

Influence of Economic and Social factors on the Body Dimensions in Newborns

*I. Yankova Pandourska**, *R. Stoev*, *Y. Zhecheva*, *A. Dimitrova*

Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences, 1113 Sofia, Bulgaria

* Corresponding author e-mail: anthropologyvaila@gmail.com

Abstract

The anthropological characteristic of the population of each country is a biological reflection of the specificity of the living conditions during its historical development and at present days. The physical development of newborns, children and adolescents is an important indicator for the influence of various biological and socio-economic factors on the growing child's organism still in the mother's womb. The aim of the current review is to summarize the available data for the impact of economic and social factors on the physical development of newborns.

Key words: newborns, socio-economic factors, secular trend, mothers, seasonal variations

Introduction

The physical development of newborns, children and adolescents is a reflection of the influence of a variety of biological and socio-economic factors on the growing infant's organism still in the mother's womb. The low standard of life, hardships in war time, economic crises, disrupted ecological balance, as well as other natural and social disasters render strong negative influence on the basic morphological parameters of newborns [7, 12, 53]. As an important indicator of their health status are widely accepted body weight and body length at birth. Because of their sensitivity to socio-economic influences these anthropometric characteristics often are used also as markers of living standards [6]. Other widely used indicators characterizing socio-economic status are also the percentage of newborns with low (under 2500 g) and very low (under 1500 g) birth weight, as well as the average number of liveborn children [54, 57, 60].

The influence of the environmental factors on the development of the newborn is not direct but mediated by the mother. This determines the fact, that newborn's anthropometric measurements (especially body weight) are indicators of economic wellbeing and quality of life of the mothers during the pregnancy [59]. The influence of unfavorable social factors on the pregnant woman leads to decrease of the mean body weight of the newborns with 150-200 g [39].

In Bulgaria the greater part of the newborns' studies are concerned mostly on their anthropometric characteristic and the influence of parental factor on the physical development of children [13, 14, 19, 30, 40, 47, 61]. The tendencies of some anthropometric parameters in newborns from Plovdiv for a period of 56 years are evaluated by Dimitrov [12]. Taking into account the socio-economic changes in Bulgaria he found an increase in the percentage of newborns with higher body weight with improvement of living conditions and the socio-economic situation in the country.

Significant differences in newborns body dimensions are observed in children born to mothers living in different climate-geographic regions [23, 37]. Today it is known that the grade of intrauterine development of the child depends of the long-term (historical) adaptation of the mother to the temperature, humidity and the barometric characteristics of the life place [16, 22, 52, 56]. On the territory of Bulgaria five climatic areas can be distinguished, which suggests that there could be differences in the anthropometric dimensions of children, born in different regions of the country. As far as we know, investigations on the dependency of basic anthropometric characteristics of newborns from the climate-geographic factors in our country have not been carried out.

The variability of stature, body weight and other anthropometric characteristics of neonates are studied in interpopulation aspect. This variability is determined by many factors, which include genetic, racial and ecological specificity of the population [38, 56, 57]. The changes in the newborns' sizes from different regions and countries are important indicator of living standard, health and socio-economic status of the particular population.

The aim of the current review is to summarize available data for the impact of economic and social factors on the physical development of newborns.

Influence of economic and social factors on the body dimensions in newborns and secular trends

The anthropological characteristic of the population of each country is a specific biological reflection of the specificity of socio-economic conditions of life during its historical development and at present days. By comparison of anthropological data of newborns, children and adolescents from different generations and regions, the specifics of their growth and maturation during the different periods of time and in different living conditions are revealed.

A secular tendency (negative or positive) of human growth and development is indicator of the incessantly changing conditions of life. The secular changes are much more expressed in social groups and populations which suffer from delay in their socio-economic progress. According to a number of authors the changes in birth weight are slight in developed countries, while in developing ones the newborns' weight is strongly affected by maternal nutrition. Similarly in the countries, where the population has low socio-economic status more children with low birth weight are born [5, 7, 17, 21, 26]. As mentioned above the body dimensions of the newborns and especially the body weight are an indirect indicator of the quality of life and social status of the mother. The difficulty in its implementation lies in the fact that the quality of life, unlike the income-based life standard, is determined by a whole complex of socio-cultural characteristics [27]. The reaction of representatives of different societies to the same event can be significantly different. This coincides with the opinion that birth weight reflects the interaction of many processes and phenomena, the contribution of which can be different [58]. The studies of long-term (intergenerational) changes in the medico-anthropological status of newborns allow the assessment of the general biological processes in children growth and development on the one hand, and on the other - serve

to assess the influence of social and economic factors on the newborns' sizes during different time periods.

Many studies on secular changes in the growth and development of newborns, children and adolescents exist in global plane for the last 10-15 years [7, 16, 23, 33, 41, 45], but in Bulgaria they are relatively scarce [19, 30, 51, 61]. After the 1980s, until the beginning of the 21st century a retardation and even halt of the acceleration processes are established [5, 61]. This means that either living conditions have stopped their improvement or that they have already allowed the full expression of the genetic potential [5]. In recent years a new tendency of increase of the newborns' body dimensions is observed. In parallel with the increase in the percentage of the children born with weight over 3500 g increases also the part of the newborns with body weight under 2500 g. This trend is also observed in countries as USA, England, Japan, Bosnia and Herzegovina [33, 41].

The physical development and the basic body dimensions of the newborns are closely related to the general health status of the children and affect the individual's health throughout life. For this reason, knowing the peculiarities of the physical development during the neonatal period and the factors which determine it are of great social and scientific importance.

Anthropometric dimensions of newborns to single and to married mothers. Influence of the duration of pregnancy

Children born to single mothers and women without registered marriage lag in body weight in comparison with newborns from families. This fact is valid for populations of developing (economically underdeveloped) countries but also for developed and well-developed countries [2, 21, 24, 51]. According to the widespread point of view the cause of this dependence is the lower quality of life of women which bear children without marriage. According to the conception of evolutionary medicine [8], the absence of man's support during the pregnancy leads to stress in the mother and as a consequence of this the duration of pregnancy is shortened and children with low birth weight are born (Krueger's hypothesis). The shortened duration of the pregnancy is interpreted as one of the mechanisms which decrease the mother's contribution to the child. Regardless of the evident interest of the scientific society, the researches in this field are still scarce.

The newborn body measures are an important indicator for the health status of the individual in the next ontogenetic stages [3, 44]. Therefore, the monitoring of the state of children, born to non-married mothers as a group with specific body weight at birth is important. In Bulgaria, the frequency of such births is near 60% for previous years according to National Statistical Institute's (NSI) data. In 2016 this frequency is 58,6% – second place in the European Union (average percentage in the EU – 42,6%, other Balkan countries – 27,8%, USA – 39,8% and Russia – 21,1%) [10].

Body dimensions of children, born to women of different age groups

During the ontogenetic stages, genetic and environmental factors cause different in force influence on the organism. Their effect is the strongest during the intrauterine period when the embryo is especially sensitive to mutagen factors and to different external and internal influences. The basic factors influencing the growth and development of the child's organism during this period are number of fetuses, genotype, age and basic body dimensions of the mother, birth order, season of birth, nutrition, education and profession of the parents, living conditions, urbanization, etc. [19, 25, 42, 43, 49].

The existence of a relation between parental age (mostly mother's age) and the indicators of newborns' physical development is treated by number of authors [9, 34, 35]. They established that in mothers under the age of 15 and those over 35 years there is a greater likelihood to give birth to children with lower body weight. In a number of studies a tendency of increasing the body length and weight of the newborns with advancing of maternal age is described [11, 13, 20, 47, 51].

In many Eastern European countries a relatively high proportion of women giving birth in a very young age is registered. In Bulgaria in 2016 there are 39,9 living births per 1000 women aged 15-19 years according to NSI. This is the highest value in EU (average 11,0 o/oo), in the Balkans (24,7 o/oo) and twice higher in comparison with USA (22,3 o/oo) or Russia (18,4 o/oo) [10].

The births in very young age have a negative effect on the body of the mother and the child. In teenage pregnancy direct biological competition between the two organisms – of the mother and the fetus is possible to appear [36]. This is the one of the reasons for the higher percent of births of infants with low birth weight (below 2500 g) by mothers under the age of 18 years [1, 2, 19, 31]. On the other hand, in Bulgaria, as well as in Europe and Russia, there is an increase of the average mother's age at first birth. In Bulgaria it is 27 years (in Sofia it rises up to 29,8 years) according to NSI data in 2016. Only in 2015, it was 26,0 years, which was minimum for EU (average 28,9 years), subminimum for the Balkans (including Moldova) and near the level in USA (26,4 years) and Russia (25,3 years). The mean age of mothers at birth also increases. In 2016 in Bulgaria it is 27,6 years – minimal in EU (average 30,6 years), subminimum in the Balkans (including Moldova) and about a year lower than the average age at birth in Russia (28,4 years) and USA (28,7 years) [10].

At the same time the medico-anthropological characteristics of children, born to mothers over the age of 30 years rest insufficiently studied.

Seasonal variations in newborns' dimensions from different socio-economic groups

The rate of intrauterine development of the fetus depends on the long-term adaptation of the mother to the natural and environmental conditions in which she lives [22, 56]. The influence of the climatic factors on the body dimensions at birth in the Russian population is analyzed by Vershubskaya et al. [52], but a number of questions remain unclear. One of them is the influence of the birth season in the groups of contemporary population [4, 50]. These authors described differences in newborns body weight from Northern and Southern hemispheres, depending on seasonality. Miklashevskaya [29] found lower body weight in children, living in hot climate regions in comparison with those from the moderate climatic areas. Some authors consider that these differences are due to fluctuations of vitamin D production under the influence of changes in ultra-violet radiation [28, 46, 55].

The relation between birth season and anthropometric characteristics (stature, body weight) and newborns health is a subject of many studies [15, 18]. Significant differences are established in children born in different climatic-geographic regions and altitudes [32, 48]. In Bulgaria studies on the impact of the climatic-geographic factors and seasonality on newborns growth and development are scarce [31].

Conclusions

Perinatal and environmental factors (socio-economic, climate-geographic and others) have a great influence on the processes of growth, development and maturation of

the infant's organism. From their complex influence the realization of individual genetic potential for growth and development is determined to a great extent.

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