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ANALYSIS OF INDICATORS OF PUBLIC HEALTH IN THE KAMENSKO-DNEPROVSKYI RURAL REGION

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Ключові слова: захворюваність і поширеність хвороб, громадське здоров'я, класифікація хвороб за МКХ-10, темп приросту, середньобагаторічний рівень хвороб

Ключевые слова: заболеваемость и распространенность болезней, общественное здоровье, классификация болезней по МКБ-10, темп прироста, среднемноголетний уровень болезней

Abstract. Analysis of indicators of public health in the Kamensko-Dneprovskiy rural region. Hryhorenko L.V., Baibakov V.M. Purpose of the research performed by the cohort method is to study the levels of public health among children and adults living in the rural industrial area of the Zaporizhzhia region. In order to estimate primary and overall disease incidence by the separate nosological forms in children and adult population: (C00-C97), (E10-E14), (I10-I15), (I20-I25), (J95-J99), (K20-K31) retrospective research was carried out according to the ICD-10. Scientific substantiation of the research in the rural district was based on the following categories: choosing category of the adult population and children aged 0-14 years to 15-17 years, social-hygienic parameters, types of water supply systems. Investigation of the incidence was carried out according to the report of Information Health Department Centre for the period of 2008-2016 years. The main factors which influence the formation of public health are demographic indicators of different age groups, as well as indicators of dispensary supervision (the composition of health groups, the proportion of frequently ill children) on the territory of experimental observation area. In our research we tried to study these two groups of medical and social factors to understand the conditions under which health of the rural population in this industrially developed region of Ukraine is being formed. The percent of organized groups of frequently ill children in the Kamensko-Dneprovskiy rural district during 2008-2016 observation period increased from 53.3% in 2008 to 68.2% in 2016, which also testifies to a negative tendency to increase in the rate of children falling ill more than 4 times during 1 year, and the low resistance of the body to acute viral infections.

Реферат. Аналіз показників стану громадського здоров'я в Кам'янсько-Дніпровському сільському районі. Григоренко Л.В., Байбаков В.М. Мета дослідження, виконаного когортним методом – вивчення рівнів популяційного здоров'я серед дитячого і дорослого населення, що проживає в сільському індустріальному районі Запорізької області. Для оцінки первинної та загальної захворюваності серед дитячого та дорослого населення і захворювань за окремими нозологічними формами: (C00-C97), (E10-E14), (I10-I15), (I20-I25), (J95-J99), (K20-K31) згідно з МКХ-10 було проведено ретроспективне епідеміологічне дослідження. Наукове обґрунтування досліджень у сільській місцевості засноване на таких критеріях: виборі вікової категорії дорослого населення і дітей від 0-14 років до 15-17 років, однорідності соціально-гігієнічних параметрів, типів систем водопостачання. Дослідження захворюваності було проведено за даними звітів департаменту охорони здоров'я протягом 2008-2016 років. Основними чинниками, що впливають на формування громадського здоров'я, є демографічні показники різних вікових категорій, а також показники диспансерного нагляду (складу груп здоров'я, питомої ваги дітей, які часто хворіють) на території дослідного району спостереження. У нашому дослідженні ми намагалися вивчити ці дві групи медико-соціальних факторів, щоб визначити, в яких умовах відбувається формування здоров'я сільського населення індустріально розвинутого регіону України. Питома вага кількості дітей організованих колективів, які часто хворіють, на території Кам'янсько-Дніпровського району за період спостереження (2008-2016 роки) збільшувалась: від 53,3% у 2008 році до 68,2% у 2016 році, що свідчить про негативну тенденцію до збільшення числа дітей, які хворіли протягом 1 року більше ніж 4 рази, і низький рівень опору організму проти гострих вірусних інфекцій.

During the last ten years in Ukraine demographic situation deteriorated against a background of negative trends in population genetic processes [1, 2, 3, 7]. The number of patients in the Ukrainian population increased by 25%, total population decreased by 4 million people. Noninfectious, including oncological morbidity rate in the population increases annually by 2.6-3% [4]. In this regard, the national hygienic problem today is to assess economic losses due to the deterioration of public health among adults and children. It is caused by influence of biomedical factors and influence of negative environmental factors [5, 6, 8].

Kamensko-Dniprovskiy rural district is located in the western part of Zaporizhzhia region and borders with Dnipropetrovsk region in the north and Kherison region in the west. In the south it borders with Velyka Bilozerka rural district, in the east - with Vasilevskiy district of Zaporizhzhia region. The given region covers total area of 1.23 thousand km², this makes up 6.2% from the total area of Zaporizhzhia region. Area in the region is characterized by torrid summer, mild winter with frequent thaws. The largest quantity of precipitation (267 mm) falls in April and October. Population of the district is 41 800 people, including 13 800 people – urban population, 28 000 people – rural population. In the age structure of population, age groups over 50 years old dominate, this is 50.7% of total adult population. A tendency to the population aging is observed.

Kamensko-Dniprovskiy district consists of 17 administrative entities, including 16 villages. In this rural district numerous small villages dominate, with population less than 2 000 people in 10 villages. Administrative-territorial structure includes Kamensko-Dniprovskiy city council and 8 rural councils which control 16 villages.

In Kamensko-Dniprovskiy district there is a tendency to development of agricultural production. Area of landfill soils covers 63 200 hectares. There are 7 animal breeding complexes, including 1 dairy farm. About 38.2% of residents (total of 1 831 people) are employed in agriculture production.

Organization of drinking water supply is centralized and carried out from individual mine or tubular wells. The district is covered with centralized water supply by 60%. Centralized water sources is underground aquifer on the depth 26 m or more.

Purpose of the retrospective epidemiological research performed by the cohort method is to study the level of public health among children and adults living in the rural industrial area of the Zaporizhzhia region.

MATERIALS AND METHODS OF RESEARCH

Analysis of morbidity rate by main classes of diseases in accordance with International Clas-

sification of Diseases-10 was carried out among adult and children population in Kamensko-Dniprovskiy rural district for the period from 2008 to 2016 years. There were used data of statistical reports of the regional information center of Department of Public Health in Zaporizhzhia region for 2008-2016 years. Generally, 450 cases of morbidity rate among adult population were investigated as well as 550 indicators of morbidity rate among children population in Kamensko-Dniprovskiy district (statistical report Form N 12).

The experienced district includes 17 administrative centers, including 16 rural settlements. In the Kamensko-Dniprovskiy district, small villages with a population less than 2 000 people predominate. There are about 10 settlements in total. To assess the health status of the child population in the experimental (Kamensko-Dniprovskiy) district, an analysis on the prevalence of diseases and morbidity was made, classified by the individual nosological groups, according to ICD-10. In the rural area it was stratified by age composition, choice of which was based on the uniformity of social and hygienic parameters, types of water supply systems (mainly decentralized and imported drinking water), level of health care system in rural dispensaries. The rural population is provided with drinking water through centralized water supply and with individual mine or tubular wells [16]. Average annual indicators of drinking water quality were monitored in accordance with DSanPiN 2.2.4-171-10 "Hygienic requirements for drinking water intended for human consumption" [9, 10].

Epidemiological method was the basis of the study [11, 12]. Based on the data from official statistical reports [13, 14, 15, 17], the database focused on the health status of children and adults was created. Statistical grouping and development of materials on the prevalence of diseases among rural population was conducted in accordance with the "International Statistical Classification of Diseases and Related Health Problems" (ICD-10) [18]. Statistical analysis and analysis results was carried out using medical-statistical methods [19, 20, 21, 22]. The formation and editing of the original database was carried out on the personal computer "Pentium 5 Intel PC", Windows XP Professional environment (product number 42310-789-55779002-675209). All statistical processing was performed using STATISTICA 10.0 portable.

RESULTS AND DISCUSSION

In a structure of morbidity rate in Kamensko-Dniprovskiy district infectious and parasitic diseases rank first. Morbidity rate in this class of diseases among all age groups of population in the region is

characterized by the tendency to increase from 56490.12 to 622262.63 cases per 100 000 population in 2008-2011 to 622573.23 to 651257.33) cases per 100 000 population in 2012-2016 years; 25%; 75% confidence interval (CI) was (54025.03; 651257.33)‰. However, average annual indicator of infectious and parasitic diseases was on the level of 58232.04 cases per 100 000 of population in the district and 57957.58 cases per 100 000 of population in Zaporizhzhia region. Growth rates were respectively 7.0 – in the district and 0.9 – in the

region. The highest level of this class of diseases was observed in 2011, being 1.07 times higher as compared with the level of average annual indicator for the district and region. In children aged 0-14 years old 25%; 75% CI for the given class of diseases was on the level of 116032.1; 135127.1‰ – from 125927.06 to 134843.1 cases per 100 000 of population in 2008-2011 from 134856.07 to 135127.1 cases per 100 000 of population in 2012-2016 respectively (Fig. 1).

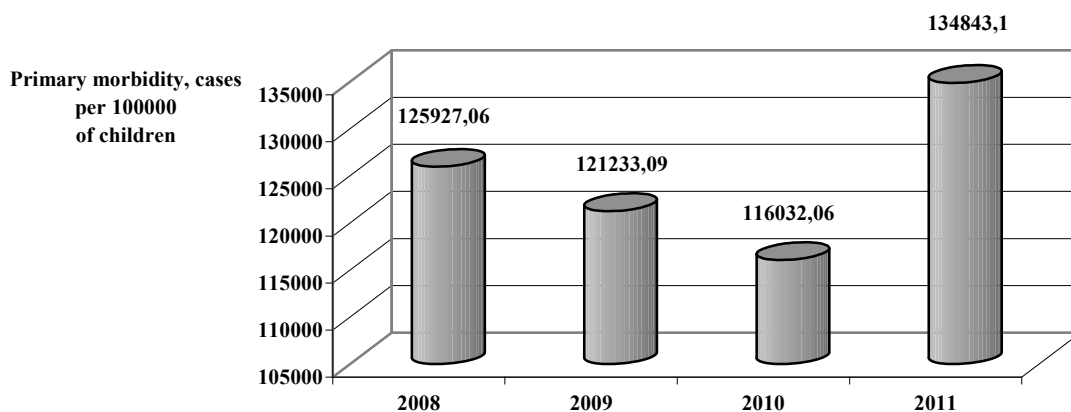


Fig. 1. Tendency of infectious and non-infectious diseases morbidity among children aged 0 - 14 years in Kamensko-Dniprovskiy rural district for 2008-2011

Second rank place in the structure of morbidity belongs to the non-infectious diseases, characterized by the tendency to increase during 3-year period of observation, respectively from 54135.58 to 59901.11 cases per 100 000 of population in 2008-2011 to (59936.37 to 60104.21) cases per 100 000 of population in 2012-2016, which exceeds level of average annual indicator by 1.03-1.07 times both in the district and region. Growth rate of this index for the period of 2008-2011 years is 7.0% in the district and 0.8% in the region. Fig. 2 shows morbidity rate of non-infectious diseases among children aged 0-14 years with (25%; 75%) CI (110266.7; 150133.63)‰: from (118174.86 to 125954.55) cases per 100 000 of population in 2008-2011 to (132755.12 to 150133.63) cases per 100 000 of population in 2012-2016.

Third rank position belongs to respiratory diseases, influenza and SARS. Incidence by this class of diseases by average annual indicator was on the level of 24560.88 cases per 100 000 of population in the district and 26787.54 cases per 100 000 of population in the region in 2008-2011 to 25126.01 cases per 100 000 population in the district and 30542.07 cases per 100 000 population in the

region in 2012-2016 years. The highest growth rate of morbidity rate in all population of Kamensko-Dniprovskiy district was 12.2%, in the Zaporozhzhia region – 2% with (25%; 75%) CI (22815.63; 30542.07)‰.

Analysis of level of morbidity among population shows growth rate of oncological diseases, diseases of the nervous system and sensory organs, with growth rates in the district being 32.3%, while in the region – 8.7 and 2.1% in 2008-2016 years.

Great decrease in morbidity among population with negative growth rates was observed in the district by the following classes of diseases: blood and blood-forming organs - growth rate being 6.4%, diseases of the endocrine system -22.1%, diabetes - 19.1%, psychiatric disorders -11.9%, myopia - 11.5%, cardiovascular diseases -7.0%, hypertension -17.4%, coronary artery disease -27.1%, gastritis and duodenitis -34.6%, diseases of the skin and subcutaneous tissue -34.2%, diseases of locomotor system -7.4%. There was a moderate decrease of asthma morbidity -2.2%, diseases of digestive system – 4.4% in the rural district during 2008-2016 years.

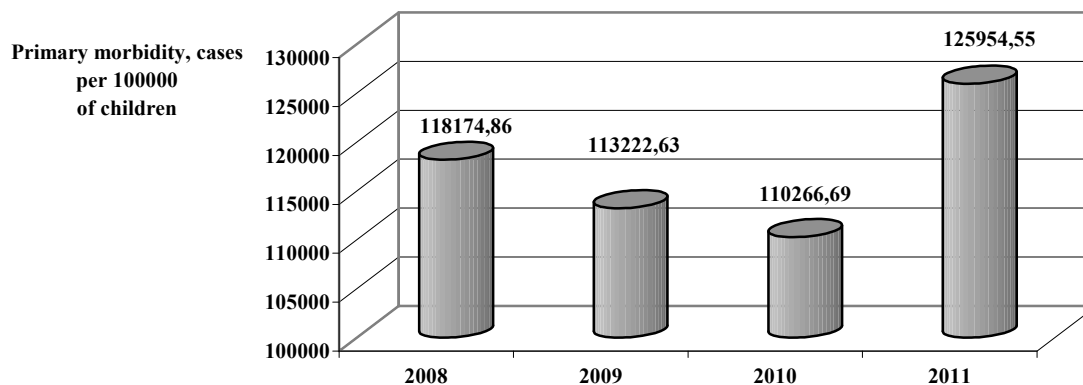


Fig. 2. Dynamics of non-infectious diseases morbidity among children aged 0 -14 years in Kamensko-Dniprovskiy rural district for 2008-2011

Among the categories of children and adults living in the territory of Kamensko-Dniprovskiy region there were revealed the highest rates of positive growth in the incidence of infectious and parasitic diseases (growth rate – 7.0%), non-infectious diseases (7%) neoplasms (32.3%), malignant neoplasms (6.8%), diseases of the nervous system and sensory organs (32.3%), respiratory diseases, influenza and acute respiratory diseases (12.2%), injury and poisoning (7.7%) and a moderate increase in the incidence of gastric and duodenal ulcers (1.1%) for 2008-2016.

A positive dynamic tendency to a pronounced increase in morbidity among children aged 0-14 years by long-term annual average indicator both in the district and the region as for infectious and non-infectious diseases (growth rates respectively 8.3 and 3.0%), non-infectious diseases (7.7 and 2.7%), infectious and parasitic diseases (16.9 and 6.8%), cancer (66.1 and 11.5%), malignant neoplasms (21.7

and 11.4%), diseases of the nervous system and sensory organs (51.9 and 10.6%), respiratory diseases, influenza and SARS (12.5 and 3.1%) was established. Stabilization was registered by the incidence of asthma among children aged 0-14 years, with growth rates of 0.5% in the district and 14.5% – in the region.

The highest incidence among children in this class of disease was observed in 2010 and amounted to 107.91 cases per 100 000 of population, being 1.7 times higher than the figure for average annual level in the area and by 1.4 times respectively in the region.

In the (Fig. 3) incidence of asthma among children aged 0 to 14 years in Kamensko-Dniprovskiy district is presented, (25%; 75%) CI varies on the level of 15.26; 107.91‰ – from 15.26 to 61.83 cases per 100 000 of population in 2008-2011 to 62.35 to 65.87 cases per 100 000 of population in 2012-2016.

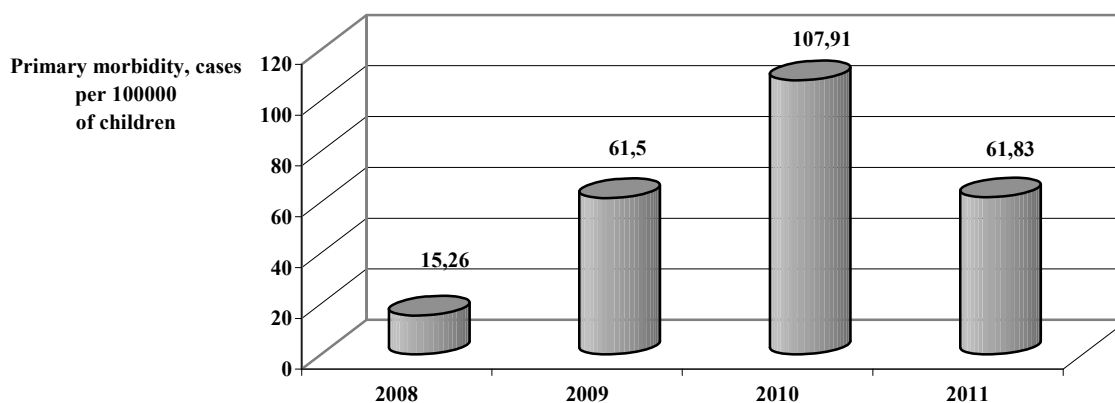


Fig. 3. Tendency of asthma incidence among children aged 0 - 14 years in Kamensko-Dniprovskiy district for 2008-2011

Dynamic tendency with a marked decrease in the incidence rate was registered among children aged 0-14 years in such classes of diseases as diseases of blood and blood-forming organs (negative growth rate -8.0%, diseases of the endocrine system -12.5%, myopia -21.8%, cardiovascular diseases -20.9%, diseases of the digestive system -5.6%, gastritis and duodenitis and diseases of the skin and subcutaneous tissue -32.1%, diseases of locomotor system -19.6%.

Analysis of morbidity rate among adults and adolescents aged 15-17 years shows that infectious and non-infectious diseases rank first. Tendency in the incidence of this class demonstrates the pronounced growth of intensive indices from the level of 44210.82 in 2008 to 49021.05 cases per 100 000 of population in 2011, with a positive growth rate of 6% in the district and a negative growth rate of 0.5% in the area to 50016.23 cases per 100 000 of population in 2012 and 51120.05 cases per 100 000 population in 2016.

(25%; 75%) CI is demonstrated on the following values (42757.5; 51120.05)%₀. Non-communicable diseases occupy the second place in the structure of morbidity among adults and adolescents and are characterized by dynamic growth by 6.4% in the area from 42821.97 to 47828.79 cases per 100 000 of population for the period of study (2008-2011) to 48034.01 and 52022.01 cases per 100 000 of population in 2012-2016 years with its corresponding (25%; 75%) CI levels (41889.13; 52022.01)%₀.

The third place in the rank structure of morbidity rate among adults and adolescents belongs to respi-

ratory diseases, influenza and SARS. Morbidity rate of adults and young adults in this class of diseases is characterized by the growth dynamics of 11.2%. Average annual incidence rate of respiratory diseases, influenza and SARS was 13724.38 cases per 100 000 of population in the area and 15,650.94 cases per 100 000 of population in the region in 2008-2011 and respectively 14834.05 cases per 100 000 population in the area and 16735.34 cases per 100 000 population in the region in 2012-2016 years; (25%; 75%) CI levels are (12644.61; 16735.34)%₀.

Analysis of data on morbidity among adults and adolescents showed marked growth over the period from 2008 to 2011 in the class of diseases of the nervous system and sensory organs (26.9%), neoplasms (30.5%), injuries and poisonings (9.1%), as well as infectious and non-infectious diseases (6.0%), non-infectious diseases (6.4%), respiratory diseases, influenza and acute respiratory diseases (11.2%).

Dynamic tendencies with a marked decrease in morbidity among adults and adolescents were registered in such classes of diseases as infectious and parasitic diseases (growth rate -8.0%), diseases of endocrine system (-24.0%), diabetes (-18.9%), psychiatric disorders (-14.5%), myopia (-9.1%), cardiovascular diseases (-6.6%), including hypertension (-17.4%), coronary disease (-27.1%), gastritis and duodenitis (-36.7%), skin and subcutaneous tissues (-35.7%), diseases of the locomotor system (-6.6%). (Fig. 4-7).

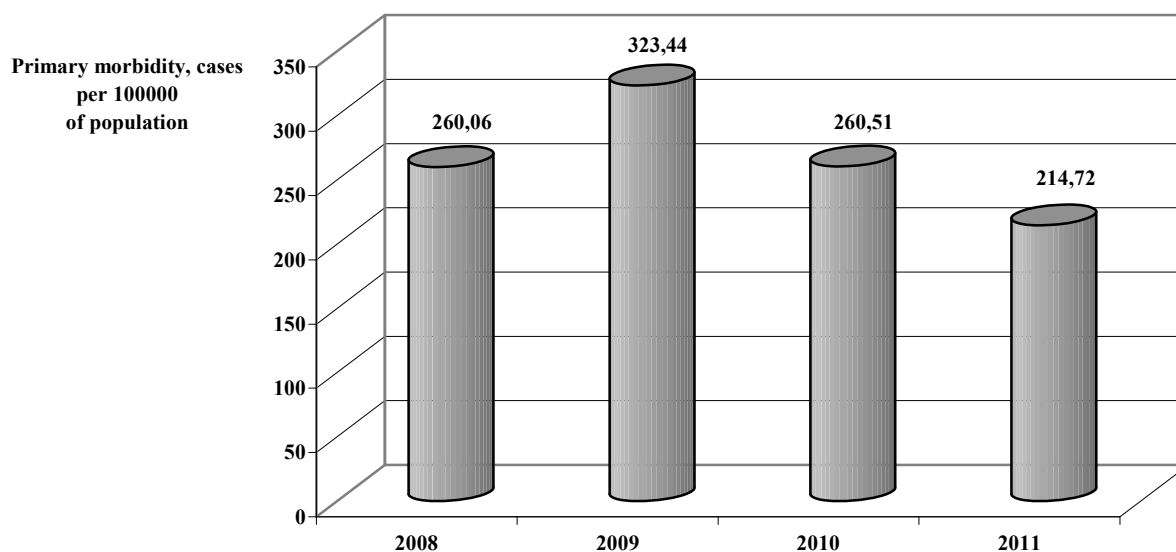


Fig. 4. Tendency of diabetes incidence in the adult and child population aged 15-17 years in Kamensko-Dniproviskyi district for 2008-2011

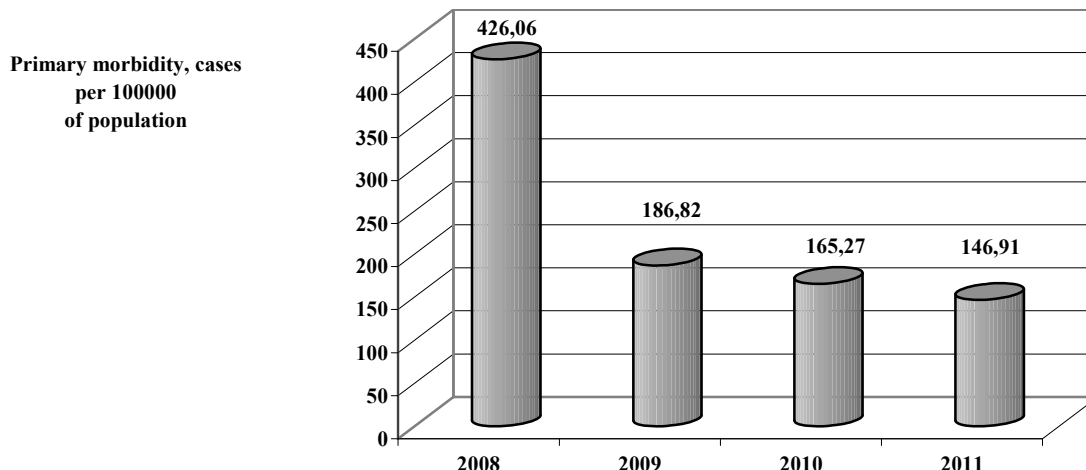


Fig. 5. Tendency of gastritis and duodenitis incidence in adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

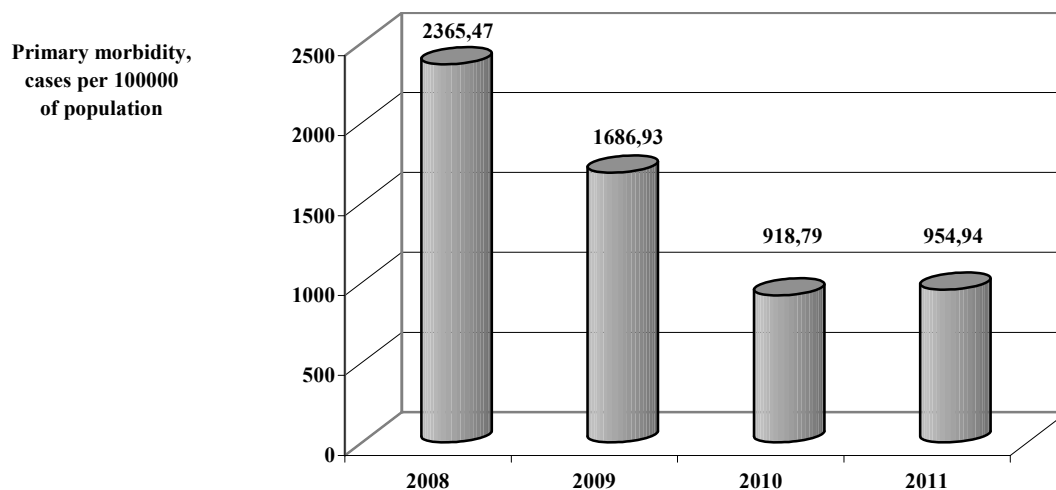


Fig. 6. Tendency of skin and subcutaneous tissue diseases incidence in the adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

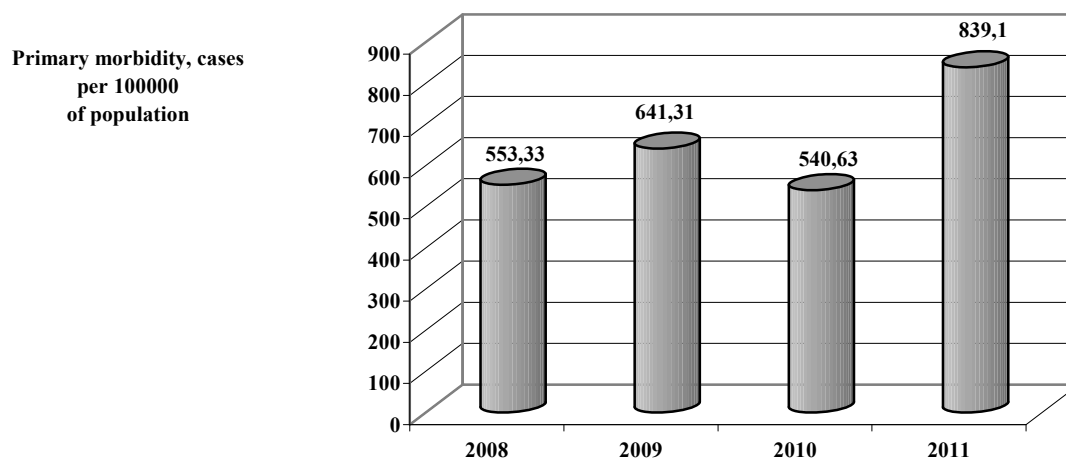


Fig. 7. Tendency of tumors incidence in the adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

Analysis of prevalence of diseases among adult and child population in Kamensko-Dniprovskyi region showed that the first place is occupied by infectious and non-infectious diseases, the second - non-infectious diseases, the third place - diseases of the circulatory system. The tendency of increasing levels of indicator in dynamics for 2008-2016 in these types of diseases is revealed. The prevalence of infectious and non-infectious diseases in the general population tends to increase from 145885.40 to 151652.97 cases per 100 000 of population, with a growth rate in the region by 3.6%. However, prevalence of diseases of this class was from 146390.14 cases per 100 000 of population in the area and 146412.63 cases per 100 000 of population in the region in 2008-2011 to 148352.02 cases per 100 000 of population in the area and 155375 cases per 100 000 population in the region; (25%; 75%) CI levels are respectively (140970.9; 155375)_‰.

Adverse dynamic tendencies with a marked growth rate were registered also in the following classes of diseases: infectious and parasitic diseases (growth rate 5.8%), diseases of the endocrine system (7.5%), diabetes (8.9%), diseases of the nervous system and sensory organs (15.4%), cardiovascular diseases (5.8%), including coronary heart disease (13.0%), injury and poisoning (8.2%). Prevalence of hypertension was stable both in the area (annual growth rate of 1.0%) and the region (1.5%) in 2008-2016.

It was revealed a tendency to a significant decrease in prevalence of malignancies in the area on average (growth rate -10.0%), diseases of the blood and blood-forming organs (-11.4%), myopia (-29.0%), asthma (-13.4%), gastritis and duodenitis (-13.2%) diseases of the skin and subcutaneous tissue (-30.9%), congenital anomalies (-6.4%) in 2008-2016.

In the structure of prevalence of diseases among children aged 0-14 years, infectious and non-infectious diseases occupy the first rank place. The incidence of this class of diseases among children in the district has a tendency to increase from 168823.44 to 173071.57 cases per 100 000 of children in 2008-2011 to 175056.33-180226.75 cases per 100 000 of children in 2012-2016 years with (25%; 75%) CI (154216.1; 180226.75)_‰.

Prevalence of this class of diseases was from 164360.13 cases per 100 000 children in the area and 170357.35 cases per 100 000 of children in the region in 2008-2011 years to 173560.22 cases per 100 000 of children in the area and 175237.05 cases per 100 000 children in the region in 2012-2016.

The highest prevalence of this class of diseases was observed in 2011, but it was 1.05 times lower than average annual level in the district, and 1.01 times lower than in the region: (25%; 75%) CI varied from (154216.1 to 175237.05)_‰ (Fig. 8).

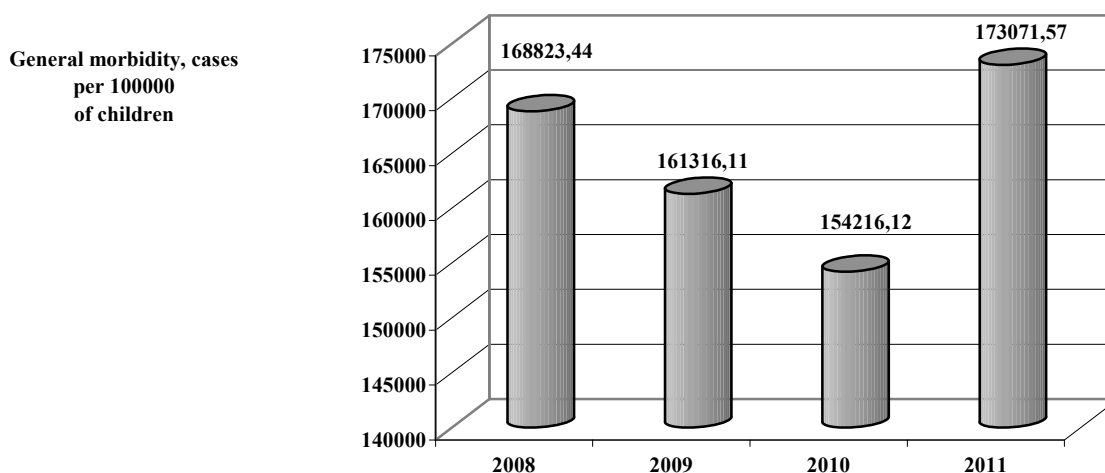


Fig. 8. Tendency of infectious and non-infectious diseases incidence among children aged 0 - 14 years in Kamensko-Dniprovskyi district for 2008-2011

The second rank in the structure of disease prevalence in children aged 0-14 is occupied by non-communicable diseases, which is also characterized by a tendency to increase during 2008-2011 period from 154845.11 to 156299.27 cases per 100 000

children on average annual rate in 2011 to 1.04 times to 157372.22-160263.07 cases per 100 000 children in 2012-2016 years – its (25%; 75%) CI was shown on the next levels (141143.8; 160263.07)_‰ (Fig. 9).

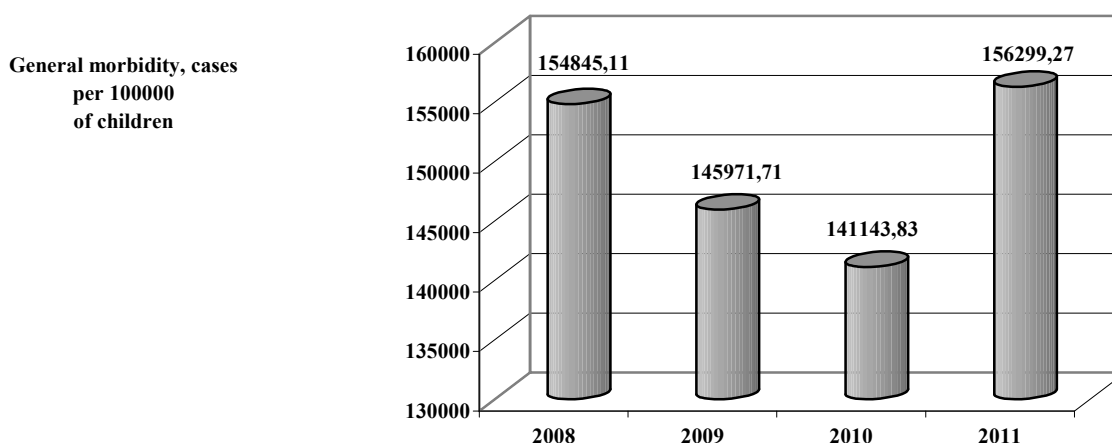


Fig. 9. Tendency of non-communicable diseases incidence among children aged 0 to 14 years in Kamensko-Dniproviskyi district for 2008-2011

The third rank position is occupied by respiratory diseases, influenza and SARS. Prevalence in this class of diseases in children aged 0 - 14 years by average annual level is from 87260.22 cases per 100 000 of children in the district and 104638.46 cases per 100 000 of children in the region in 2008-2011 to 95124.87 cases per 100 000 children in the district and 106027.23 cases per 100 000 children in the region in 2012-2016. There is the following (25%; 75%) CI (81408.97; 106027.23)%₀.

Adverse dynamic tendency with a marked growth rate in the district was recorded in the following classes of diseases, both infectious and non-communicable (growth rate of 5.3%), infectious and

parasitic diseases (13.4%), cancer (6.9%), malignant neoplasms (116.5%), diabetes (14.9%), diseases of the nervous system and sensory organs (9.7%), myopia (10.9%), respiratory diseases, influenza and acute respiratory diseases (12.2%) in 2008-2016.

There was registered a tendency to decline in the prevalence of blood diseases and blood-forming organs (negative growth rate of in the district - 18.2%), diseases of the endocrine system (-22.6%), cardiovascular diseases (-12.0%), diseases of the digestive system (-17.9%), including gastric and duodenal ulcer (growth rate -76.3%), gastritis and duodenitis (-37.2%), diseases of the skin and subcutaneous tissue (-30.6%) in 2008-2016 (Fig. 10-12).

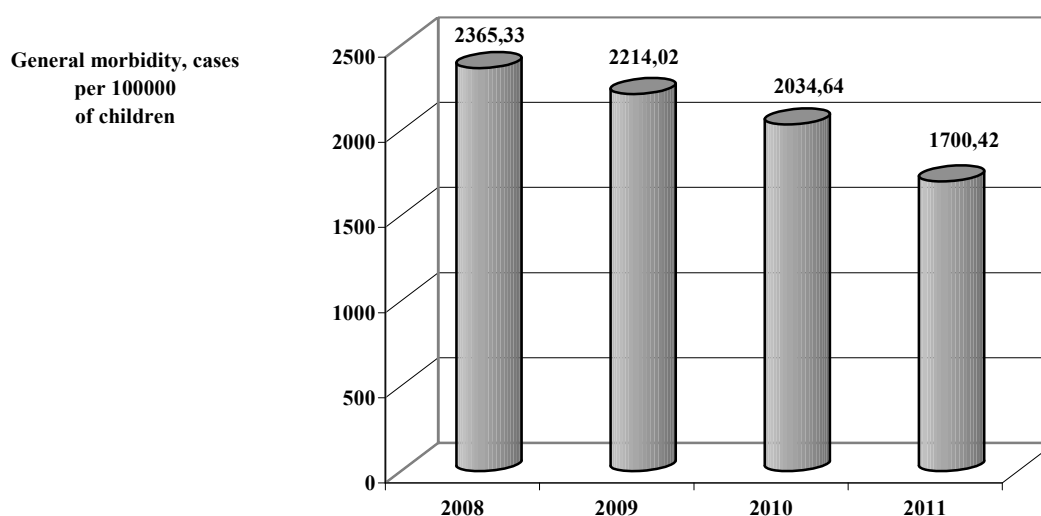


Fig. 10. Tendency of blood diseases and blood-forming organs incidence among children aged 0 - 14 years in Kamensko-Dniproviskyi district for 2008-2011

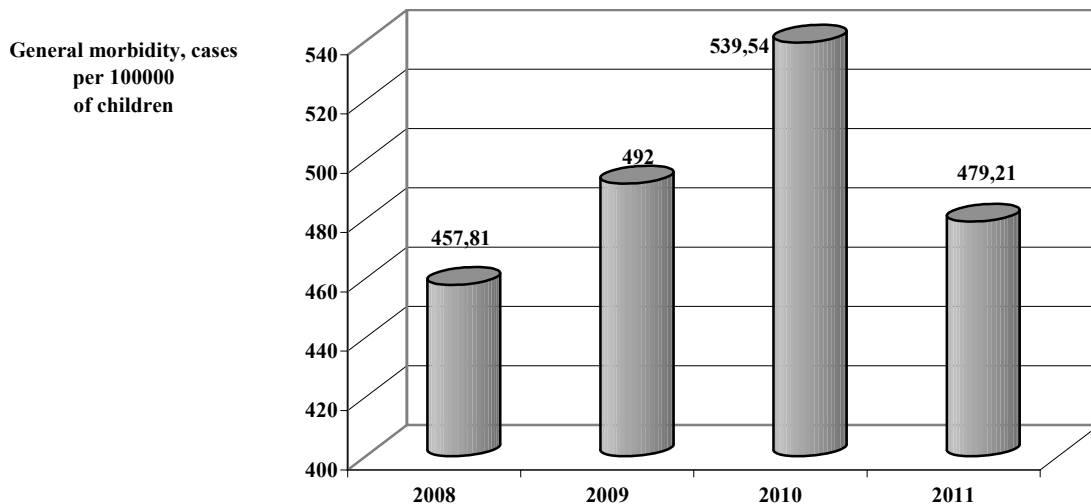


Fig. 11. Tendency of bronchial asthma prevalence among children aged 0 - 14 years in Kamensko-Dniproviskyi district for 2008-2011

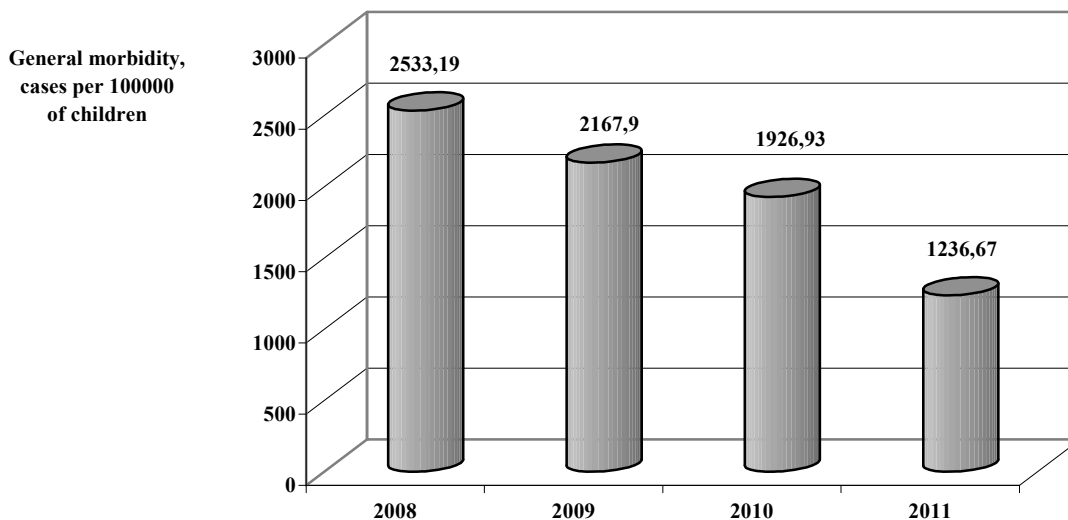


Fig. 12. Tendency of gastritis and duodenitis prevalence among children aged 0 - 14 years in Kamensko-Dniproviskyi district for 2008-2011

Prevalence of diseases by average annual indicator exceeded its level in the district in 2010-2011: from 1.0 to 1.03 times for infectious and non-infectious diseases and non-infectious diseases, from 1.01 to 1.08 times for diseases of the endocrine system, from 1.02 to 1.09 times for diabetes, from 1.1 to 1.2 times for diseases of the nervous system and sensory organs, by 1.05 times in 2011 for cardiovascular diseases, by 1.13 times in 2011 for coronary heart disease, from 1.04 to 1.06 times for respiratory diseases, flu and SARS, from 1.05 to 1.09 times for injuries and poisonings.

Dynamic of levels of prevalence of diseases among adults and adolescents aged 15-17 years demonstrates a marked decrease in these indicators with negative growth rates in class of blood diseases and blood-forming organs (-6.3%), malignant neoplasms (-10.6%), myopia (-41.3%), asthma (-15.0%), gastritis and duodenitis (-10.5%), skin and subcutaneous tissue diseases (-31.4%), congenital abnormalities of development (-14.6%) in 2008-2016 (Fig. 13, 14).

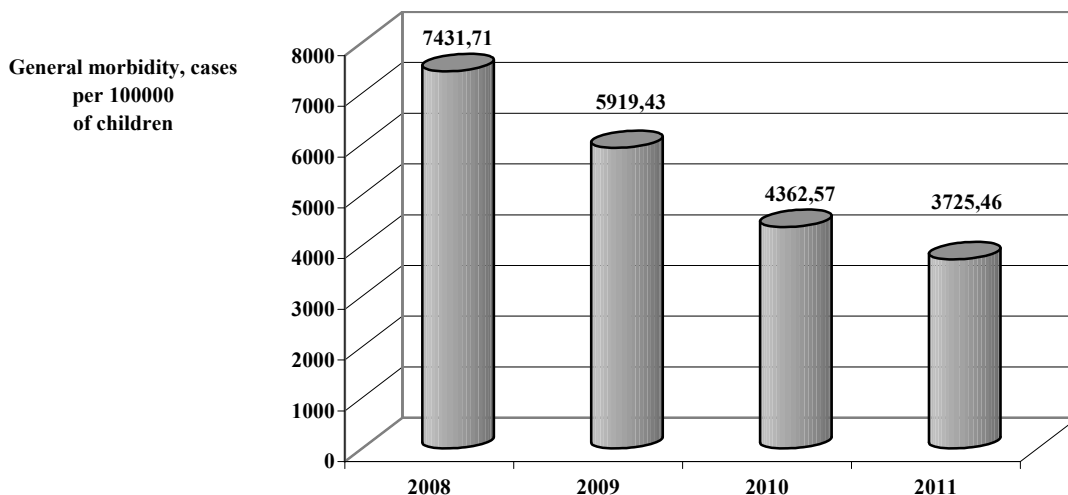


Fig. 13. Tendency of skin and subcutaneous tissue diseases prevalence among children aged 0 - 14 years in Kamensko-Dniprovskiyi district for 2008-2011

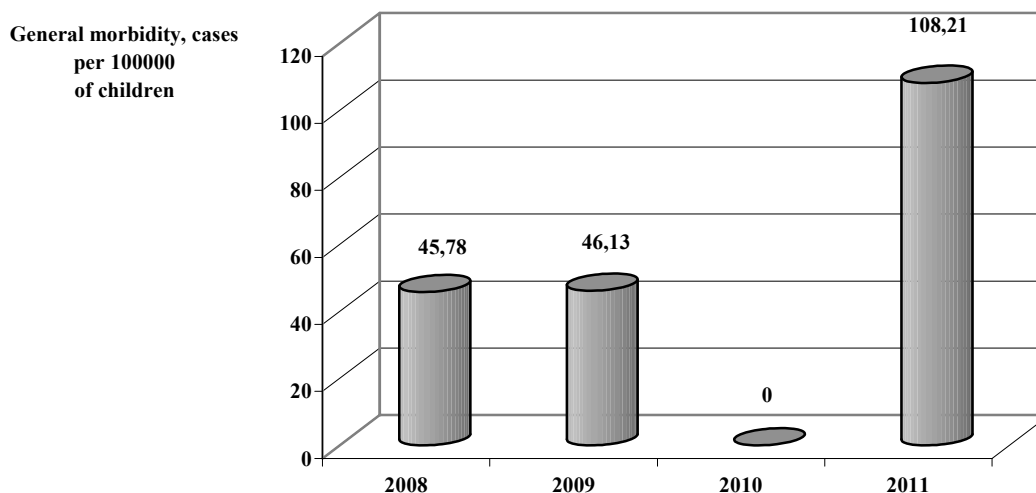


Fig. 14. Tendency of malignancies prevalence among children aged 0 - 14 years in Kamensko-Dniprovskiyi district for 2008-2011

Long-term data on prevalence of main types of diseases among children and adult categories of the population aged 15 to 17 years are presented in (Fig. 15-21).

The main factors which influence the formation of public health are demographic indicators of different age groups, as well as indicators of dispensary supervision (the composition of health groups, the proportion of frequently ill children) in the territory of experimental observation area. In our study we tried to study these two groups of medical

and social factors in order to understand the conditions under which health of the rural population in this industrially developed region of Ukraine forms.

According to the results of our research it was established that in 2008-2011 total population rate in the Kamensko-Dniprovskiyi district decreased from 52279 cases per 1000 of population in 2008 to 50178 cases per 1000 of population in 2011. The rate of decrease in the given district was 5% (Table 1, 2).

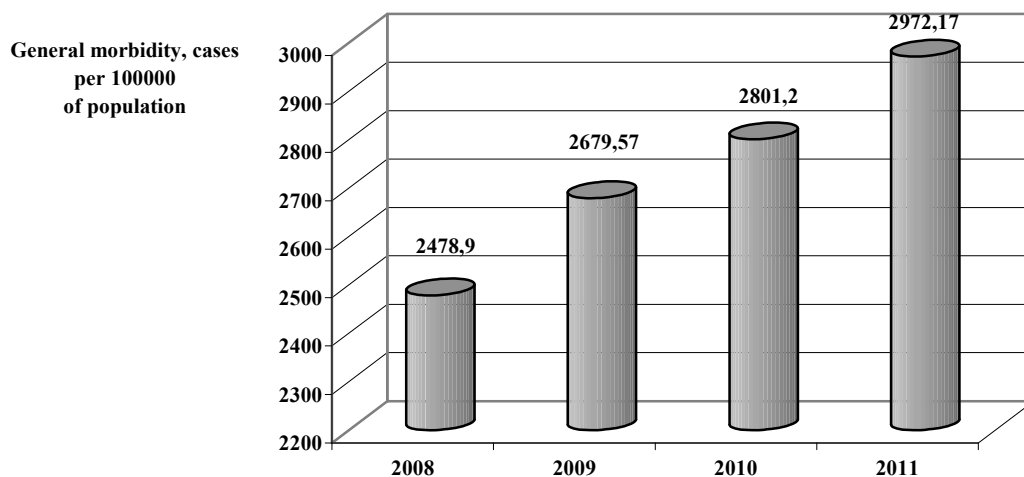


Fig. 15. Tendency of diabetes incidence in the adult and child population aged 15-17 years in Kamensko-Dniproviskyi district for 2008-2011

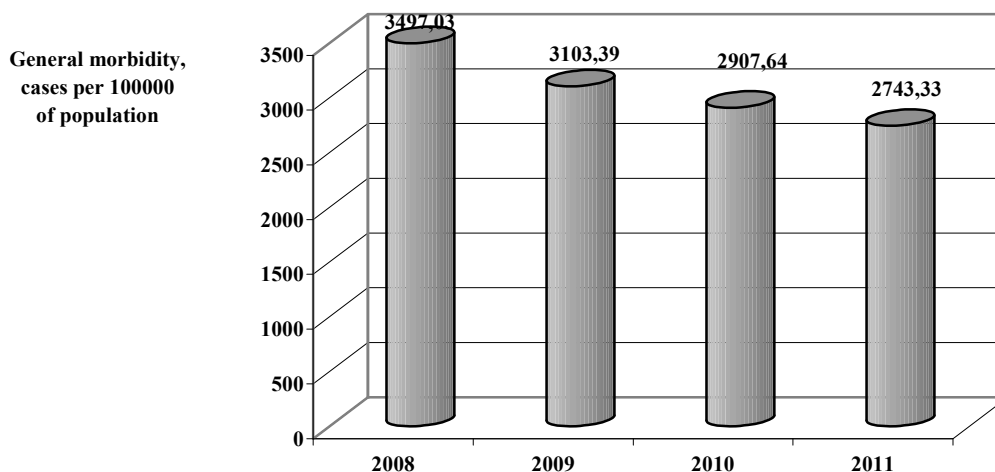


Fig. 16. Tendency of gastritis and duodenitis incidence in the adult and child population aged 15-17 years in Kamensko-Dniproviskyi district for 2008-2011

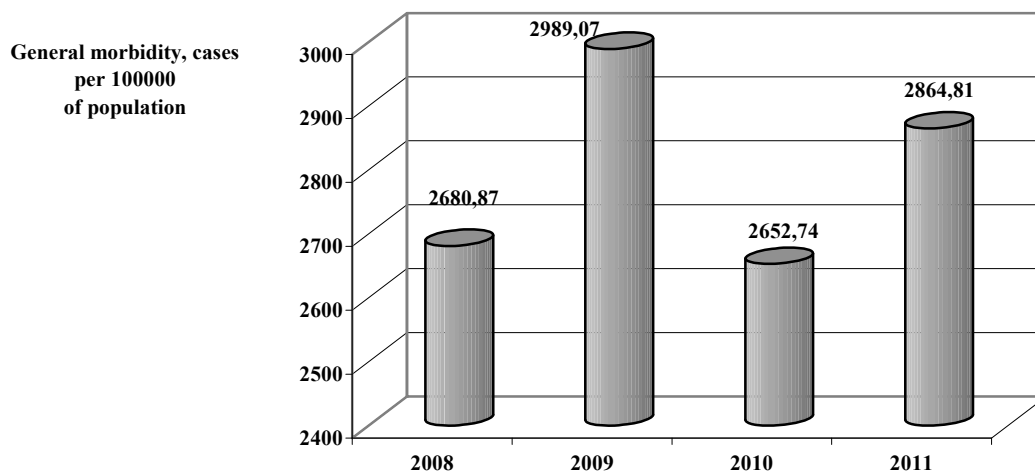


Fig. 17. Tendency of malignancies incidence in the adult and child population aged 15-17 years in Kamensko-Dniproviskyi district for 2008-2011

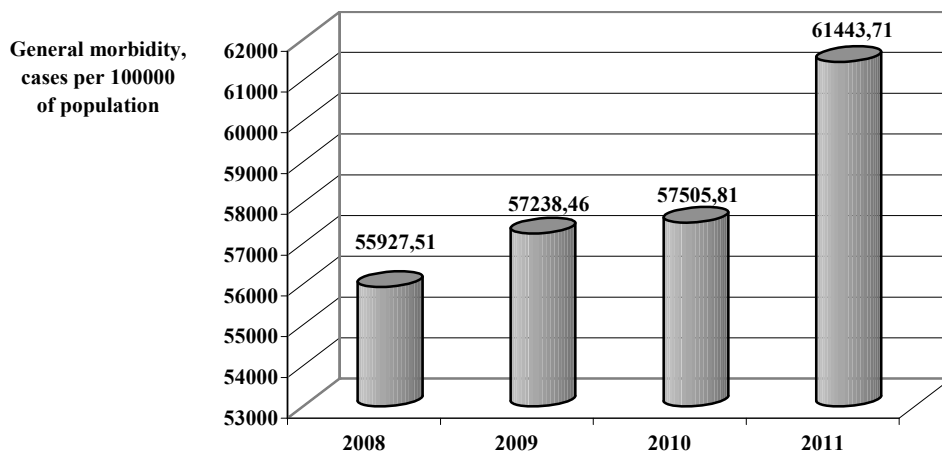


Fig. 18. Tendency of cardiovascular diseases incidence in the adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

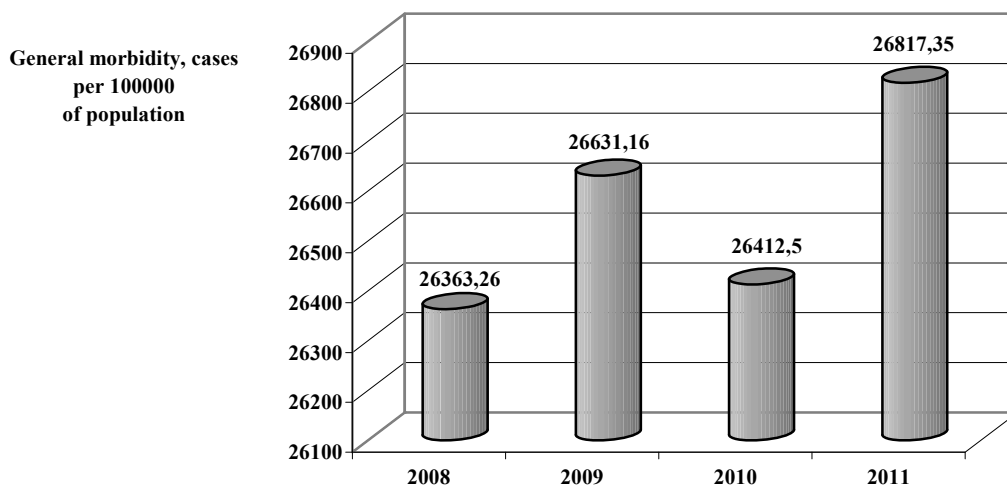


Fig. 19. Tendency of prevalence of respiratory diseases, influenza and acute respiratory diseases in the adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

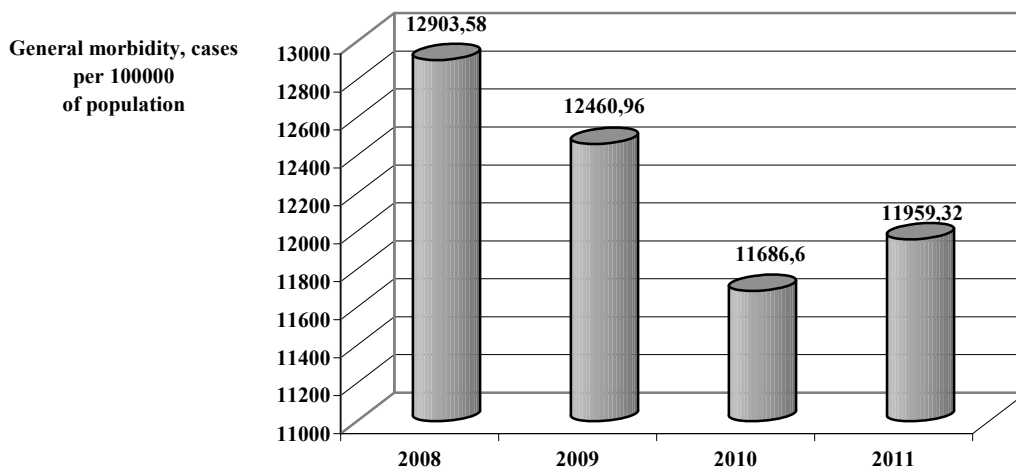


Fig. 20. Tendency of digestive diseases incidence in the adult and child population aged 15-17 years in Kamensko-Dniprovskiy district for 2008-2011

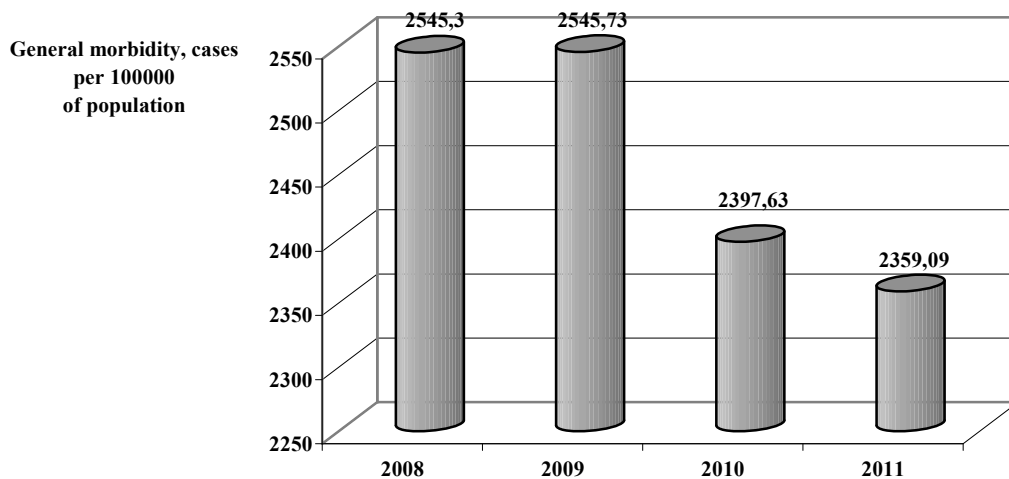


Fig. 21. Tendency of gastric and duodenum ulcers incidence in the adult and child population aged 15-17 years in Kamensko-Dniproviskiy district for 2008-2011

According to our data, number of children referred to the I group of health during 2008-2016 decreased from 50.8 to 40.3%, while the number of children from controlled groups in II (33.6-40.7%) and III group of health (15.6-17.5)% increased, which testifies to a negative tendency towards decrease in proportion of healthy children and increase in the proportion of children with functional disorders of organs and systems (II group of health) and chronic diseases in the compensation stage (III group of health). The percent of frequently ill children of organized groups in the Kamensko-Dniproviskiy rural district during observation period

(2008-2016 years) increased: from 53.3% in 2008 to 68.2% in 2016, which also testifies to a negative tendency to increase in the rate of children who were ill more than 4 times during 1 year, and the low resistance of the body to acute viral infections.

Demographic situation in the Kamensko-Dniproviskiy rural district is critical as in recent years the overall mortality rate has increased from 16.9 to 18.5 cases per 1000 of population and child rate mortality rate has increased from 1.3 to 1.6 cases per 1000 of population. At the same time, the fertility rate in recent years also increased from 6.6 to 11.3 cases per 1000 of population (table 3).

Table 1

Child and adolescent population by age category

Contingent	2008	Percent	2009	Percent	2010	Percent	2011
Total population	52279	4%	50722	0.9%	50272	0.2%	50178
Children total	9703	1.5%	9554	2.6%	9310	1.2%	9192
0 -6 years	3478	2.4%	3394	2.7%	3304	1.6%	3249
Controlled groups of children	1105	8%	1023	0.5%	1018	0.4%	1014
7 - 14 years	4608	5.3%	4376	2.4%	4273	0.2%	4281
Schoolchildren	5897	4.5%	5644	3%	5477	4.6%	5234
0 -14 years	8086	4%	7770	2.5%	7576	0.6%	7530
15 -17 years	1817	1.8%	1784	2.7%	1734	6.9%	1622

Table 2

Demographic indicators of child population

Child contingent	2008	Percent	2009	Percent	2010	Percent	2011
Total population	52279	4%	50722	0.9%	50272	0.2%	50178
Children total	9703	1.5%	9554	2.6%	9310	1.2%	9192

Thus, a detailed analysis of health indicator of the rural population of the Kamensko-Dniprovskyi district has allowed us to identify a whole range of medical and social factors that contribute to the deterioration of health, primary in the most sensitive category, such as a child population living in the ecologically burdensome region of Ukraine – Zaporozhzhia region.

Prospect of further research: systematic study of child health in each controlled group of children, organization of in-depth medical examinations, control over institutions with the maximum use of methods of instrumental and laboratory research, scientific research of environmental factors which have a negative impact on the population health.

Table 3

Characteristics of demographic indicators among child population of Kamensko-Dniprovskyi district for 2008-2011

Indicator	2008	2009	2010	2011
Birth rate (per 1000 of population)	6.6	6.7	8.9	11.3
Total mortality rate (per 1000 of population)	16.9	17.8	18.2	18.5
Natural increase	-9.4	-9.8	-10.1	-11.2
Child rate mortality (per 1000 population)	1.3	1.5	0.8	1.6
Child population (per 1000 of population)	15.0	15.2	15.1	15.1

CONCLUSIONS

1. It is established that in the structure of primary and general morbidity among adults and children aged 0-14 and 15-17 years in Kamensko-Dniprovskyi region diseases of (I, IV, VI, IX, X, XI, XII, XIII) classes by ICD-10 rank the first during 2008-2016 years.

2. It is proved that in morbidity rate among adults and children categories of population in Kamensko-Dniprovskyi region for the period from 2008 to 2016 infectious and parasitic diseases rank first with a tendency to increase from 56490.12 to 651257.33 cases per 100 000 of people; 25%; 75% CI was (54025.03; 651257.33)‰. Average annual incidence rate for this class (I class) was on the level of 58232.04 cases per 100 000 of population in the district and 57957.58 cases per 100 000 of population in the region. The rate of positive growth for

the I class of disease is 7.0 in Kamensko-Dniprovskyi district and 0.9 – in Zaporizhzhia region.

3. A pronounced decrease in morbidity rate among adult and children population of the region with negative growth rates in the district during 2008-2016 years by classes of diseases according to ICD-X: III (growth rate – 6.4%), IV (growth rate – 22.1%), V (-11.9%), VII (-11.5%), IX (-7.0%), XII (-34.2%), XIII (-7.4%), including hypertension (-17.4%), coronary artery disease (-27.1%), gastritis and duodenitis (-34.6%) should be taken into account. There was a decline in the incidence of asthma (-2.2%) and diseases of III class (-4.4%) in the district.

4. Among the category of children aged 0-14 years in Kamensko-Dniprovskyi area there were defined unfavourable dynamic tendencies with a marked prevalence of diseases in the following classes:

I (growth rate 13.4%), II (6.9%), VI (9.7%), VII (10.9%), X (12.2%), including infectious and non-infectious diseases (5.3%), malignant neoplasms (16.5%), diabetes (14.9%). During 2008-2016 there was registered a tendency to pronounced decrease in total morbidity rate of III class of diseases (rate of negative growth in the district -18.2%), IV class (-22.6%), IX class (-12.0%), XI (-17.9%), XII class (-30.6%), including gastric and duodenal ulcer (growth rate -76.3%), gastritis and duodenitis (growth rate -37.2%).

5. Non-infectious diseases occupy the second rank in the structure of morbidity among adolescents (15-17 years) in the rural areas and are characterized by growth in dynamic by 6.4% in the area from 42821.97-47828.79 cases per 100 000 of population in 2008-2011 to 48034.01-52022.01 cases per 100 000 of population in 2012-2016 with corresponding (25%; 75%) CI levels (41889.13; 52022.01)‰. There is a general stabilization of total morbidity

rate among adolescents with hypertension in the area (annual growth rate is 1.0%) and in the region (1.5%). Pronounced growth of primary and general morbidity levels among category of child population (aged 15-17 years) occurs by the following classes of diseases according to ICD-10 (IV, VI, IX, X, XIX).

6. There was revealed an unfavorable dynamic tendency to increase in proportion of frequently ill children (from 53.3 to 68.2%)‰, as well as a decrease in the number of children from the I group of health (50.8-40.3)% against increase in the number of children from the II (33.6-40.7)% and the III group of health (15.6-17.5)% in 2008-2016, which is probably indicate a low resistance of the child body to acute respiratory viral infections, and increased percent of children with chronic diseases in the compensation stage.

Conflict of interest. The author declares no conflict of interest.

REFERENCES

1. Antomonov MYu. [Mathematical processing and analysis of biomedical data]. Kyiv: Malyi Druk. 2006;558. Russian. Available from: <http://dspace.nbuv.gov.ua/bitstream/handle/.../07-Antomonov.pdf>
2. Antomonov MYu. [Mathematical processing and analysis of biomedical data]. 2-e izd. Kyiv: Medinform. 2018;579. Russian. Available from: <https://www.olx.ua/.../antomonov-m-yu-monografya>
3. Berdnyk OV, Zaikovska VYu. [The feasibility of using different health indicators in assessing environmental impact]. *Hihiena naselenykh mist: zbirnyk naukovykh prats.* 2008;52:417-422. Ukrainian. Available from: www.gigiena-mist.kiev.ua/gnm/60-0346.pdf
4. Moskalenko VF, Hulchii OP, Holubchykov MV, et al. [Biostatistics]. Kyiv: Knyha plus. 2009;124-29. Ukrainian. Available from: http://medterms.com.ua/load/biologija/biostatistika_v_f_moskalenko/4-1-0-66
5. Borovikov V. [Statistica. The art of analyzing data on a computer. For professionals]. Sankt-Peterburg: Piter. 2001;656. Russian. Available from: <http://computersbooks.net/index.php?id1=4...borovikov-v...>
6. Borovikov VP, Borovikov IP. [Statistica: Statistical analysis and data processing in the Windows environment]. Moskva: Filin. 1997;608. Russian. Available from: <https://www.twirpx.com/file/384012/>
7. Buriak LI, Belitckaia EN, Shchudro SA, Grigorenko LV. [Alimentary obesity as hygienic problem]. Dnepropetrovsk: Porogi. 2012;273. Russian.
8. Tymchenko OI, Kartashova SS, Lynchak OV, et al. [The genetic component as a factor in the formation of health Ukraine]. *Ekolohiia dovkillia ta bezpeka zhyt-tediialnosti.* 2005;1:3-8. Ukrainian. Available from: www.gigiena-mist.kiev.ua/gnm/60-0342.pdf
9. [Hygienic requirements for drinking water intended for human consumption: State sanitary norms and rules]. DSanPiN 2.2.4-171-10. 12.05.2010. N 400; 1 July 2010. N 452/17747 [Internet]. Ukrainian. Available from: <http://normativ.ua/types/tdoc19074.php>.
10. [Sources of centralized drinking water supply. Hygienic and environmental requirements for water quality and selection rules: DSTU 4808:2007]. Kyiv: Derzhspozhyvstandart Ukrainy. 2012;27. Ukrainian. Available from: http://online.budstandart.com.ua/catalog/doc-page?id_doc=53159
11. Hrebniak MP, Shchudro SA, Taranov VV, Fedorchenko RA, Hryhorenko LV, et al. [Dietology in terms, schemes, tables, tests]. Textbook. Dnipro: Aktsent PP. 2018;248. Ukrainian.
12. [The experience of implementing the intersectoral program "Health of the Nation" for 2002-2011 years]. Kyiv: Ministerstvo okhorony zdorovia ta Ukrainyskyi instytut stratehichnykh doslidzhen. 2006;375. Ukrainian. Available from: www.uiph.kiev.ua/download/Vidavnictvo/Ukraina.Zdorovja%20nacii/2017-4_1.pdf
13. Lapach SN, Chubenko AV, Babich PN. [Statistical methods in biomedical research using Excel]. Kyiv: Morion. 2001;408. Russian. Available from: <https://www.studmed.ru/lapach-sn-chubenko-av-babich-pn-s>
14. Lynchak OV, Tymchenko OI. [The gene pool and health: focus genetic and demographic processes in terms of depopulation]. Kyiv: Medinform. 2011;265. Ukrainian. Available from: www.health.gov.ua/www.nsf/all/u04-05?opendocument

15. Mykytenko DO, Tymchenko OI. [The equivalent value of human life in terms of economic efficiency of preventive measures]. *Hihiiena naselenykh mist: zbirnyk naukovykh prats.* 2015;67:389-99. Ukrainian. Available from: www.gigiena-mist.kiev.ua/gnm/57-0389.pdf
16. Mykytenko DO, Tymchenko OI, Lynchak OV. [Genetically caused reproductive losses, the economic aspect]. *Hihiiena naselenykh mist: zbirnyk naukovykh prats.* 2012;60:342-46. Ukrainian. Available from: www.gigiena-mist.kiev.ua/site/gnm.nsf/all/arhiv?opendocument
17. [ICD X: International Statistical Classification of Diseases and Problems Related to Health]. *Zheneva: VOZ.* 1995;1(1):698. Russian. Available from: <https://apps.who.int/iris/handle/10665/85973>
18. [Statistical report of Zaporizka oblast for 2008]. *Holovne upravlinnia statystyky u Zaporizkii oblasti.* 2009;263. Ukrainian. Available from: http://www.zp.ukrstat.gov.ua/index.php?option=com_content&view=article
19. [Statistical report of Zaporizka oblast for 2009]. *Holovne upravlinnia statystyky u Zaporizkii oblasti.* 2010;245. Ukrainian.
20. [Statistical report of Zaporizka oblast for 2010]. *Holovne upravlinnia statystyky u Zaporizkii oblasti.* 2011; 256. Ukrainian. Available from: www.zp.ukrstat.gov.ua/index.php?option=com_content&view=article
21. [Statistical report of Zaporizka oblast for 2011]. *Holovne upravlinnia statystyky u Zaporizkii oblasti.* 2012; 270. Ukrainian. Available from: www.zp.ukrstat.gov.ua/index.php?option=com_content&view=article
22. Grebnyak NP, Shchudro SA, Fedorchenko RA, Pushina OS, Hryhorenko LV, et al. [Medical ecology in terms, schemes, tables and tests]. *Textbook.* Dnipro: Aktsent PP. 2017;204. Ukrainian.

СПИСОК ЛІТЕРАТУРИ

1. Антомонов М. Ю. Математическая обработка и анализ медико-биологических данных. Киев: Малай Друк, 2006. 558 с.
URL: <http://dspace.nbuv.gov.ua/bitstream/handle/.../07-Antomonov.pdf>
2. Антомонов М. Ю. Математическая обработка и анализ медико-биологических данных. 2-е изд. Київ: МИЦ «Мединформ», 2018. 579 с.
URL: <https://www.olx.ua/.../antomonov-m-yu-monografya>
3. Бердник О. В., Зайковська В. Ю. Доцільність використання різних показників здоров'я при оцінці впливу навколишнього середовища. *Гігієна населених місць: зб. наук. пр. Вип. 52.* Київ: 2008. С. 417-422. – URL: www.gigiena-mist.kiev.ua/gnm/60-0346.pdf
4. Біостатистика / В. Ф. Москаленко та ін.; за ред. В. Ф. Москаленка. Київ: Книга плюс, 2009. С. 124-129.
URL: http://medterms.com.ua/load/biologija/biostatistika_v_f_moskalenko/4-1-0-66
5. Боровиков В. *Statistica. Искусство анализа данных на компьютере. Для профессионалов.* Санкт-Петербург: Питер, 2001. 656 с.
URL: computersbooks.net/index.php?id1=4...borovikov-v...
7. Боровиков В. П., Боровиков И. П. *Statistica: Статистический анализ и обработка данных в среде Windows.* Москва: Филинь, 1997. 608 с.
URL: <https://www.twirpx.com/file/384012/>
7. Буряк Л. И., Белицкая Э. Н., Щудро С. А., Григоренко Л. В. *Алиментарное ожирение как гигиеническая проблема.* Днепропетровск: «Пороги», 2012. 273 с.
8. Генетична складова як чинник формування здоров'я населення України / О. І. Тимченко та ін. *Екологія довкілля та безпека життєдіяльності.* 2005. № 1. С. 3-8. URL: www.gigiena-mist.kiev.ua/gnm/60-0342.pdf
9. Гігієнічні вимоги до води питної, призначеної для споживання людиною: державні санітарні норми та правила [Електронний ресурс] / ДСанПіН 2.2.4-171-10; затв. наказом МОЗ від 12.05.2010 р. № 400; Зареєстровано в Міністерстві юстиції України 1 липня 2010 р. за №452/17747.
URL: <http://normativ.ua/types/tdoc19074.php>
10. Джерела централізованого питного водопостачання. Гігієнічні та екологічні вимоги щодо якості води та правила вибору: ДСТУ 4808:2007. Київ: Держспоживстандарт України, 2012. 27 с.
URL: http://online.budstandart.com/ua/catalog/doc-page?id_doc=53159
11. Дієтологія у термінах, схемах, таблицях, тестах / М. П. Гребняк та ін. Рекомендовано МОН України як навчальний посібник для студентів вищ. навч. закладів. Дніпро: Акцент ПП, 2018. 248 с.
12. Досвід впровадження міжсекторальної програми "Здоров'я нації" на 2002-2011 рр. Київ: Міністерство охорони здоров'я та Український інститут стратегічних досліджень, 2006. 375 с.
URL: www.uiph.kiev.ua/download/Vidavnictvo/Ukraina.Zdorovja%20nacii/2017-4_1.pdf
13. Лапач С. Н., Чубенко А. В., Бабич П. Н. *Статистические методы в медико-биологических исследованиях с использованием Excel.* Київ: Морион, 2001. 408 с. URL: <https://www.studmed.ru/lapach-snchubenko-av-babich-pn-s>
14. Линчак О. В., Тимченко О. І. *Генофонд і здоров'я: спрямованість генетико-демографічних процесів в умовах депопуляції.* Київ: Мединформ, 2011. 265 с.
URL: www.health.gov.ua/www.nsf/all/u04-05?opendocument
15. Микитенко Д. О., Тимченко О. І. Еквівалент вартості людського життя з погляду економічної ефективності лікувально-профілактичних заходів. *Гігієна населених місць: зб. наук. пр. Вип. 67.* Київ, 2015. С. 389-99. URL: www.gigiena-mist.kiev.ua/gnm/57-0389.pdf

16. Микитенко Д. О., Тимченко О. І., Линчак О. В. Генетично обумовлені репродуктивні втрати: економічний аспект. *Гігієна населених місць*. Випуск 60. Київ, 2012. С. 342-346. URL: www.gigiena-mist.kiev.ua/site/gnm.nsf/all/archiv?opendocument

17. МКБ X: Международная статистическая классификация болезней и проблем, связанных со здоровьем: 10-й пересмотр. Женева: ВОЗ, 1995. Т. 1, Ч. 1. 698 с., Ч. 2. 633 с., Т. 2. 172 с. URL: <https://apps.who.int/iris/handle/10665/85973>

18. Статистичний довідник Запорізької області за 2008 рік. – Головне управління статистики у Запорізькій області. 2009. 263 с. URL: http://www.zp.ukrstat.gov.ua/index.php?option=com_content&view=article

19. Статистичний довідник Запорізької області за 2009 рік. Головне управління статистики у Запорізькій області. 2010. 245 с.

20. Статистичний довідник Запорізької області за 2010 рік. Головне управління статистики у Запорізькій області. 2011. 256 с.

21. Статистичний довідник Запорізької області за 2011 рік. Головне управління статистики у Запорізькій області, 2012. 270 с.

URL: www.zp.ukrstat.gov.ua/index.php?option=com_content&view=article

22. Medical ecology in terms, schemes, tables and tests / N. P. Grebnyak et al. Recommended by the Ministry of Education and Science of Ukraine as a textbook for students of Higher Medical Education Institutions. Dnipro: Accent PP, 2017. 204 p.

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