of the Urals area, where the ethnicities like Mari, Chuvash, Tatars, Votiaki and others lived and were measured. The same patterns could be observed in Figures 3 and 4. However, the number of territories in this case was much smaller. Figure 4 was based on recalculated datasets of RLMS HSE and ULMS and helped to complete the number of studies on the differentiation of height across the country.

There are twelve territories with predominantly Russian population (Ukrainians for Kiev) with the information provided for all datasets, which have been used in the Figures 1-4. Table 2 demonstrates the *uneven rates of changes in male stature across different territories in different time periods*. In order to make these comparisons we combined the information on urban and rural territories. For example, information about the Moscow region in Table 2 from the Anuchin's dataset represents the average values of male stature in the city of Moscow and the Moscow region as well. And the value of male stature in the Krasnodar region from the RLMS HSE dataset is the average value of male stature in the Krasnodar city and some rural territories of the Krasnodar region.

Figure 1. Geographical distribution of the stature of the recruits born in 1853-1863
Рисунок 1. Географическое распределение дефинитивной длины тела мужчин, рожденных в 1853-1863 гг.

Figure 2. Geographical distribution of the stature of the recruits born in 1906-1909
Рисунок 2. Географическое распределение дефинитивной длины тела рекрутов, рожденных в 1906-1909 гг.

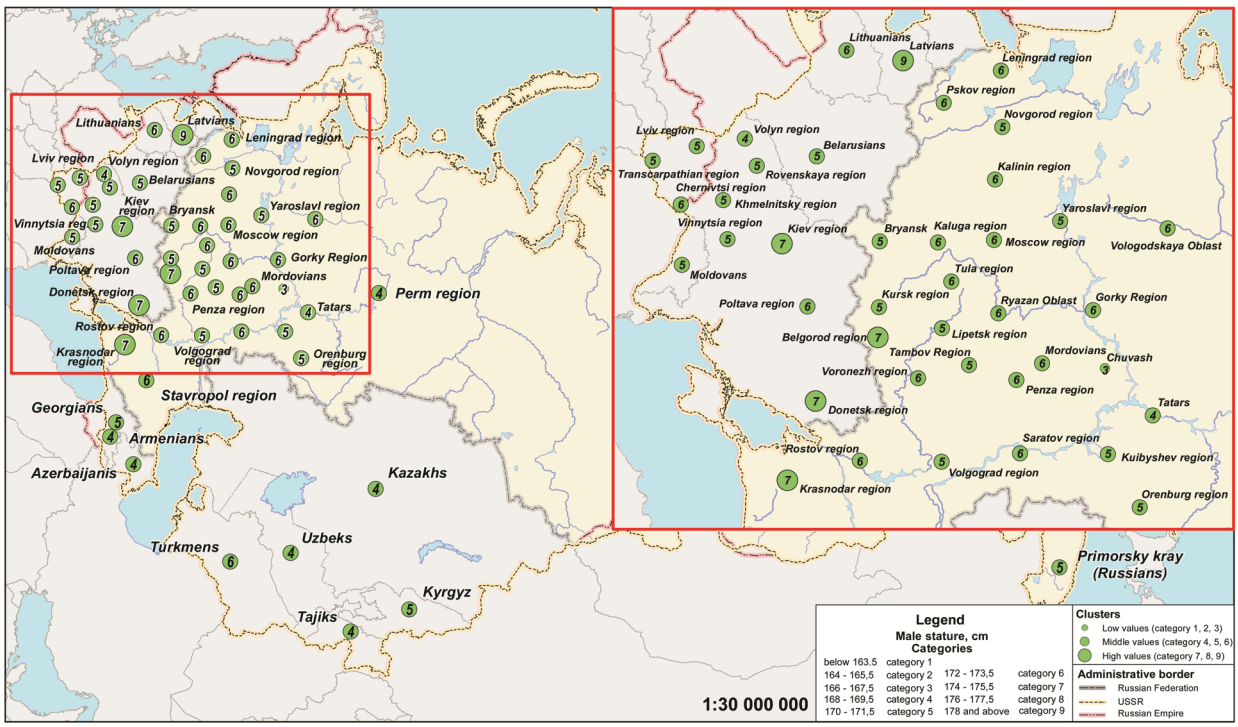

Figure 3. Geographical distribution of the stature of men born in 1952-1956
Рисунок 3. Географическое распределение дефинитивной длины тела мужчин, рожденных в 1952-1956 гг.

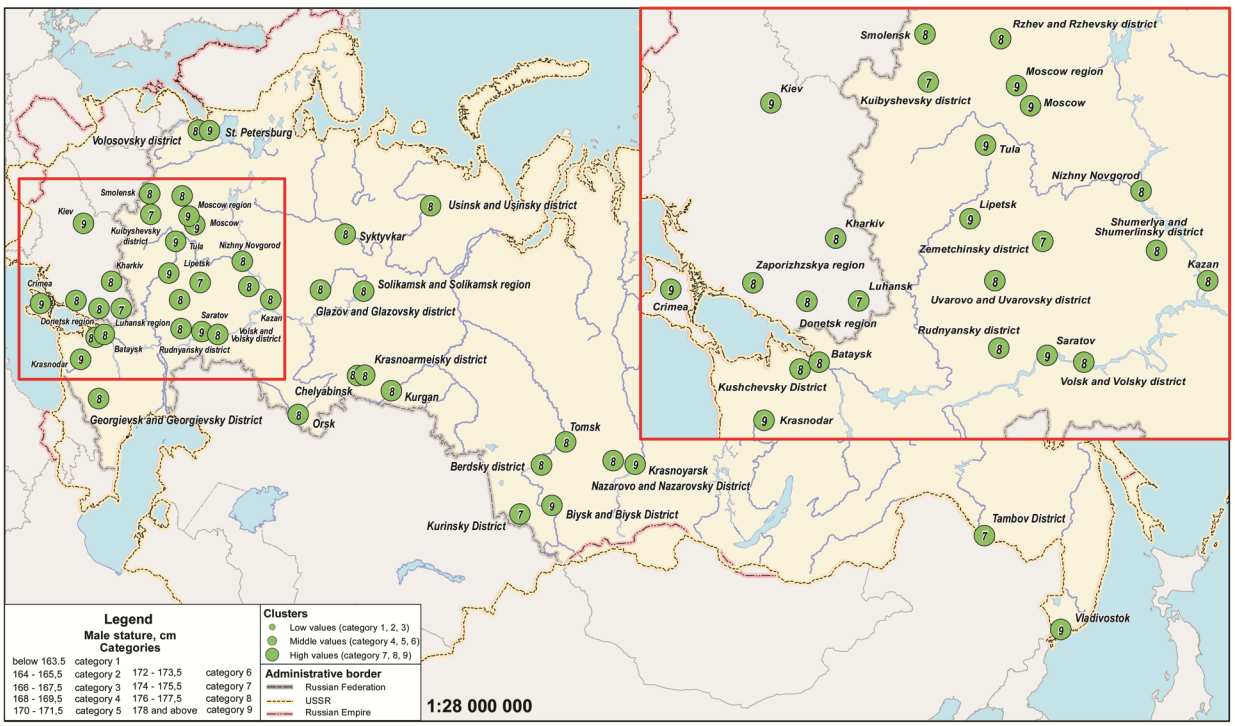

Figure 4. Geographical distribution of the stature of men born in 1961-1996
Рисунок 4. Географическое распределение дефинитивной длины тела мужчин, рожденных в 1961-1996 гг.

Only in two cases, this logic was violated – in Tula and Vladivostok regions. In the RLMS HSE dataset there were data about male stature for the urban groups only. As a result, the total increase for these regions could be higher than for the other territories.

Thus, in Moscow and Saint-Petersburg regions the significant changes in the male stature were observed during both the first and second parts of the 20th century. Apart from that, in Orenburg and Vladivostok regions the tempos of changes in male stature were higher in the second part of the 19th century and in the second part of the 20th century. While in Tambov and Penza regions, the significant increases in the indicator were observed only once in the second and first part of the 20th century accordingly. These results may be connected with different ethnic composition of the studied populations and different socioeconomic and demographic variables specific for the particular territories.

Total increase in height for different territories also varied but to a lesser degree. The increase for the whole country was 12.7 cm for the observed period, while the variations among the territories were from 10.9 cm for Krasnodar region to 15.5 cm for Tula region.

Since it is rather difficult to compare figures 1-4 with each other, we made interpolation surfaces for the European part of Russia for each dataset (Figure 5A-D). We choose this specific territory be-

Table 2. Changes in male stature in the territories, repeated in all used datasets, in cm

Таблица 2. Изменение в длине тела мужчин в регионах, значения по которым есть во всех рассматриваемых базах данных, в см

Changes in height, cm	All data (average values)	Kiev region*	Moscow region	Saint-Petersburg region	Tula region	Krasnodar region	Stavropol region	Saratov region	Tambov region	Penza region	Orenburg region	Perm region	Vladivostok region
Birth cohorts from 1853-1863 to 1906-1909 (years 1880's-1930's)	3.1	3.1	3.0	2.1	2.6	2.1	3.0	3.3	3.5	3.1	3.8	1.0	3.9
Birth cohorts from 1906-1909 to 1952-1956 (years 1930's-1970's)	3.1	**5.3**	**5.5**	**5.7**	**6.7**	**5.6**	4.6	4.7	2.5	**6.7**	3.7	2.9	1.7
Birth cohorts from 1952-1956 to 1961-1996 (years 1970's-2000's)	6.5	3.7	6.1	5.3	6.2	2.6	3.2	5.0	**8.1**	1.0	6.4	**8.2**	7.2
Total increase	12.7	12.1	14.6	13.1	15.5 **	10.3	10.8	13.0	14.1	10.8	13.9	12.8	12.8 **

Примечания. Полужирным выделены значения приростов в показатели дефинитивной длины тела, превышающие значения среднеквадратических отклонений по базе данных, к которой рассчитывается изменение в показателе. * – Данные по украинцам. Возраст участия 22-49 лет. ** – Данные в РМЭЗ НИУ ВШЭ только по городам.

Notes. Only those meanings are highlighted in bold, where the value of total increase are higher than the meaning of standard deviation of the database to which the increment is calculated. * – Ethnicity of the participants – Ukrainians. Age of the studied men – 22-49 years. ** – RLMS HSE dataset provided data about stature for the urban groups only.

cause interpolation methods can be used successfully only when the territory is uniformly covered with points that are used for interpolation. To specify the interpolation of the west side of the European part for the last dataset, we used the information from NCD RisC about male stature born from 1961 to 1996 in Lithuania, Latvia, Estonia and Belarus [NCD RisC, 2016]

Considering the differences in the datasets we could observe areas with more or less stable values of short and tall stature. Thus, there are several areas with tall stature. The first one is observed near the Baltic Sea and Saint-Petersburg and the second area – between contemporary cities of Kiev and Krasnodar. An area with stable lower stature is situated around the middle part of Volga River – near Kazan city. Moreover, we could consider that a new center with tall stature had appeared in Moscow and neighboring territories in the second part of the 20th century.

Discussion

Secular changes of the male stature during the 19-20th centuries are proved all over the world. There are comparable studies about positive changes in human height for plenty of countries, including Russia [Baten, Blum, 2012; Hatton, 2014; NCD–RisC, 2016]. Moreover, many studies showed secular changes in height for the population of some Russian cities, like Saratov, Moscow, Archangelsk, and others [Godina, 2011; Godina, Yampolskaya, 2004; Lehmann, 2014; Godina et al., 2017]. Negasheva and Khafizova [2020] showed this result based on the studies made in different regions and cities of Russia. Thus, the observed result corresponds to other studies and does not contradict them. Nevertheless, it is for the first time that the consistent pattern of changes in male stature in different territories of Russia was illustrated with comparable maps.

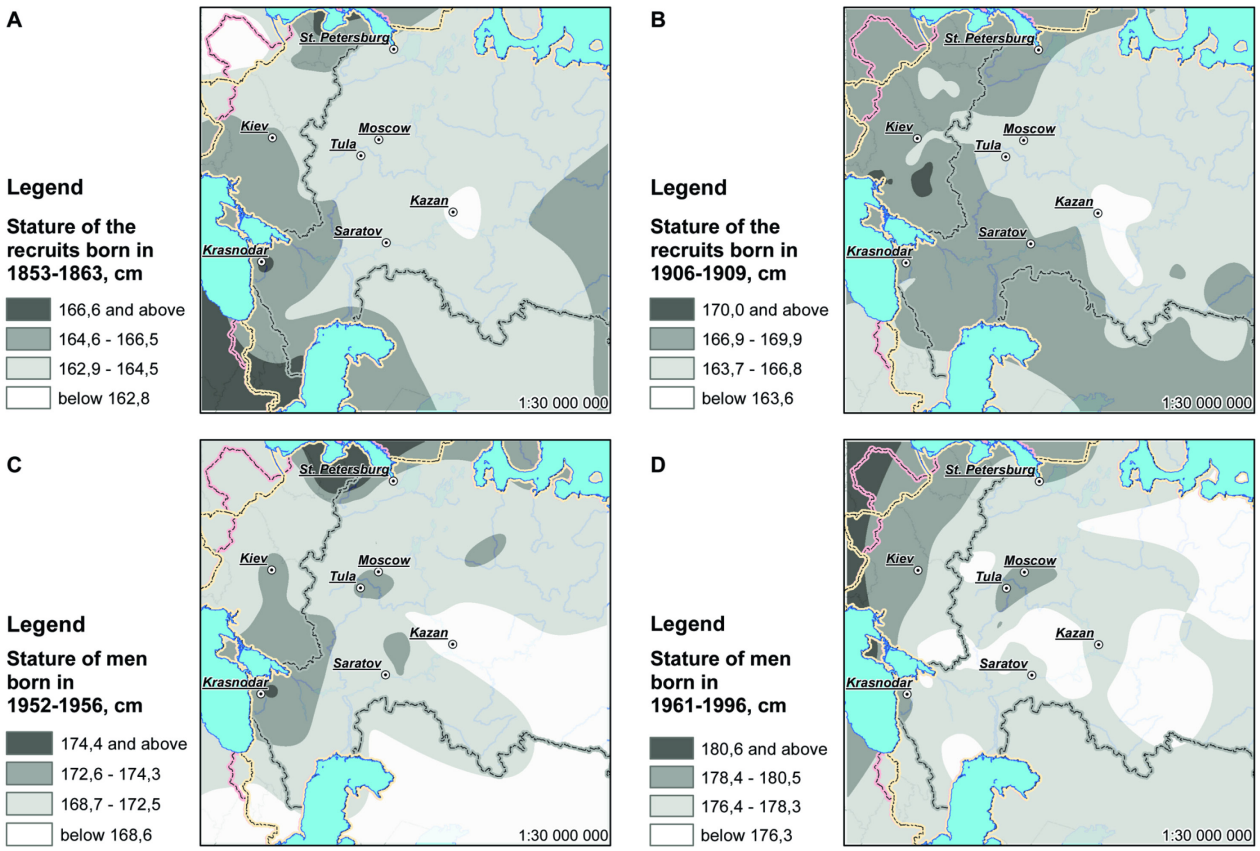

Figure 5. Interpolation surfaces of body height distribution for the territory of European part of Russia
Рисунок 5. Интерполяционные поверхности по показателям дефинитивной длины тела мужчин для Европейской части России

Traditionally, secular changes are explained in terms of improving socio-economical situations, the quality and quantity of diet, medical care etc. [Tanner, 1986; Cole, 2003; Bogin, 2013]. Thus, the differentiation of the male height within the countries like Italy and Portugal was connected with the way of life and level of socio-economic development of the regions – the better, the higher the stature [Padez, 2003; Arcaleni, 2006]. However, when starting a discussion in an attempt to understand the differentiation of male stature and its changes over time on the territory of Russia, it appears that besides the mentioned factors there could be more reasons for changes or stability in stature.

Analyzing the geographical variations of male stature Anuchin considered the influence of some specific characteristics of the region of recruits' origin, such as: climate conditions, complex physical characteristics of the territory (mountains, large rivers, level of forestation, soil composition), standard of living that could be evaluated by the size of land, where peasants worked, a quantity of baked bread per capita and amount of livestock (cattle), percentage of people living in the houses made of stones, as well as population density, family status and basic health status of the recruits. Despite the variety of all considered factors, Anuchin concluded that none of the mentioned factors provided the satisfactory explanation of height differentiation. The main factor that could explain why some territories differed from others in male body height, was, in his opinion, the percentage of people of non-Russian ethnicities living in the provinces. However, he suggested that these differences in the remote past were also caused by environmental factors, while the main impact to the average body height in the particular territory was explained by heredity [Anuchin, 1889].

According to Mironov's research, based on contemporary methods of analysis, variation in body height among the population of provinces in the middle of the 19th century could be mostly explained by the level of the agricultural development of the territories, particularly, level of stockbreeding, as well as by the percentage of Russian people in the region. It is worth mentioning that the level of agriculture in the province directly influenced the quality of the people's nutrition [Mironov, 2012].

Moreover, variation in stature between men of Russian and non-Russian ethnicities is a well-documented fact that could be observed nowadays. Due to the dataset published by Bunak, the average male body height in the administrative borders of contemporary Russia equaled 167.1 cm (for recruits born in 1906-1909), whereas according to the additional information in Bunak's dataset the average indicator of the male stature of such ethnicities as Komi, Chuvashi, Tatar were 3-4 cm lower (164 cm, 165 cm, and 163 cm correspondingly) [Bunak, 1932].

Using the aggregated dataset based on the RLMS HSE survey we could observe the same outcomes for the most recent time period. This dataset contains information on several regions, where the mean values of body height both for people of Russian and non-Russian ethnicities can be calculated: Glazov and Glazovskiy district (Udmurt), Kazan city (Tatar), Shumerlya and Shumerlinskiy district (Chuvash). The average height of Russian men, living in these territories equaled 175 cm, whereas the indicator of body height for other ethnicities was lower – 170 cm for Udmurts, 173 cm for Tatars, and 172 cm for Chuvashs [Lebedeva, 2019]. Thus, the area with stable lower stature in the middle part of the Volga River could be explained in terms of the higher density of non-Russian ethnicities.

A stable area with taller stature between Kiev and Krasnodar, near the Black Sea, could be partly connected with the official relocation of people from the central and southern provinces of Russian Empire in the 19th century. For example, the share of non-Cossack people in the Kuban province had increased from 17.8% in 1878 to 39% in 1890 [Petrov, 2011]. The development of this territory, as well as the border territories (Verny city of Central Asia, Buinaksk near the Caspian Sea)[1] and the Far East (Vladivostok city) was important to the government from the position of agricultural and military security since the mid-19th century [Abramov, 1867; Mironov, 2012]. Thus, recruits of different ethnicity than the local population, in good physical condition and taller than their peers could have been sent there. Figures 1 and 2 illustrate this assumption.

[1] Some surnames and names of the migrants and the titles of the provinces, where they came from to the Verny city can be found at https://genealogiya.kz/gorod-vernyj/.

Another area with stable tall stature was located near the Baltic Sea. Unfortunately, the datasets used in the study did not provide enough information on this area. Figure 1 illustrates that the male body height for the territory of contemporary Lithuania, Latvia, and Estonia had higher values of this indicator. Figure 3 only illustrates information about ethnicities, and according to it, the Latvians were the tallest in the dataset collected by Purundzhan. According to the latest research of NCD–RisC, Latvia and Lithuania are among the countries with the tallest population in the world. The average values of male height are 181 and 179 cm correspondingly [NCD–RisC, 2016].

Discussing the role of the socio-economic factors in positive secular changes, it is worth mentioning that living conditions in Russia differed due to the type of the settlements. Various social services in urban areas were better developed, especially from the mid-20th century, whereas physical activities were lower. Thus, the difference between people, living in the rural or urban areas, for male body height could be up to 3-4 cm [Godina, Zadorozhnaya, 2010; Godina et al., 2017]. Figure 4 confirmed this result, however, the difference between the categories was not significant. The average male height in major urban centers of the country (Moscow, Saint-Petersburg, Nizhniy Novgorod, Krasnoyarsk, Vladivostok, Krasnodar) was higher than in other territories. Surprisingly, that in this group one could also find Tula with rather high male height values – 177 cm. The proximity to Moscow agglomeration could play a major role in this case. Moreover, according to other studies, the average male body height in Tula usually corresponds to the indicators in Moscow [Khafizova, Negasheva, 2020].

The differentiation in average body height between inhabitants of urban and rural areas could be also found in Anuchin's dataset for the recruits born in the middle of the 19th century. Thus, the value of recruits' height in Saint-Petersburg equaled 165.6 cm, while in the province in general – 164.1 cm. In the city of Moscow, this indicator equaled 165.3 cm, while in Moscow province – 164.0 cm. The same difference could be observed between the city of Odessa and Kherson province – 166.1 cm and 165.3 cm correspondingly. These variations could be also considered indirect indicators of social class differences between recruits. This idea was early discussed by B.N. Mironov [Mironov, 2012].

The observed differentiation of male stature across the studied territories could be also interpreted in terms of biocultural plasticity of growth process. Such factors as phylogenetical, ecological, social-economic-politic-emotional conditions could influence the process of growth and development and even have impact to the target growth across the generations [Bogin, 2020, p. 492].

Conclusion

To conclude, the role of improvement of socio-economic conditions and medical services in positive secular changes in male stature across the world and particularly in Russia is difficult to underestimate. Our study illustrated the following trends for Russia and the neighboring countries from the mid-19th century till the end of the 20th century: general pattern of changes in male stature, the consistency of changes and the uneven character of changes across the territory. Our research also confirmed the idea that areas with tall and short stature were more or less stable across the time. These areas were reproduced according to the positive secular changes. These well-known assumptions were confirmed using contemporary cartographic methods and completed with the new source of information – the RLMS HSE dataset collected in the 21st century.

In economic and social science in similar circumstances it is popular to refer to the broader meaning of the path dependency concept [Paul, 1985]. In other words – "history matters". Contemporary geographical distribution of average male height could not be clearly understood without taking into account historical factors of the development of the country, as well as the ethnic structure of the populations.

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Authors Contributions

LL, EG contributed to the research conceptualization. LL contributed to data analysis and wrote the initial manuscript version. YK contributed to making the maps (figures). EG contributed to editing and revising the manuscript. All authors had final approval of this submitted version.

Limitations of the study

The limitations of the study are mainly connected with the data used for this research. If more datasets were available, it would contribute to more detailed conclusions about regional patterns in secular trends. Also, as was already mentioned, the last dataset presented the values of the recalled height, which differed from the results of anthropometric measurements. However, that was the only opportunity to consider the latest directions in secular trends on the studied territories.

The uniqueness of the study

The novelty of this study is based on the introduced cartographic methodology. For the first time the series of maps were constructed, which illustrated the secular changes of male stature in Russia and some neighbouring countries both in time and space.

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КАРТОГРАФИЧЕСКИЙ МЕТОД В ИЗУЧЕНИИ СЕКУЛЯРНОГО ТРЕНДА ДЛИНЫ ТЕЛА МУЖЧИН РОССИИ И СОПРЕДЕЛЬНЫХ СТРАН НА ПРОТЯЖЕНИИ XIX-XX ВВ.

Введение. *Цель статьи – изучить региональные различия в росте мужчин в XIX-XX вв. в Российской империи, СССР, России и некоторых соседних странах и проиллюстрировать наблюдаемые изменения во времени с использованием современных картографических методов и нового источника информации – набора данных RLMS HSE.*

Материалы и методы. *Мы предположили, что существует предрасположенность популяций, проживающих на определенной территории, к сохранению зон «малорослости» и «высокорослости» в терминах Д.Н. Анучина до самого последнего времени. Для достижения цели были отобраны такие источники информации, в которых были представлены данные по дефинитивной длине тела по максимальному количеству территорий, – публикации Д.Н. Анучина, В.В. Бунака, А.Л. Пурунджана. Для сравнения данных между собой была предложена методика картографической визуализации данных, а также построены карты интерполяционной поверхности для территории Европейской части России.*

Результаты. *Подтверждается наличие зон с преимущественно высокими значениями дефинитивной длины тела на протяжении всего рассматриваемого периода рядом с Балтийским морем и Санкт-Петербургом, а также на юге и юго-западе Европейской части России и сопредельных стран между современными городами Киев и Краснодар. Выделяется также зона с преимущественно низкими значениями дефинитивной длины тела – в средней части реки Волга, рядом с Казанью. Кроме того, по данным второй половины XX века появилась новая зона «высокорослости» – Москва и некоторые приграничные регионы. Показано, что изменения в дефинитивной длине тела на протяжении XIX-XX веков проходили на разных территориях неравномерно, что может быть связано с этническим составом изучаемого населения и различными социально-экономическими и демографическими факторами.*

Заключение. *Восстановлена «картина» пространственной дифференциации изменений показателя дефинитивной длины тела в России и сопредельных стран в XIX-XX вв. С применением современных картографических методов показана постепенность, всеохватность и неравномерность происходящих изменений. Была проиллюстрирована определенная предрасположенность территории к воспроизводству ареалов «малорослости» и «высокорослости», в терминах Д.Н. Анучина, в Европейской части России. Эти ареалы были сформированы под влиянием различных исторических факторов, однако, проявляются в современных условиях, несмотря на происходящие секулярные изменения.*

Ключевые слова: длина тела; мужчины; Россия; XX век; XIX век; региональные различия; секулярный тренд

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