

Infant mortality for the 10-year period of implementation of WHO technologies in the Republic of Kazakhstan

Mortalidad infantil durante el período de 10 años de implementación de las tecnologías WHO en la República de Kazajstán

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Abstract

The article reveals an analysis of infant mortality over a ten-year period of the introduction of WHO technologies in the Republic of Kazakhstan. The aim of the study was to analyze infant mortality in the Republic of Kazakhstan for the period from 2008 to 2018. The authors conducted an analysis and consistent interpretation of the results. As a result, it was found that in order to further reduce the infant mortality rate and save each life, a constant comprehensive analysis of the indicators is necessary taking into account the structure of infant losses.

Keywords: infant mortality, WHO technologies, medicine of the Republic of Kazakhstan, maternal health.

Resumen

El artículo revela un análisis de la mortalidad infantil durante un período de diez años desde la introducción de las tecnologías de la OMS en la República de Kazajstán. El objetivo del estudio fue analizar la mortalidad infantil en la República de Kazajstán para el período de 2008 a 2018. Los autores realizaron un análisis y una interpretación coherente de los resultados. Como resultado, se encontró que para reducir aún más la tasa de mortalidad infantil y salvar cada vida, es necesario un análisis exhaustivo constante de los indicadores teniendo en cuenta la estructura de las pérdidas infantiles.

Palabras clave: mortalidad infantil, tecnologías de la OMS, medicina de la República de Kazajstán, salud materna.

Introduction

The problems of motherhood and childhood are constantly in the spotlight and are one of the priority areas for the development of domestic health care¹. One of the most pressing problems of obstetrics and neonatology is miscarriage and the birth of children with low body weight (less than 2500g) as a result of premature birth or intrauterine growth retarda-

tion. According to WHO, the proportion of such children among newborns is from 5 to 16%. In developed Western countries, birth of small children is registered in 4-12% of cases of all births, and in Kazakhstan 20,000 small children are born annually. The perinatal mortality of small children is 6-10 times higher than that of newborns with normal body weight, and the perinatal morbidity is from

70 to 80% and is an important social and economic problem for the state due to the high costs of nursing, rehabilitation and social adaptation of such children².

One of the serious problems of modern medicine is the increase in the number of newborns with intrauterine growth retardation (IUGR)³⁻⁵. The significance of this pathology is determined by its large specific gravity in neonatal morbidity and mortality. According to various authors, the frequency of this syndrome is from 12 to 36%. Dementieva revealed that newborns with IUGR make up 30.1% of all newborns with low birth weight (less than 2500 g), and 67.4 per 1000 live births prematurely and 179.5 per 1000 premature births in the general population⁶⁻⁸.

Children born with low body weight die 2530 times more often than children with normal body weight, and make up from 55 to 65% of the number of deaths in the first year of life. In the structure of morbidity and mortality, the first place continues to be occupied by premature babies, whose perinatal mortality is about 90.0 ‰. First of all, this applies to children with very low and extremely low body weight⁹.

Under intrauterine growth retardation is understood a chronic nutritional disorder of the fetus, manifested by a decrease in anthropometric indicators compared with those required for a given gestational age of the child. All these conditions lead to a high risk of developing disorders of the neuropsychic state, a delay in intellectual development. The earlier the fetus begins to experience adverse effects, the more the fetus lags in development, not only in anthropometric indicators, but also in morpho-functional aspects of development¹⁰.

In the Message to the people of Kazakhstan, ““The New Decade - The New Economic Boom - The New Opportunities of Kazakhstan”, President Nazarbayev N.A. emphasized that one of the most important tasks of the coming decade is to improve the medical and demographic situa-

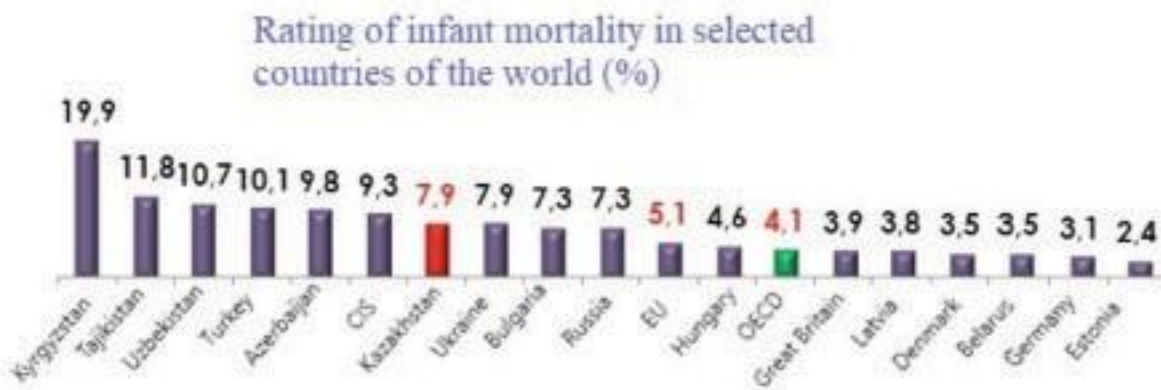
tion in Kazakhstan, to strengthen social stability and security. The key to solving this issue is to protect the health of mothers and children, since it is this group of the population that is the most vulnerable and directly dependent on state support and any social and economic reforms¹¹. And the state will create all the necessary conditions for increasing the country's population by 2020 by 10%.

To assess the state of public health, the quality of life of the population, the degree of development and organization of health care in various countries, WHO recommends that, along with the traditional criteria (general, maternal, perinatal and infant mortality), the mortality rate for children under 5 years of age be used. One of the main indicators of the health status of the population, including children, is the mortality rate¹²⁻¹⁴.

The Republic of Kazakhstan adopted the criteria for live births and stillbirths recommended by WHO in 2008; international technologies based on evidence-based medicine were introduced into the obstetrics and childhood system. Thanks to the adoption of industry and national programs, including the State program “Salamata Kazakhstan,” effective organizational technologies have been implemented, such as the regionalization of perinatal care — the distribution of maternity hospitals by the level of technology for the care of pregnant women and newborns. Pregnant women with severe pathology and premature birth are sent to perinatal centers, where high-level specialists work for the resuscitation and nursing of premature and sick newborns, modern medical equipment is concentrated and expensive medicines are used. The technologies they carry out are in line with international standards¹⁵.

Despite the reduction in infant mortality, its level remains high and exceeds the indicators of European countries by two to three times (Fig. 1).

Figure 1 - Rating of infant mortality in selected countries of the world.



In 2002, the World Health Organization launched the implementation of effective perinatal technologies to improve maternal and newborn care in Kazakhstan, as part of the WHO Strategy for Making Pregnancy Safer (MPS). This initiative includes: a basic training course on effective perinatal care (EPC), follow-up and reinforcement courses, assessment of the quality of inpatient care provided to mothers and newborns. The EPC training package was developed by the WHO Regional Office for Europe and is intended for midwives, obstetricians / gynecologists, neonatologists and pediatric nurses. The goal of the EPC is to improve the quality and results of caring for mothers and newborns by improving and updating professional and managerial knowledge, skills and their application in practice by medical workers of all levels of the obstetric institution. The EPC course includes basic obstetric and neonatal care, infection control, and some aspects of specialized care for conditions such as preeclampsia, postpartum hemorrhage, and perinatal asphyxia. The course is conducted using a multidisciplinary approach, using interactive teaching methods, group work, plenary sessions and conducting curatorial clinical practice. The EPC training course is conducted within 8 working days and includes 2 key components - theoretical and practical parts. Ideally, a follow-up visit should be provided within 6 months after the end of the training course to assess the progress achieved, strengthen skills and conduct additional practical exercises directly at workplaces (in obstetric institutions).

Assessment of the quality of care (QC) and subsequent follow-up was carried out in November 2009 and April 2011 in the regional perinatal centers of Aktobe, Karaganda and Southern Kazakhstan, as well as in the National Scientific Center for Maternal and Child Health in Astana. The assessment was carried out using the WHO methodology based on standards of care developed on the principles of evidence-based medicine. The method allows an assessment focused on carrying out activities in all main areas and taking into account those factors that may affect the quality of medical care and care, including infrastructure, provision and equipment, organization of services, and clinical case management. The focus of this method is those areas that have the most significant effect on maternal and infant mortality, severe morbidity, and in general, on the well-being of mother and newborn. Evaluation of QC had two main goals: first of all, experts evaluated the progress in introducing effective perinatal technologies in institutions; secondly, experts established the main stages for further improving the quality of medical care in maternity hospitals.

As a result of the assessment, significant improvements in the quality of care for mothers and newborns were noted. When assessing, the following scoring system was used from 0 to 3: "3" - full compliance with international standards, "2" - "mainly" compliance with international standards, "1" - "significant improvement is required", and "0" - "Not up to standards". Positive progress was

achieved in almost all areas, with visible progress within 18 months after the first assessment of CI. In particular, an improvement was noted in the following areas:

- Demedicalization of maternal and newborn care, with the abandonment of unnecessary medications and medical interventions;
- Compared to 2008, the percentage of cesarean sections under regional anesthesia increased by 2-3 times. Thus, caesarean section surgeries under local or regional anesthesia are performed in 50% of cases in Aktobe, in 80% in Karaganda and in 70% in southern Kazakhstan;
- In all cases, management of preterm delivery has improved with the use of corticosteroids;
- There has been a positive shift in the passive management of the case at the third stage of the delivery period;

Another positive aspect is the active participation of mothers in caring for small babies and sick newborns, including the early start of feeding the baby with expressed breast milk. In addition, the practical implementation of preparedness for emergency obstetric care was achieved, namely: the introduction of standards for the management of severe obstetric bleeding and eclampsia, trained health workers, round-the-clock operations in the intensive care unit, as well as the availability and access to essential medicines and blood components. Despite the noted progress, problem areas still require urgent action. These include: infection control in hospitals, management of normal birth and obstetric hemorrhage, and basic care for newborns (including thermoregulation). For example, the rate of laparotomy due to sepsis after cesarean section is high (1 in 200-300 cases), and mortality rates among newborns show an increasing trend in late neonatal mortality. The introduction in Kazakhstan of perinatal technologies recommended by WHO has shown its high efficiency. WHO approaches for training, supervision, supportive supervision and quality-of-care assessment help the country improve the quality of perinatal care and care for mothers and newborns. The following efforts should focus on: (a) reviewing the existing infection control system at the national level in accordance with international standards for evidence-based medicine; and (b) the organization of an internal system to improve the quality of medical services, such as, for example, the WHO audit "Analysis of life-threatening obstetric complications - about losses"¹⁶.

All causes of perinatal mortality can be divided into two groups:

- 1) diseases or conditions of the mother or afterbirth, pathology of pregnancy and childbirth, which caused the death of the child;
- 2) diseases and conditions of the child (fetus), which were the cause of death.

Among the first group of reasons, the largest share is occupied by complications from the placenta, umbilical cord

and membranes (premature detachment of the placenta, pathology of the umbilical cord, etc.); in second place - complications of pregnancy in the mother (toxemia of the second half of pregnancy, premature discharge of amniotic fluid, etc.); in the third, maternal conditions unrelated to this pregnancy; on the fourth, complications of childbirth and delivery (rapid childbirth, anomalies of labor, criminal interventions).

Among the second group of causes, the most important are: asphyxia, respiratory conditions (including congenital pneumonia) and congenital anomalies.

The infant mortality rate takes into account the early neonatal (mortality in the 1st week of life - 168 h); neonatal (mortality during the first 4 weeks of life); post-neonatal (from the 29th day to the end of the 1st year of life) mortality.

Mortality of children from 7 days to 1 year of age in most cases is associated with congenital malformations; in the hospital it was 29% of the total mortality rate, which indicates the loss of every 4th infant with this pathology. Annually in the region, in the absolute value of 70-80 children under 1 year of age, from birth defects, which exceeds the number of 40-50 children who died from respiratory diseases, and infections of 20-30 children. In children with congenital malformations, any associated disease, in particular respiratory diseases, is more severe than without malformation and can be fatal. Annually, according to mortality analysis of the regional children's hospital, 100% of dead children had background diseases, which aggravated the condition during treatment. In the structure of deaths among newborns is intrauterine infection. Intrauterine infections, in many respects determines the level of stillbirth, infant mortality, is a topical of the most serious diseases of children.

Herpes simplex viruses, CMV, seemingly harmless at first glance, settle in the most vulnerable areas of the child's brain, creating vital centers such as speech and motor, which lead to severe developmental defects. Among the significant causes of mortality in children from 7 days to 1 year are organ diseases respiratory viral infections, pneumonia and infection. Among children who died from respiratory diseases, the proportion of babies born prematurely with bronchopulmonary dysplasia and children with congenital malformations is significant. Resuscitation measures and subsequent intensive care, including hardware-based artificial lung ventilation, with adequate control of blood gases, metabolites and electrolytes, prevents the development of air leak syndrome, bronchopulmonary dysplasia, and death of newborns. This is determined by the fact that the hospital uses the latest equipment when required for mechanical ventilation. We carry out the prevention of secondary complications of dioxidine in children who have been on mechanical respiration for a long time on respiratory ventilation. It should be noted that this introduction has given a positive result in the development of measures to reduce infant mortality.

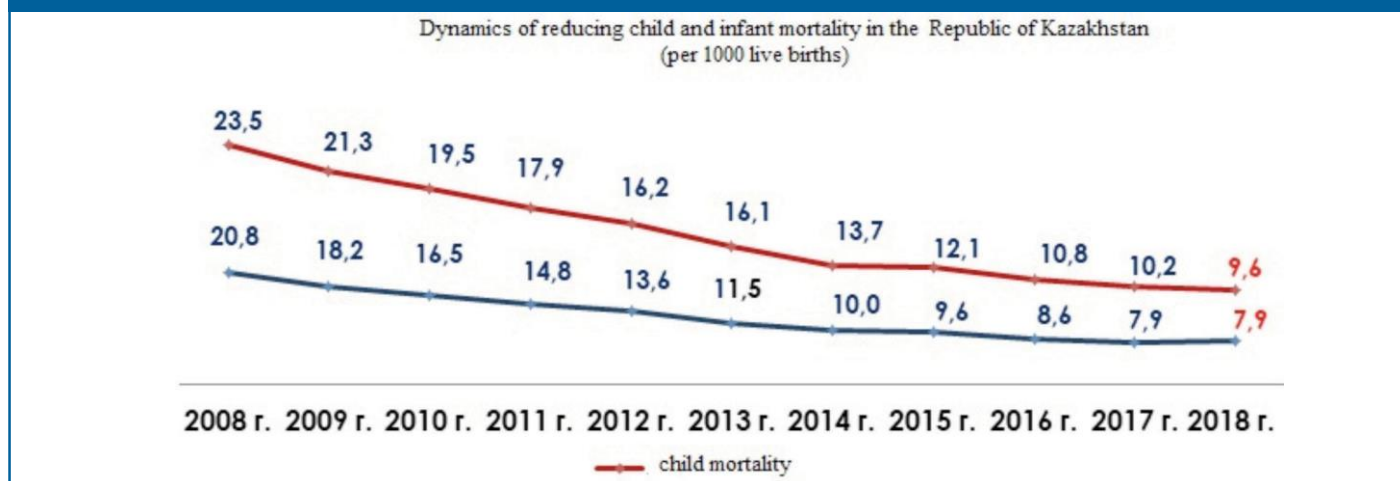
Materials and Methods: The study was conducted on the basis of an analysis of reporting documentation submitted by the Republican Center for Health Development of the Ministry of Health. Assessment of the quality of medical care for newborns and children of the first year of life was carried out using the WHO methodology, based on medical care standards developed on the basis of evidence-based medicine. The method allows an assessment focused on the implementation of measures in all major areas, taking into account factors that may affect the quality of care and services.

Results and Discussion: The health care reforms implemented in Kazakhstan have provided positive results in terms of improving the quality of services provided in the system of maternal and child health.

According to current data, in 2016 infant mortality decreased by 11.6%, from 9.6 per 1000 live births in 2015 to 8.6 in 2016. In most cases, the causes of infant mortality are complications of the perinatal period. In addition, children under 1-year old die due to congenital malformations, respiratory and circulatory diseases.

Every day in the republic more than 1 thousand children are born, more than 400 thousand per year. The birth rate has increased by 3% over the past 5 years. As a result of measures taken to reduce infant mortality, premature babies with a birth weight of 500 grams or more got the right to life. Over 5 years, the survival rate of children with a weight category of up to 1,500 grams increased by 30% and amounted to about 60%. Taking into account the introduction of the criteria for stillbirths recommended by the World Health Organization, the country has begun improving and strengthening inpatient services, introducing into practice simple, cost-effective, affordable, evidence-based international technologies, effective perinatal care, integrated management of childhood diseases. At the same time, the organizational and methodological basis for ensuring the quality of pediatric care in city children's clinics has not yet been developed; criteria and indicators of the quality of work of pediatricians in the new conditions for the implementation of primary health care; insufficiently studied conditions and factors affecting the quality of pediatric care; the quality control system of medical care for children is in need of improvement^{25,33-35}.

Over the past 10 years in Kazakhstan, infant mortality decreased by 2.6 times and amounted to 7.9 ‰ (Fig. 2). In 2008, in the Republic of Kazakhstan, when the criteria for live births and stillbirths were introduced, this indicator rose to 20.8%, while regionalizing perinatal care, building new perinatal centers, equipping them with modern equipment, developing neonatal surgery, cardiac surgery, sanitation, telemedicine and etc. has significantly reduced infant mortality over the years.

Figure 2 - Dynamics of infant and neonatal mortality in the Republic of Kazakhstan.

Today, a reserve for reducing infant mortality is the fight against exogenous controlled causes (accidents, injuries, respiratory diseases, infections). It is more difficult to deal with endogenous causes, this is mortality from diseases of the neonatal period (55%) and congenital malformations (20.7%), which occupy the 1st and 2nd places in the structure of mortality of children under 1 year in 2018. The number of deceased babies from respiratory diseases is 4.8% and from accidents, poisoning and injuries - 4.4%. The solution to this problem, of course, depends not only on health care, systemic work with education, social protection, internal affairs and other bodies are of great importance here.

Thanks to the introduction of the WHO live birth criteria, we have learned to better care for children born with extremely low birth weight. The survival rate of premature infants in 2018 increased and amounted to 99% in the weight category 2500 and above, in the weight category up to 1500-2500-98%, with a weight of 1000-1499-76%, in the weight up to 1 kg - 65%. This gave us the opportunity to effectively develop neonatal surgery, cardiac surgery, because the skills of nursing small children, in general, can improve the literacy of doctors and apply their knowledge in the treatment of newborns with a different pathology. A significant contribution to reducing child (infant) mortality is made by the development of highly specialized medical care, as problems with sensory impairment (hearing loss and retinopathy) have appeared with nursing of premature babies and this is also a new area that had to be mastered.

Today, not only in the leading republican centers, but also in some regional centers, laser coagulation of the retina is successfully performed with retinopathy of the premature to preserve their vision, open heart surgery in newborns has become commonplace in the country, and more than 2000 such surgeries per month are performed, the survival rate of children with congenital malformations reached 86%.

In all 16 regions of the country, regional training centers have been established to coordinate the implementation of effective perinatal care, integrated management of

childhood diseases, 16 regional coordinators for effective perinatal care are working. To assess knowledge and practical skills, regional and republican simulation centers are open and operate.

Adequate clinical management of childhood diseases and patronage of children at the primary health care level was ensured by the implementation of WHO strategies for the provision of inpatient care for children and the integrated management of childhood illnesses (IMCI) at the outpatient level^{19,26-29}. Together with international organizations (WHO, the UNICEF Children's Fund), large-scale campaigns were held to inform mothers on the rules for caring for children under 5 years old. An "Individual card for the development of a child aged 0 to 5 years" has been published for young parents. A methodical manual "Physical Development of a Child aged 0 to 5 Years" has been developed for medical workers. Within the framework of the WHO program "Integrated Management of Childhood Illnesses", preventive observation of children under 5 years of age has been carried out, more than 600 rooms of a healthy child have been organized where psychophysical screening of young children, training and counseling of parents on nutrition issues are carried out by health workers^{28,31,32}.

The analysis of staffing of obstetric organizations was carried out, which amounted to: obstetrician-gynecologists - 89.5%, neonatologists - 87%, anesthetists-resuscitators - 88%, and paramedical workers - 84.7%. An audit and evaluation of obstetric care organizations was carried out depending on the level of regionalization of perinatal care, a phased retooling with the necessary equipment was planned. The level of medical equipment in maternity hospitals was 78%.

In July 2016, for the rational use of medicines, together with British experts, the Kazakhstan National Drug Formulation was developed and introduced, which includes drugs with proven clinical efficacy.

Work continued on health informing. As part of the development of e-health, information systems are being

introduced that already today allow the patient to independently choose an attachment clinic, choose a hospital, track the progress of the queue for planned hospitalization, independently make an appointment with the doctor by phone, through the e-government portal and the websites of organizations PHC; E-health standards developed. The platform provides the introduction of electronic health passports for all citizens of the republic, a patient's personal account and a health worker, and a unified health data warehouse. As a result of the implementation of the Platform, a unified e-health information space was created, while both medical workers and patients were able to access the necessary health data, regardless of the place of medical care.

Unified services of electronic referrals and electronic prescriptions made it possible to increase the availability of medical care. The information collected in the electronic health passport provided assistance in making clinical decisions, continuity in the provision of medical care to a particular patient between healthcare organizations, improving the quality of medical care and reducing the number of medical errors.

The patient's personal account made it possible to ensure the involvement of citizens in the process of protecting their own health by informing about health risks and the need for preventive procedures. The introduction of medical information systems has enabled the implementation of a pilot project on the transition to paperless healthcare and the full automation of business processes of medical organizations. The medical information systems delivered as part of this event provide a reduction in unproductive working hours for working with documentation (preparation of extracts, filling out magazines, reporting); improving the quality of medical care due to information support of medical activities and, as a result, reducing the number of medical errors, increasing throughput, reducing the duration of treatment, the number of complications, mortality, eliminating the double entry of similar information.

Infant mortality is one of the most important characteristics of society, reflecting the impact of a set of adverse factors on public health, such as maternal health, the quality and availability of medical care, socio-economic conditions, etc.

For the analyzed period, the structure of the causes of infant mortality has not changed significantly, with the leading importance of perinatal causes and congenital malformations.

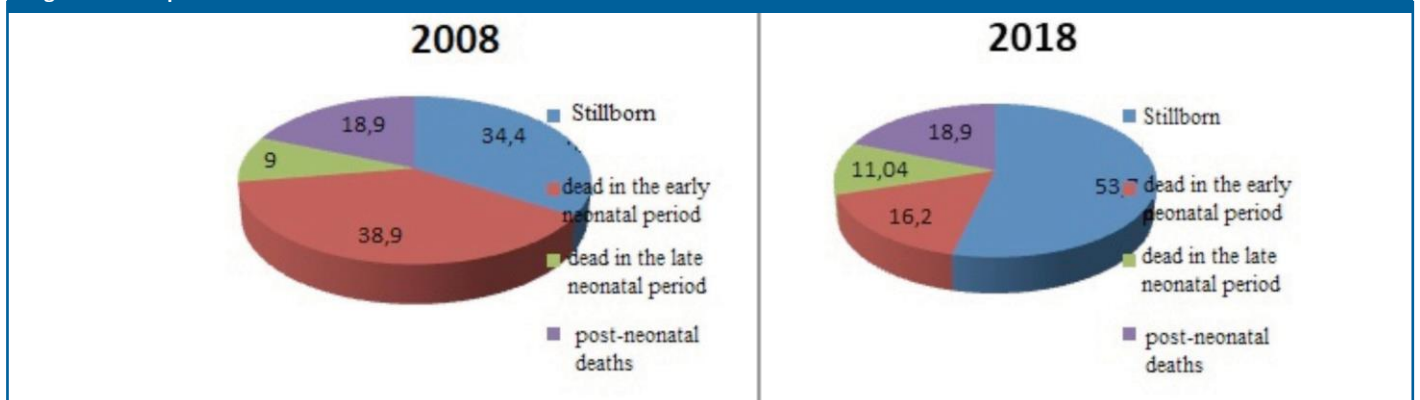
Despite the prenatal screening of pregnant women for the diagnosis of congenital malformations, the detection of malformations remains still low (with an adequate minimum 78%, in 2018 the Republic of Kazakhstan prenatal screening was 60.3%), which leads to an increase in the number of children born with CM and an increase in the mortality rate from CM.

In 2018, the proportion of stillbirths, late neonatal and postneonatal mortality in the structure of fetal and infant losses increased, while the proportion of early neonatal mortality decreased significantly, which indicates a distortion of statistical data (Fig. 3). It should also be noted that the women's health index is growing steadily every year, while in 2018 it amounted to only 71%.

The share of respiratory diseases decreased from 8.7% to 4.4%, while the share of accidents, poisoning and injuries remained unchanged 4-4.4%.

A significant factor in reducing infant mortality is mortality from accidents, injuries and poisoning, the mortality rate at home was 7.6% and this indicates inadequate clinical management of childhood diseases, patronage of children at the level of primary health care, and not complete compliance with the integrated management of childhood illnesses (IMCI) on an outpatient basis, sometimes parents' ignorance of the signs of danger and indicate available reserves that may Promote further improvement of the main indicators characterizing the quality of medical services in the system of childhood and obstetric care.

Figure 3 - Comparative characteristics of the structure of fetal-infant losses in Kazakhstan for 2008 and 2018 %.



Thus, to further reduce the infant mortality rate and save each life, a constant comprehensive analysis of the indicators is necessary taking into account the structure of infant losses. It is necessary to develop new strategic mechanisms for using modern medical technologies for therapeutic and rehabilitation measures aimed at correcting perinatal and congenital diseases; high-quality work and interaction of all health care institutions accompanying the fetoinfantile period and the period of the first year of life, further strengthening and improving the quality of medical care, especially in primary health care, monitoring the implementation in practice of the effective WHO and UNICEF programs, in particular, the patronage service, increasing professional level of doctors and nurses; and the ability to rationally apply new perinatal technologies. The reserve for reducing infant mortality is: strengthening and improving the quality of medical care, especially in primary health care, putting into practice effective WHO and UNICEF programs, improving the professional level of doctors and nurses and the ability to rationally apply new perinatal technologies.

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