

FACTORS WHICH DETERMINED MORTALITY OF NEWBORNS AND INFANTS IN THE FIRST AND LAST DECADE OF THE 20TH CENTURY IN SERBIA

Biljana Stojanović, Svetlana Stojanović

The risk of dying is the highest in newborns and infants. This is one of the most vulnerable periods in development because newborns and infants are exposed to the influence of many risk factors, such as genetics, family or socioeconomic environmental factors. Annual statistics for the first decade of the 20th century showed that one quarter of liveborns died during the first year of life. Data also showed a higher mortality of small children in the country compared to urban areas. Poor food hygiene was the major cause of newborns' death, both at birth and during the first few months. The last decade of the 20th century was particularly interesting and important to perceive mortality of newborns and infants, because of significant political and socioeconomic disturbances after international sanctions against Serbia and bombing in 1999. Sudden rise of mortality rate of newborns and infants was noticed in all parts of Serbia in 1992 and 1993. It has constantly been decreasing ever since. *Acta Medica Medianae* 2013;52(3):61-66.

Key words: mortality, newborn, infant, Serbia

Belgrade College of Health Studies, Belgrade, Serbia

Contact: Biljana Stojanović
Belgrade College of Health Studies
254, Cara Dušana Street
11 000 Belgrade, Serbia
Email: biljana.stojanovic@sbb.rs

Introduction

Mortality of population, especially of newborns and infants, has always been used as an indicator for assessing health of a population (1). Seifert pointed out how economically, culturally and politically important was for every people to keep and care for strong youth capable of defense (2). Dr Hranislav M. Joksimović quoted Maltus who claimed that people multiplied faster than food and therefore high mortality, especially of children, was needed to prevent the world to over-multiply, or as he said – nature itself regulates survival of the world by high mortality. Charles Darwin supported the opinion that human society is, like nature, governed by the law of natural selection, since only the best and the healthiest survive, while these of poorer health die young; therefore, high mortality of children is useful for the mankind. German physician Fenkelstein proved wrong an old saying "an ill beginning, an ill ending". He presented the pictures and tables of development of weak and ill children who grew up to be equal, in terms of look, height and weight, as their peers who were healthy infants. Therefore, there is no parallel between weakness

of infants and health later on in life (2). Significance of mortality of infants and small children was understood by great English statesman, who in 1902 said that all the riches were in vain if people's strength and wellbeing deteriorated (3). Youth should be the pride of nation, pillar of grand state. It is our duty to ensure full development of all children because they are the future of our people. True saving is not saving on children, but saving for children. The means spent on children will bear the most beautiful fruit (4).

Beginnings of following mortality of newborns in Serbia

The first step towards following dynamics of mortality rate of infants in the Kingdom of Serbs, Croats and Slovenes was made in 1924. This indicator was systematically followed until the end of 1939, when a gap appeared and lasted until 1948. After that, necessary preparations for precise registration of deceased infants were taken, and collecting statistical data on that phenomenon started again in 1949 (1). The first detailed study about mortality of infants in Yugoslavia was published in 1948 by Dr Fedor Mikić. This study referred to the period between 1929 and 1932. According to it, the mortality rate of infants in Yugoslavia was 155 per 1.000 liveborns. It presented higher mortality in towns (159/1000 liveborns) compared to rural areas (150/1000) (5). Since 1949, there has been systematic collection of data on mortality of

infants in our country. Dr Voja Đukanović's analysis is significant for the initial period of observation (1949-1956). Analyzing the dynamics of mortality of infants in twenty nine European and noneuropean countries, he concluded that mortality of infants in our country decreased significantly more slowly than it was expected (6). The data showing dynamics of mortality of infants between two World Wars can be considered neither reliable nor complete. Present situation in most of the European countries and a few noneuropean countries (the USA, Canada, New Zealand etc.) can be considered very good as their mortality of infants is significantly below 20 per 1000 liveborns. This situation brings optimism to all the countries in the world that mortality of infants can be contained in targeted range. Thanks to researches, we know much more about mortality of infants in our country as a demographic and health problem, as well as determinants which have influenced on it. However, it is perfectly clear that dominating determinants in high mortality of infants are socioeconomic, while lower mortality is more under the influence of biomedical determinants. Also, the most effective measures for good health care and decrease in mortality of infants are known nowadays (1).

Mortality of newborns and infants in Serbia in the first decade of the 20th century

During the period between the two censuses (1895 and 1900), the number of inhabitants increased by 10.654. The birth rate in Belgrade was 28.44% in 1901, in 1902 it decreased to 24.29%, but in 1903 it started to increase and it was 24.67% (7). In 1903, 26.3% of infants died during the first year of life (8). This percentage can be compared only with some parts of Germany and Romania, whereas in most of developed countries of Europe it was lower: 13.2% in Switzerland, 12.2% in France, 11.4% in Denmark, 10.4% in Sweden, 7.5% in Norway and 9.6% in Ireland (9). Of the total number of deaths in Serbian villages, 27.2 percents of infants under the age of twelve months and 37.1 percent of children under the age of 24 months died (10). Percentage of deceased children under the age of 6 in urban areas was 37.0 (in the total number of deceased) and 49.9 percent in the villages (11). Indicators of death for boys and girls in the period 1888-1908 were really bad. They show that mortality rate was not significantly changed during these twenty years; at the same time, the European countries started using Koch and Pasteur's discoveries, which resulted in decrease, if not complete absence, of typhus, cholera and diphtheria in the Western Europe at the beginning of the 20th century (11), whereas 8,529 out of 10.000 liveborns survived the first year of life in 1888 (8), and in 1908 that number was even smaller (8,364/10 000) (9).

The most frequent factors determining death in newborns and infants in Serbia in the first decade of the 20th century

Terrible conditions of delivery, presumably in the villages, in the 19th century and in the beginning of the 20th century were described in 1902: "In a house full of family members, a future mother has to get away to give birth. This is why she often goes to the open air, into the cold air and snow to give birth to her child. As she is suffering strong pains she has to squeal, but not too loud so that no one can hear her or see her. She is usually alone. As she is standing, the child falls onto the top of its head, so if the surface is hard, it is often hurt and bruised. Only after the child starts crying, her husband or a woman comes to help. They take the child, cut the cord and tie the navel, wash it with cold water and then diaper it. Unfortunate mother becomes unclean by the very act of delivering, and so she is sent to some corner where straw or dirty, ragged, old clothes are laid for her as for a dog. Even she herself, when the delivery is to happen, puts on the worst shirt and skirt which she has already put away for chickens to lay eggs and cats to have kittens on them. In that dark corner on the cold ground, on a dirty bed, in the dirty clothes and complete filthiness she has to spend the next 40 days. Not the whole time of course, because on the third day, she gets up and starts with everyday housework, with the exception of, if it is possible, baking and serving the food. She is considered to be unclean before she goes to church. During that period she has special spoon and dishes to eat from and which should not be washed (because the child will vomit a lot). Above all, that mother must not drink any water for 40 days, but as much brandy as she wants (even wine, anything but water)" (12). As a result of mother's ignorance and prejudice of all kinds, the mother' and child' health was being ruined. Destiny of woman worker - mother with an infant was particularly hard (13). When the child was left home with some other family member, most often with grandmother, it even had worse fate because instead of mother's milk mostly got undiluted cow's milk, or sheep and goat's milk, which was fatty and difficult to digest. Besides, that food was usually in "horribly dirty dishes, sticky dirty bottles, dirty cups and dusty teats which sometimes were not washed until they were broken" (14). Sanitary reports showed that causes of nearly half of newborns and infants' deaths were gastrointestinal diseases, and that causes were to be looked for in hygienic habits. Doctors determined that a very small number of children was breastfed because mothers in well-off households did not want to breastfeed their children and women in underprivileged families were forced to work all day and were not able to devote themselves to their children (11). Expert magazines concluded that the most important

cause of mortality was bad or rotten food, then uncleanness and low quality of homes with a lot of people living together, cooped up in a single room (15). Dreadful living conditions led to fast spread of contagious, especially of respiratory diseases, so they (pneumonia in the first place) were just after gastrointestinal diseases which led to death of children. Doctors warned that common cause of mortality was also parents' negligence, as well as the fact that parents rarely called doctors for help, since it was "normal for a child to die if it is God's will" (15). All these facts pointed to higher mortality of infants of divorced parents whose mothers had to work. Most of them lived up to the age of two (15). Mortality of the poor was much higher (16). There was a serious talk about other countries where "a person is appreciated as the greatest capital" and that they invested in caring for illegitimate and poor children, while at the same time in Serbia there was no such care. A well-known doctor Jovan J. Jovanović appealed: "And exactly in our little country every single person is needed. We needlessly lose a few thousands of children who could be saved without some significant effort to be healthy and good citizens. What's the use of our famous fertility when barely 40 out of 100 legitimate children live up to the age of 14; if there are parts of the country where more people die than are born; if there are periods when there are no recruits only because the whole generation died during infancy. We have to capitalize human material if we want to survive" (16). In 1922 in Northern Serbia, 10.93% of infants died, a year later 12.27% and in 1924 11.79%. In 1922, in the whole Serbia, mortality rate of children under 14 was 9.08%, in contrast to Denmark where it was only 2.56% (17).

Mortality of newborns and infants in Serbia in the last decade of the 20th century

Achievements in development of health culture and protection were quickly forgotten during the last crisis in the Serbian society in the 1990's. The mortality rate of infants in parts of Serbia increased in 1992 and 1993, and from 1994 it decreased and during the period from 1990 to 2000 it dropped by 1.6 times (1). Increase in mortality rate of infants in 1992 and 1993 was a direct consequence of sanctions of international organizations. These conclusions concur with findings of other researchers who noticed higher frequency and more serious complications during gestation which inevitable caused fetal growth restriction. During the bombing of Serbia in 1999, in an extremely stressful period, the incidence of miscarriage and premature delivery increased (19). Some researchers (Aranetta and Rajab) reported about the increased number of miscarriages and ectopic pregnancies in women in the American troops in the Gulf War, and also in women in Iraq, Kuwait and Bahrain. They consider environmental pollution and stress to be

the causes (19). Increase in complications during pregnancy was also conditioned by poor primary prenatal care due to the lack of diagnostic resources, medicines, disinfectants etc. (20). Similar observations were made by K.K. Tmušić and S. Ristić who found that epidemiological situation in Kosovo and Metohija was rapidly getting worse in 1992 and 1993. Mortality rate of male infants increased from 2.9% in 1991 to 6.8% in 1993, and mortality rate of female infants increased from 2.2% to 6.2% (21). N.R. Sulejmani and S. Tomić pointed out the increase in prematurity in total number of births in the period from 1991 to 1995, with high increase in mortality, especially in 1993 (22). Proportional mortality rate of infants in the central Serbia and Vojvodina changed favorably. It was halved during ten years (1991-2000). Such favorable change was the result of perinatal, neonatal and postnatal health care which was through persistent conducting of obligatory programmed health care for women and children (1971-1992) and special health care programme for women, infants, schoolchildren and university students implemented by the Government of Serbia. Research of B. Čolaković and S. Crnogorac showed that in the SR of Yugoslavia, 5-6% of pregnant women had preterm delivery. Preterm births made two thirds of perinatal mortality, especially for preterm neonates with birth weight less than 1,500 grams (23). Other authors (24) showed that 97% of women in developed countries had at least one doctor's appointment, 99% had professional help at delivery and about 90% were visited after delivery. In developing countries, only 53% have professional help at delivery, 30% were visited once after delivery and about 65% of pregnant women had at least one doctor's appointment in order to protect their pregnancies. These differences in use of health care during pregnancy, delivery and confinement between developed and undeveloped countries, undoubtedly influenced differences in mortality rates of newborns and infants. Although male children are more often born than female, because of higher mortality of male infants later in life, females always prevail. Significantly higher mortality rate of male newborns, infants and children under 5 in all observed years from 1990 to 2000 in all areas of Serbia was shown (1). Mortality is very different in certain ages of newborns and infants, i.e. perinatal, neonatal and postneonatal period. This is due to different (exogenous and endogenous) factors which have influence on mortality of infants. The percentage of deceased newborns during the first 24 hours and first 6 days of life was increasing. The share of perinatal mortality in countries with high mortality of infants was considerably lower – below 20% of infants died during the first week, and only 20-30% during the first 28 days of life. These ratios are the same today. Mortality of infants depends on order of births (the most endangered are the first and second born children), as well as on mother's age.

There is increase in mortality rates of infants of mothers over 30 years old. Mother's marital status also has considerable effect on mortality rate of infants, since higher mortality rate of illegitimate infants was found in almost all analysed years and areas (with only exception of Kosovo and Metohija). This is connected with wanting a child and psycho-socioeconomic conditions of illegitimate child's life. Mother's profession has considerable effect on mortality rate of infants. The highest mortality of infants is in mothers without incomes (housewives and students), then mothers with customer service jobs, farmers, saleswomen etc. For obvious reasons, mothers' education has significant influence on mortality of infants. The mortality of children whose mothers are less educated is up to seven times higher. Percentage of deceased children under the age of 5 (proportional mortality of small children) in developed countries is under 2% of the total number of deceased inhabitants. In Serbia, it decreased from 3.63% in 1991 to 1.66% in 2000. Even after 1997, proportional mortality of small children was below 2% in the central Serbia, and even below 1% in Vojvodina (1).

The most frequent factors which determined mortality of newborns and infants in Serbia in the last decade of the 20th century

The newborns usually died of diseases and conditions during perinatal period and congenital anomalies, while older infants died of other causes. Mortality of small children (under five years of age) had similar tendency as mortality of infants (1). The causes of death of small children were mostly the diseases and conditions which could be treated using appropriate measures of health care: contagious and respiratory diseases, trauma, poisoning and undefined conditions. Percentage of congenital anomalies was constantly increasing and percentage of contagious diseases was decreasing. Congenital anomalies,

on which health care could not affect much, become the leading death factor in the most developed parts of Serbia (Vojvodina and central Serbia) in 2000 (three quarters of causes). At the same time, the leading death factors in Kosovo and Metohija were respiratory and contagious diseases (1). These were followed by conditions which were not defined well enough, then respiratory and other diseases. Serbia entered the 21st century as the 5th country in Europe by mortality of children under the age of 5, following Turkey, Albania, Macedonia and Romania (25). High, 40% increase of mortality of children was reported in the 1990s (26). According to a United Nations' report, during the last decade of the 20th century, 13 newborns out of 1000 liveborns died. That put Serbia in the same group of countries with Dutch Antilles and Uruguay. M. Jovanović wrote: "We should have in mind that according to that parameter, mortality of newborns is four times higher than in Sweden, Japan (3 out of 1000 children dies), more than twice higher than in Belgium, Finland (4), Austria, Germany, France, Spain (5), in Czech Republic, Greece, Israel, New Zealand, Portugal and Slovenia (6); almost twice higher than in Malta or the USA (7), in Croatia (8), Hungary, Estonia, Lithuania, Poland (9)" (27).

Conclusion

Mortality of infants in Serbia is still high, although it decreased in the last decade of the 20th century. At the end of the 20th century, surviving of newborns with low birth weight and short gestation age was improved. Owing to the advance of medicine and use of modern ways of treatment and care, better professional help for mothers and newborns and regular checkups, it is possible to discover and recognize pathogenesis of diseases and therefore decrease mortality of newborns and infants.

References

1. Stojnovic B. An epidemiological study of infant mortality and child mortality in the territory Serbia [dissertation]. Kragujevac: Faculty of Medicine, University of Kragujevac; 2005.
2. Joksimovic H. Infant mortality. Public Health 1909; 9:195.
3. At the beginning of a new age. Health 1939; 1:3.
4. Yugoslav Union for the Protection of Children-Her Majesty Queen Mary. National offspring 1935; 3-4.
5. Mikic F. Statistical atlas of infant mortality. Belgrade: Medical Books; 1948.
6. Djukanovic V. Health status and health service organization in Yugoslavia. Belgrade 1963.
7. Nikolajević D T. Statistics about dying in Belgrade in year 1901, 1902 and 1903. The first congress of Serbian physicians and naturalists, Belgrade 1904.
8. Piñol JL. Histoire de l'Europe urbaine, II, Paris: Seuil; 2003, p. 93.
9. Statistical Yearbook of the Kingdom of Serbia for year 1903. Belgrade 1906. p.43.
10. Statistical Yearbook for year 1907. and 1908. Belgrade 1912. p. 47.
11. Statistical Yearbook of year 1903. Belgrade 1906. p. 173-87.
12. How we are born. Public Health 1902; 12: 281-3.
13. Isić M. "A woman in a peasant family in Serbia between two world wars," the modernization processes in the Serbian 19th and 20 century. Belgrade 1998. p.193.
14. The health movement. Health 1936; 2: 14.
15. Dying children. National Health 1903; 11: 270-1.
16. Lazarevic L. The term, tasks and resources to nurture children. Public Health 1900.
17. Isić M. The peasantry in Serbia 1918-1941, Book 1, Vol 2. Belgrade 2001; p. 226-7.
18. Krstic D, Marinkovic D, Mirkovic L, Krstic J. Pregnancy outcome during the bombing of Yugoslavia from March 24 to June 9, 1999. Vojnosanit Pregl 2006; 63(4): 377-82. [\[CrossRef\]](#) [\[PubMed\]](#)
19. Araneta MR, Kamens DR, AC Zau, Gastanaga VM, Schlangen KM, Hiliopoulos KM, et al. Conception and pregnancy during the Persian Gulf War: the risk to women veterans. Ann Epidemiol 2004, 14(2): 109-16. [\[CrossRef\]](#) [\[PubMed\]](#)
20. Cvetković M. Pregnancy, childbirth and the newborn in the harsh life conditions and related to sanctions. Proceedings of the effect of UN Security Council sanctions on public health. Belgrade 1994; p.73-4.
21. Tmušić K, Ristic S. Adverse effects on human health caused by international sanctions on the territory of Kosovo and Metohija. Proceedings of the effect of UN Security Council sanctions on public health. Yugoslavia, Belgrade 1994; p. 27.
22. Sulejmani NR, Tomic S. Some observations on the conditions under which we work in the classroom Neonatology at OGC Pristina. News in Neonatology. Belgrade 1999.
23. Čolaković B, Crnogorac S. Pregnancy - make it safe and pleasant. Proceedings of the "Safe Motherhood". Belgrade 1998; p. 54.
24. Parezanović V, Kisin Đ. Provide safe motherhood – the message to the world, the message for everybody. Proceedings of the "Safe Motherhood". Belgrade 1998.
25. The State of the World's Children. UNICEF 2003; p. 102.
26. United Nations. Common Country Assessment for Serbia and Montenegro. Belgrade 2003; p. 34.
27. Jovanovic M. Serbia 1804-2004: 200 years of development burdened by discontinuities (the seven theses). In: Dimic LJ, Jovanovic M, Stojanovic D, eds. Serbia 1804-2004: Three point of view or dialogue invitation. Belgrade: Serbica; 2004.

FAKTORI KOJI SU ODREDILI MORTALITET NOVOROĐENČADI I ODOJČADI U PRVOJ I POSLEDNJOJ DEKADI XX VEKA U SRBIJI

Biljana Stojanović, Svetlana Stojanović

Rizik od smrtnosti je najveći u periodu novorođenčeta i odojčeta. Ovaj period spada u najvulnerabilniji period razvoja, jer su novorođenčad i odojčad izložena dejstvu mnogobrojnih faktora rizika, kako genetskih tako i faktora porodične i socijalne sredine. Godišnje statistike u prvoj dekadi XX pokazivale su da je oko četvrtine živorođene dece umiralo u prvoj godini života. Pritom, podaci pokazuju da je smrtnost male dece na selu bila viša nego u gradu. Higijenske prilike u Srbiji bile su glavni uzrok smrti odojčadi, kako na porođaju tako i u prvim mesecima života, zbog davanja nedovoljno higijenske hrane. U poslednjoj dekadi XX veka posebno je interesantno i značajno sagledati smrtnost novorođenčadi i odojčadi u Srbiji zbog značajnih političkih i socioekonomskih poremećaja, koji su nastali posle uvođenja sankcija međunarodnih organizacija i bombardovanja naše zemlje 1999. godine. U ovom periodu zapažen je nagli skok stope mortaliteta novorođenčadi i odojčadi u svim teritorijalnim delovima Srbije u 1992. i 1993. godini, da bi se kasnije stalno smanjivala. *Acta Medica Medianae 2013;52(3):61-66.*

Ključne reči: mortalitet, novorođenče, odojče, Srbija