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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

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საქართველოს სამედიცინო სიახლენი

**GEORGIAN MEDICAL NEWS**

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**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии -** ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News –** საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

**WEBSITE**

www.geomednews.com

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются**.

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.**

## ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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# PNEUMONIA AMONG CHILDREN UNDER 1 YEAR OF AGE: ANALYSIS OF INCIDENCE AND HOSPITAL MORTALITY FROM 2010 TO 2020 IN THE REPUBLIC OF KAZAKHSTAN

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## Abstract.

**Aim.** To analyze the dynamics of morbidity and mortality from pneumonia in children under 1 year of age in the Republic of Kazakhstan for 10 years since the introduction of vaccination against pneumococcal infection in the National Immunization Schedule of the Republic of Kazakhstan in 2010.

**Materials and research methods.** A retrospective cross-sectional study was carried out using the statistical collection of the National Scientific Center for Health Development named after S. Kairbekova from 2010 to 2020.

**Results.** The criterion for the study of epidemiology was the incidence of pneumonia in children under 1 year of age per 1000 children. The indicator compared with 2010 in the year, the incidence decreased by 34.0 cases, and amounted to 20.1 cases. In 2010, it was 54.1 cases. Analyzing the lethality of children from pneumonia by region, we also decided to show the top 5 regions with a high rate. This list in 2010 included Akmola (n=149.7), Turkestan (n=79.7), West Kazakhstan (n=76.9), Kostanay regions (n=66.1) and the city of Nur-Sultan (until 2019, the city of Astana) (n=69.5). The indicator for the republic in 2010 was 54.1 cases per 1,000 children. The incidence per 1000 children in 6 regions and 1 city is higher than the republican indicator. In 2020, in Kazakhstan, the incidence of pneumonia in children under 1-year-old per 1000 children was 20.1 cases. In such regions as Akmola, Turkestan, North Kazakhstan, Kostanay and Zhambyl regions, the indicators are the highest in the country.

**Conclusion.** From 2010 to 2020, the incidence of pneumonia in children under 1 year of age tends to decrease in Kazakhstan, however, the city of Almaty shows a relatively high proportion of the total mortality for all diseases under 1 year of age. This work is analytical, and further work with a study of immunization of children against pneumococcal infection is required for a full study. A curve should be plotted on parental refusals to vaccinate over a given period of time.

**Key words.** Pneumonia, Lower respiratory tract infection, Epidemiology, Infectious diseases, Kazakhstan.

## Introduction.

Children under five years of age are more vulnerable to pneumonia, and pneumonia remains the leading cause of morbidity and mortality in these children [1-3]. Pneumococcal disease is estimated by the World Health Organization (WHO) to cause 1.6 million deaths worldwide every year, half of them in children. Southeast Asia and Africa were two continents with a high prevalence of childhood pneumonia, with an estimated 61 million and 35 million cases of pneumonia each year in children under five years of age, respectively. The incidence of pneumonia in children under five years of age decreased to 120 million (from 0.88 million deaths) in 2010 and to 102 million (from 0.7 million deaths) in 2015 worldwide [4]. This decline was associated with a decrease in the magnitude of major risk factors, increased socioeconomic development and preventive interventions, improved access to care and quality of care in hospitals. Despite this progress, pneumonia still remains a major public health problem for children, especially in developing countries [4-6].

Reducing the mortality of children under 5 years of age is one of the priority tasks of the healthcare system of the Republic of Kazakhstan. In 2008, 33,774 cases of pneumonia were registered in Kazakhstan in children under 5 years of age. The total number of cases of death of children under the age of 5 in 2008 was 8,225 children, of which about 1.5 thousand children died of pneumonia. According to official data, pneumonia ranks first among the causes of death of children under 1-year-old in the Republic of Kazakhstan [7]. Since 2010, Kazakhstan has gradually begun mass vaccination against pneumococcal infection for children (done in three stages).

Scientific studies on the prevalence of pneumonia and pneumonia as a cause of mortality in children under 1 year of age are very limited. This study is the first analysis that is aimed at studying the above topics in the Republic of Kazakhstan.

## Aim.

To analyze the dynamics of morbidity and mortality from pneumonia in children under 1-year-old in the Republic of Kazakhstan for 10 years since the introduction of vaccination against pneumococcal infection in the National Immunization Schedule of the Republic of Kazakhstan in 2010.

## Materials and methods.

In the beginning we searched results of investigations of mortality and morbidity rates of pneumonia amongst children under 1 year of age. However, this kind of surveys absence, and in background we decided to write about situation of pneumonia among infants under 5 years old. Searching of scientific article were conducted by keywords in English and Russian languages in electronic scientific bases as PubMed, Cochrane, Google scholar and Elsevier.

Then was conducted the retrospective cross-sectional study, which carried out using the statistical collection of the National Scientific Center for Health Development named after S. Kairbekova from 2010 to 2020. The study included children under 1 year of age.

## Results.

The territory of the Republic of Kazakhstan is 2,724,902 km². The population, according to the estimate of the State Statistics

Committee as of January 1, 2022, is 19,082,467 people. The population density is one of the lowest in the world: less than 7 people per square kilometer. The capital is Nur-Sultan. The largest city with a population of over 2 million people is Alma-Ata. It ranks 9th in the world in terms of territory, 2nd among post-Soviet countries (after Russia), 42nd in terms of GDP PPP and 64th in terms of population. In administrative-territorial terms, it is divided into 14 regions and 3 cities of republican significance: Nur-Sultan, Alma-Ata and Shymkent [8].

We started analyzing the incidence of pneumonia in children under 1 year of age from 2010 to 2020. Statistical analysis covered all regions of the Republic of Kazakhstan. From 2010 to 2020, the incidence of pneumonia in children under 1 year of age tends to decrease in absolute numbers (Figure 1). In 2010, this indicator was 17,761 cases of morbidity, and in 2020, the indicator decreased by 52.1% compared to 2010, i.e., 8493 cases. If we evaluate the changes in the prevalence of pneumonia over the years, then in 2011 the number decreased by 7.8% (n=16,438) compared to the previous 2010. In 2012, the deviation was also in the form of a decrease by 1.3% (n=16,232), and in the next year, 2013, pneumonia in children under 1 year of age decreased by 5.9% (n=15,277). In 2014, there were 9.3% fewer cases (n=13,851). One of the highest decline rates was recorded in 2015, as compared to 2014 it decreased by 12.8%, and amounted to 12,074 cases. In 2016, the incidence decreased by 12.3% (n=10,584), followed by a decrease of 14.6% to 9034 cases in 2017. Subsequent years show an increase in incidence: in 2018, the incidence increased by 1.6% compared to 2017, and by 8.2% in 2019 (compared to 2018). However, in 2020, the number of registered cases of pneumonia in children under 1 year of age decreased by 14.5% and is 8,493 cases.

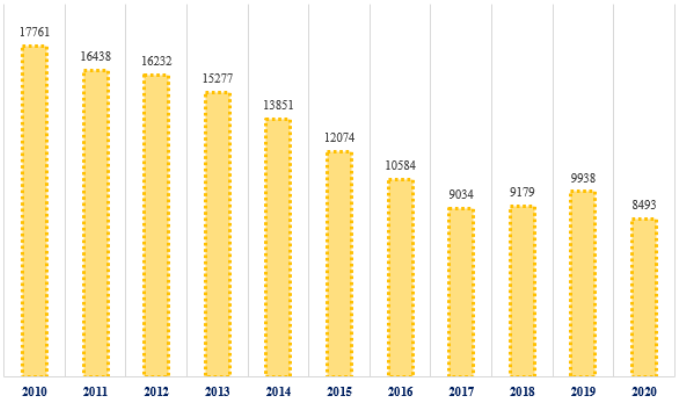


*Figure.1. The incidence of pneumonia in children under 1 year of age in the Republic of Kazakhstan (2010-2020, abs. numbers).*

We also analyzed the incidence of pneumonia in children under 1 year of age in all regions of the Republic of Kazakhstan. In 2010, high incidence rates belong to such regions as Turkestan (n=5251), Akmola (n=1897), Almaty (n=1881), Zhambyl (n=1849) and the city of Nur-Sultan (until 2019 the city of Astana) (n=1032)). In 2020, the downward trend in incidence is maintained in all regions, and the top 5 regions with a high burden of disease also include the above-mentioned regions.

The next criterion for the study of epidemiology was the incidence of pneumonia in children under 1 year of age per 1000 children. The indicator compared with 2010 in the year, the incidence decreased by 34.0 cases, and amounted to 20.1 cases. In 2010, it was 54.1 cases (Figure 2).

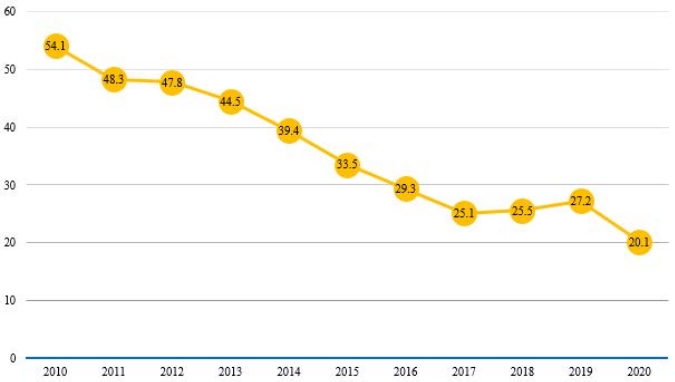


*Figure. 2. Incidence per 1000 children of pneumonia in children under 1-year-old in the Republic of Kazakhstan (2010-2020).*

Analyzing this criterion by regions, we also decided to show the top 5 regions with a high indicator. This list in 2010 included Akmola (n=149.7), Turkestan (n=79.7), West Kazakhstan (n=76.9), Kostanay regions (n=66.1) and the city of Nur-Sultan (until 2019, the city of Astana) (n=69.5). The indicator for the republic in 2010 was 54.1 cases per 1,000 children. The incidence per 1000 children in 6 regions and 1 city is higher than the republican indicator.

In 2020, in Kazakhstan, the incidence of pneumonia in children under 1-year-old per 1000 children was 20.1 cases. In such regions as Akmola, Turkestan, North Kazakhstan, Kostanay and Zhambyl regions, the indicators are the highest in the country. In 6 regions and the capital, the indicators are higher than the republican value.

Mortality from pneumonia in children under 1 year of age in the Republic of Kazakhstan in 2010 was 0.6% of the total mortality of children under 1 year of age (Figure 3). In general, there is a steady decrease in pneumonia as a cause of death. From 2011 to 2012, the mortality rate was 0.5%, and from 2013 to 2015, the proportion was 0.4%. The decrease was noted in 2016, and until 2018 it was 0.3%. In 2019, the rate was 0.2%, and in the final 2020 of our study, mortality from pneumonia in children under 1-year-old was recorded as 0.1%.

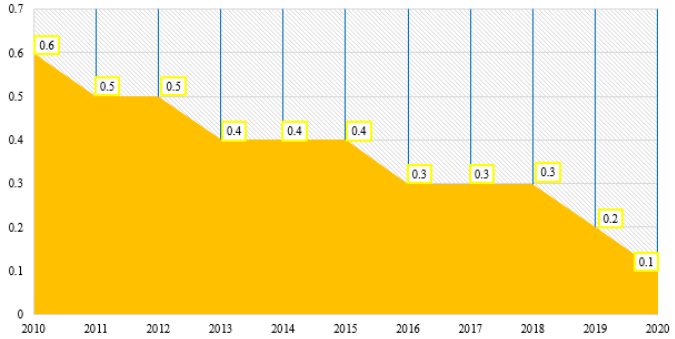


*Figure. 3. The percentage of mortality from pneumonia in children under 1 year old in the Republic of Kazakhstan (2010-2020),%.*

The following table is very informative, since childhood mortality from pneumonia is a consequence of pneumococcal infection. Vaccination against pneumococcal infection is scheduled at 2.4 and 12 months of a child's life.

In 2010, the highest mortality rate from pneumonia in children under 1-year-old was in Atyrau region (2.3%). This is followed by Kyzylorda (1.3%), Mangystau (1.2%) and Almaty (1.1%) regions, whose percentages were above 1% in 2010. In 2020, the maximum percentage of mortality from pneumonia out of the total number of deceased children under 1-year-old is 1.2% of the city of Almaty. It should be noted that in comparison with other regions, it was in the country's large metropolis that pneumonia, as the cause of mortality, sometimes increased in indicators. The next highest rates are in Atyrau (0.4%) and Kostanay (0.3%) regions.

## Discussion.

The present study is the first analysis that aims to study the prevalence of pneumonia and pneumonia as a cause of mortality in children under 1 year of age. In general, in the Republic of Kazakhstan, there is a decrease in the incidence of pneumonia in children under 1 year of age. However, according to the indicators for all three criteria (1. the number of cases of pneumonia among children under 1-year-old; 2. the number of cases per 1000 children; 3. the percentage of mortality from pneumonia of the total number of mortality in children under 1-year-old), on which our article was based, show some lack of relationship between mortality and morbidity. For example, the list of regions with a high incidence rate (in absolute numbers) for 2010 includes Turkestan, Akmola, Almaty, Zhambyl regions and the city of Nur-Sultan (until 2019, the city of Astana). But high mortality is observed in Atyrau, Kyzylorda, Mangystau and Almaty regions. In 2020, the situation repeats itself, i.e., regions with a high incidence of pneumonia do not show a high mortality rate from this disease.

Thus, possible causes can be assumed. It is possible that regions with a low incidence rate compared to other regions/ cities have a relatively low level of medical care for patients with this diagnosis up to 1 year of age. The study should also be continued and supplemented with a study of the state of routine vaccination against pneumococcal infection, which has a great influence on the prevalence of the disease.

## Conclusion.

From 2010 to 2020, the incidence of pneumonia in children under 1 year of age tends to decrease in Kazakhstan, however, the city of Almaty shows a relatively high proportion of the total mortality for all diseases under 1 year of age. This work is analytical, and further work with a study of immunization of children against pneumococcal infection is required for a full study. A curve should be plotted on parental refusals to vaccinate over a given period of time.

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