Yrysova M.B.
I.K. Akhunbaev Kyrgyz State Medical Academy, Bishkek, Kyrgyzstan
Science and Production Association "Preventive Medicine", Bishkek, Kyrgyzstan

Diseases of the circulatory system in the Kyrgyz Republic in the period of 2002–2017

Aim	To analyze a tendency in circulatory system diseases (CSD) in the Kyrgyz Republic (KR).
Material and methods	Medical statistics on morbidity, prevalence, mortality, and primary disability related with CSD in the adult population was obtained from the National Health Information Center (NHIC) of the Ministry of Health of the KR and the National Statistical Committee of the KR. For the purpose of comparative analysis, relative values were calculated per 100,000 and 10,000 population. A retrospective epidemiological study of prevalence, morbidity, mortality, and primary disability related with CSD for 2002–2017 was performed with calculation of the increase/decrease rate using the least square method for aligning the dynamic row. Also, the epidemiological situation of CSD was analyzed by sex and in 9 administrative divisions of the KR with calculation of the mean long-term incidence (MLTI) of CSD from 2007 through 2017. Statistical analysis was performed with specialized Statistica 10.0 and SPSS 11.5 software.
Results	CSD remain the major cause of death (51.6% in 2017) and primary disability (19.68% of overall primary disability) in the Kyrgyz population. Prevalence of CSD shows a pronounced upward trend (6.8% increment rate relative to 2002) whereas the incidence rate has increased with a moderate trend (3.5% increment rate). The major structure of CSD is determined by essential hypertension (51.2%), ischemic heart disease (28.0%), and cerebrovascular diseases (10.0%). CSD is more frequently observed in women (mean value for 2007–2017, 59.0%) than in men (41.0%) ($p<0.001$). Mean long-term indexes of CSD significantly differ in different regions and cities of the KR. The highest primary morbidity and prevalence of CSD is observed in Bishkek (1546.90/0000 and 12415.40/0000). Relatively low levels of these values are found in the Talas Region (720.70/0000 and 3675.10/0000, respectively).
Conclusion	CSD remains the major cause of death and primary disability in the population of the KR. Prevalence of CSD shows a pronounced increasing trend whereas the increase in incidence rate is moderate. The major structure of CSD is determined by essential hypertension, ischemic heart disease, and cerebrovascular diseases. Incidence of CSD is statistically significantly higher for women than for men. Mean long-term indexes of CSD significantly differ in different regions and cities of the KR. Therefore, it is essential to enhance preventive measures in the KR; to identify individuals with hypertension at the level of primary care; and to motivate healthcare professionals to improve the quality of healthcare (CSD prevention, detection, and treatment).

Keywords	Circulatory system diseases; incidence; prevalence; mortality; disability; cardiovascular diseases
For citation	Yrysova M.B. Diseases of the circulatory system in the Kyrgyz Republic in the period of 2002–2017. Kardiologiia. 2020;60(7):72–77. [Russian: Ырысова М.Б. Болезни системы кровообращения в Кыргызской Республике в период с 2002 по 2017 годы. Кардиология. 2020;60(7):72–77]
Corresponding author	Yrysova M.B. E-mail: miki76@mail.ru

Cardiovascular diseases (CVDs) are the leading cause of death worldwide. According to the World Health Organization (WHO), 17.9 million people died of CVDs in 2016, for 31% of all deaths worldwide. Heart attacks and strokes were causes of death in 85% of these cases. The problem of CVDs has remained an issue in the Kyrgyz Republic (KR) for more than a decade. Circulatory diseases (CDs), which have increased in incidence, are the leading cause of mortality among the Kyrgyz population. According to official statistics, CDs rank first in the structure of total mortality due to CVDs and cause almost one-half (51.6% in 2017) of deaths. More than 18 thousand people die, on average, of CDs in KR annually, or about 50 people every day. The objective of this study was to analyze the trends of CD morbidity in KR.

Material and methods

Medical statistics on CD incidence, prevalence, mortality, and first-time disablement in adults were obtained from the Republican Medical Information Center (RMIC) of the Ministry of Healthcare of KR and the National Statistical Committee of KR. The relative values for 100,000 thousand and 10,000 people were calculated for comparative analysis. A retrospective epidemiological study of the CD prevalence, incidence, mortality, and first-time disablement was carried out in 2002–2017, and the rate of increase (decrease) was calculated using the least-square regression to align the statistical series. The rate of increase or decrease determines the trend:

- from 0 to ±1% – the incidence is stable;
- from ±1.1% to ±5.0% – the trend is moderate;

ISSN 0022-9040. Kardiologiia. 2020;60(7). DOI: 10.18087/cardio.2020.7.n890

- more than ±5 – the trend is pronounced.

Sex-adjusted epidemiological analysis of CDs was performed, including the calculation of the mean annual incidence from 2007 to 2017 in nine administrative territories of KR.

Statistical processing of findings was carried out using the Statistica 10.0 and SPSS 11.5 software suites.

Results

The annual mean of the KR resident population for 2017 was 6,198,500 people.

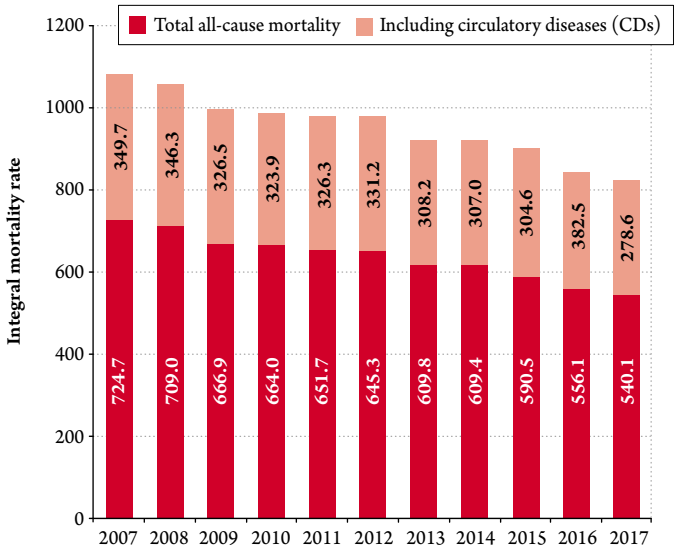
Analysis of available statistics showed that the epidemiological situation in KR is acute due to the spread of CVDs, which has been the leading cause of death for many years, ranking first in the structure of all-cause mortality (Table 1). In 2007–2017, the proportion of CDs in the all-cause mortality structure increased 1.07-fold.

Within the analyzed period, CD mortality rates ranged from 278.6 to 349.70 per 10,000 people and had a slight downward trend (0.3% vs. 2007) (Figure 1).

It was found that the general prevalence of CDs in the adult KR population varied from 4,805.9 to 7,879.50 per 10,000 people within several years with a clear upward trend (the rate of increase was 6.8% vs. 2002) (Figure 2). Primary morbidity rates ranged from 1,050.8 to 1,344.30 per 10,000 people with a moderate upward trend (the rate of increase was 3.5%).

Of the nosological entities registered in the RMIC for 2017, CDs are mainly represented by hypertension (51.2%), coronary artery disease (28.0%), and cerebrovascular diseases (10%) (Figure 3). Rheumatic heart diseases, endarteritis, thromboangitis, mitral valve prolapse, and other CVDs together comprised only a small proportion of CDs (10.8%).

Figure 1. CD mortality in 2007–2017



These CVDs result in premature disability and loss of the capacity to work as well as being the leading cause of mortality in KR. According to the RMIC data for 2007–2017, the proportion of CDs among the causes of first-time disability was 19.68%, significantly exceeding that of other diseases and ranking first during this period (Figure 4).

Analysis of sex distribution of CVDs for 2007–2017 (Figure 5) showed that the incidence of CDs in female patients was higher than that in male patients (59.0% and 41.0%, $p < 0.001$).

Table 1. Structure of total mortality in KR in 2007–2017

Years	Total all-cause mortality	Including CDs		Other reasons		Injuries and poisonings		Tumors		Respiratory diseases		Digestive diseases	
	abs.	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%	abs.	%
2007	38,180	18,422	48.3	6,783	17.8	3,722	9.7	3,007	7.9	3,588	9.40	2,658	6.96
2008	38,568	18,421	47.8	6,461	16.8	3,777	9.8	3,951	10.2	3,372	8.74	2,586	6.71
2009	35,898	17,578	49.0	6,197	17.3	3,466	9.7	3,267	9.1	3,005	8.37	2,385	6.64
2010	36,174	17,644	48.8	6,015	16.6	3,954	10.9	3,239	9.0	2,861	7.91	2,461	6.80
2011	36,353	17,992	49.5	5,929	16.3	3,613	9.9	3,791	10.4	2,602	7.16	2,426	6.67
2012	36,186	18,570	51.3	5,832	16.1	3,470	9.6	3,330	9.2	2,536	7.01	2,448	6.77
2013	34,880	17,627	50.5	5,980	17.1	3,150	9.0	3,487	10.0	2,169	6.22	2,467	7.07
2014	35,564	17,913	50.4	6,259	17.6	3,107	8.7	3,754	10.6	2,193	6.17	2,338	6.57
2015	35,073	17,959	51.2	6,029	17.2	3,111	8.9	3,841	11.0	1,839	5.24	2,294	6.54
2016	33,263	17,006	51.1	5,431	16.3	2,776	8.3	3,919	11.8	2,003	6.02	2,128	6.40
2017	33,166	17,105	51.6	5,357	16.2	2,849	8.6	3,856	11.6	1,905	5.74	2,094	6.31

KR is formed by nine administrative territories, including seven provinces and two cities of national significance. According to the mean annual data (2007–2017), the highest incidence and prevalence rates of CDs among the nine administrative territories of KR were registered in Bishkek (Figure 6). Chuy and Batken provinces are in a grave situation, followed by Naryn and Issyk-Kul provinces. In Jalal-Abad and Osh provinces, as well as Osh, the mean annual prevalence and incidence rates were almost the same. They are relatively low in Talas province.

Discussion

Kyrgyzstan is exposed to a very high risk of cardiovascular death (SCORE [Systematic COronary Risk Evaluation] ≥10%), as are Albania, Algeria, Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, Georgia, Kazakhstan, Latvia, Macedonia, Moldova, the Russian Federation, Syria, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan [1].

The highest CAD mortality rates in the Commonwealth of Independent States (CIS) countries, according to the WHO, are registered in Moldova (496.16 per 100,000 people), Ukraine (491.91), Kyrgyzstan (444.59), the Russian Federation (359.33), Lithuania (313.91), Latvia (248.88), Estonia (199.15), and Kazakhstan (181.32) [2].

In KR, various campaigns have been developed to reduce CD morbidity and mortality under the national health policy, including «Healthy Heart to Every Kyrgyz Resident by 2010,» «Manas Taalimi for 2006–2010,» «Den Sooluk,» and «CVD Control Package Program for 2009–2013.» However, despite all these healthcare efforts, the prevalence of CDs remains relatively high, and they remain the leading cause of death in the Kyrgyz population. In addition, CDs lead to loss of ability to work and are therefore an enormous economic burden to the state [3, 4].

Analysis of mortality cause statistics showed that CDs define the total mortality of the Kyrgyz population. In 2007–2017, there was also an increase in cardiovascular pathology mortality rates in the structure of total mortality. The authors of previous studies also noted an increase in cardiovascular mortality, such as a 25% increase in 1991–1996 [3, 4]. Over the past 20 years, the mean death rate from CVDs has increased by 40.5% in people aged 30–39 years and 18.1% in people aged 40–59 years. More than 18,000 people die of heart disease every year in KR, and about 50 people die every day [5]. Foreign authors report similar data. For example, CDs remain the main causes of death (52%) in the Republic of Bashkortostan, Russian Federation [6, 7]. In 2016,

Figure 2. Prevalence and incidence of CDs in Kyrgyz Republic in 2002–2017

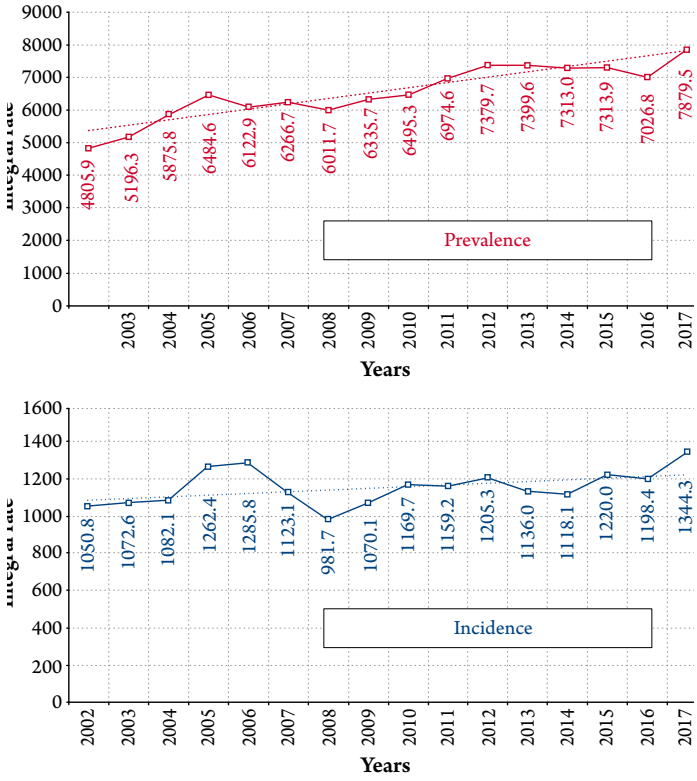
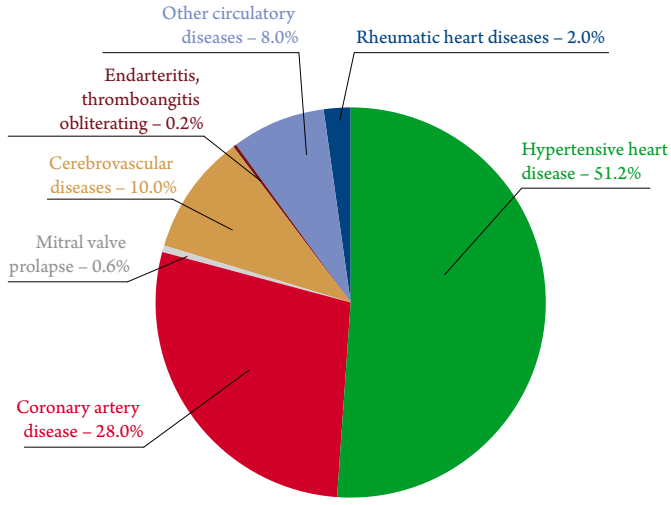


Figure 3. Structure of CDs in Kyrgyz Republic, 2017



the CVD mortality rate was 49% in the Moscow region [8]. CDs still predominate among causes of death in the Russian population (44% and 49.6% of total mortality in male and female patients, respectively) [9].

The economic burden of the population's disability is highly significant because most people who recognized to have disabilities for the first time are of working age and are excluded from the sphere of public production due to their diseases. The state bears enormous expenditures

ISSN 0022-9040. Kardiologiia. 2020;60(7). DOI: 10.18087/cardio.2020.7.n890

Figure 4. Mean annual proportion of first-time disability due to CDs among all causes in Kyrgyz Republic, 2007–2017

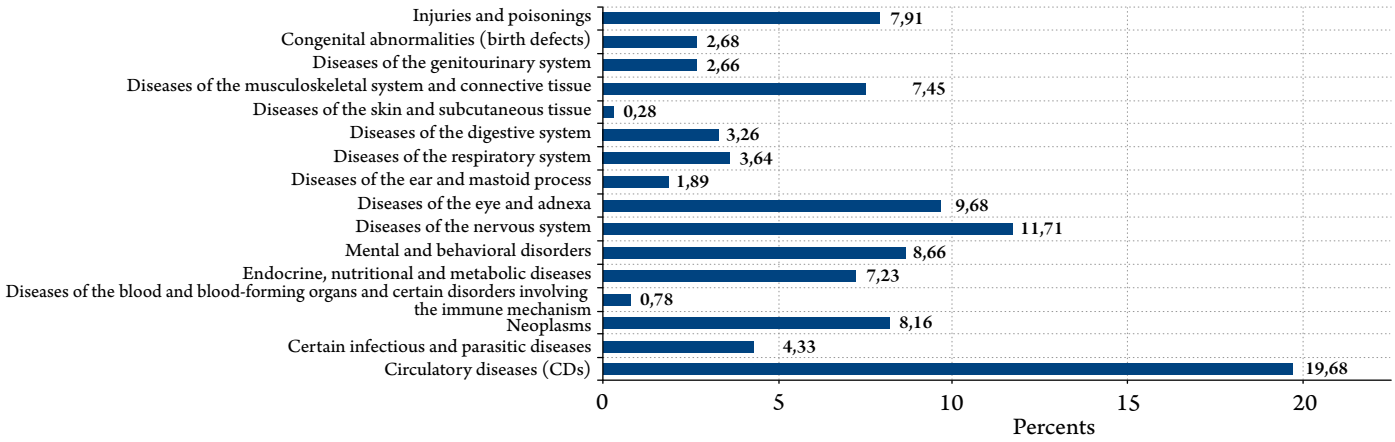


Figure 5. Sex-related distribution of CDs in 2007–2017

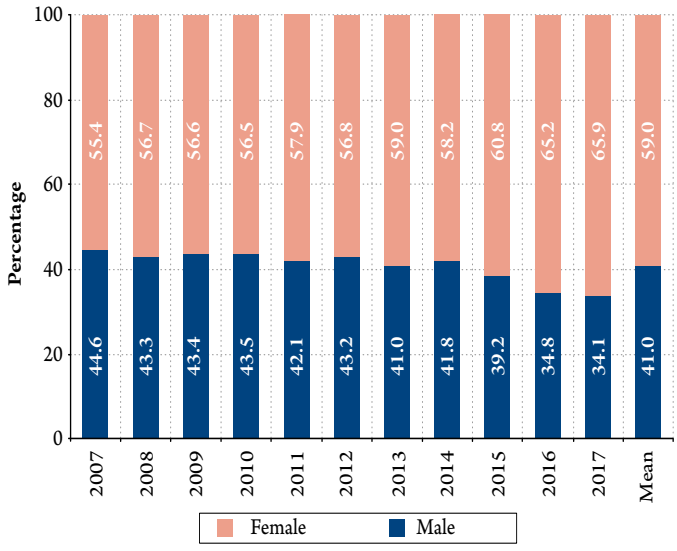
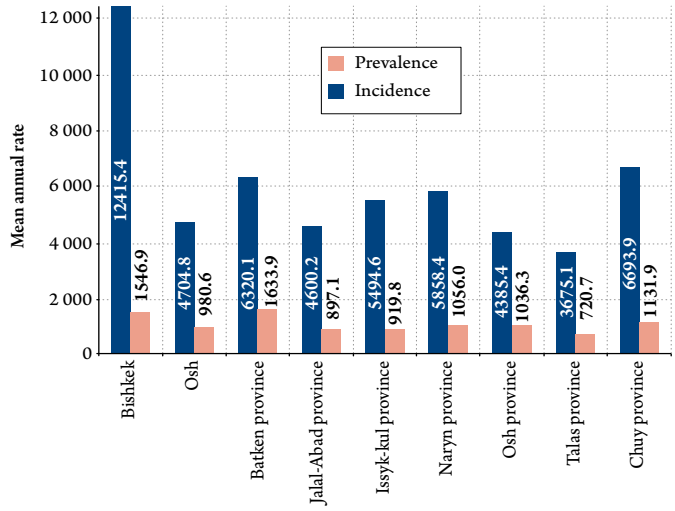


Figure 6. Mean annual (2007–2017) incidence and prevalence of circulatory diseases among administrative territories of Kyrgyz Republic (per 100,000 people)



in social security, medical care, and rehabilitation of people with disabilities [10]. According to 2007 data, the economic damage from the first-time disability retirement was 9.7 million soms a year in KR. Together with the economic damage caused by the premature death among the working-age Kyrgyz population caused by CVDs, the annual economic losses exceeded 53 million soms. These amounts have increased many times due to inflation. Not to mention indirect losses and family costs caused by the death of a family member, often the main breadwinner [4].

CDs were the leading causes of first-time disability in KR from 2002 to 2017, which is consistent with the data reported by the foreign authors. For example, CDs have ranked first among the reasons for first-time disability of the adult population in the various Russian regions for many years [11, 12]. CVDs are also the main causes of disability in Tajikistan [13, 14].

Sex-related analysis of CDs shows that CVDs are more common in female than in male patients. The prevalence of CDs (except for myocardial infarction) is also higher in the female population of Uzbekistan [15]. Globally, CVDs are the major causes of morbidity, disability, and mortality in men and women. A decrease in CAD morbidity and mortality has been reported in men, but not in women [16]. Women have a worse prognosis for CVDs than men. More women die of the first myocardial infarction and within the following 12 months [17].

Hypertension is a CVD itself and a leading risk factor that largely determines the development of many diseases globally, such as CAD, heart failure, cerebrovascular disease, peripheral artery disease, chronic kidney disease, and atrial fibrillation. The general prevalence of hypertension in the population aged ≥ 18 years old is 30% – 45% and increases sharply with age [1].

In Kyrgyzstan, hypertension (51.2%) predominates among CDs, followed by CAD (28.0%), cerebrovascular disease (10.0%), and other CVDs (10.8%). According to the Russian Federal Service of State Statistics, in 2018 the proportion of CDs caused by hypertension was 44.2%, that caused by CAD was 21.4%, and that caused by cerebrovascular disease was 19.7% [12]. The

study of CVD risk factors in Azerbaijan showed that the prevalence of hypertension statistically significantly predominated in the presence of CAD compared to its absence (61.3%±5.1% and 38.7%±1.4%, p<0.01) [18]. Hypertension is one of the main risk factors for CAD, as established in almost all epidemiological studies. The prevalence of hypertension in the adult Kazakh population varies from 15.2% to 27% according to the official statistics, depending on the region. The incidence of hypertension has been steadily growing in KR in recent years. For example, according to the Statistics Agency of the Republic of Kazakhstan, 1,013.9 cases of hypertension were registered per 100,000 people in 2011; in 2010 it was this figure was 913.8 cases per 100,000 people [19].

The mean 2007–2017 annual prevalence in the nine Kyrgyz administrative territories ranged from 12,415.40 per 10,000 in Bishkek to 3,675.10 per 10,000 people in Talas province; incidence ranged from 1,633.90 per 10,000 people in the Batken province to 720.70 per 10,000 people in Talas province. The inter-territory differences in the incidence and prevalence rates appear to be due to the different professional levels of medical personnel and the availability of treatment and diagnosis services in the major cities and rural territories of the country. However, further research is required to identify regional specificities in the incidence and prevalence of CDs, such as causes and factors of their development in different segments of the population.

Conclusion

- Circulatory diseases remain the leading causes of mortality and first-time disability among the Kyrgyz population.
- The prevalence of circulatory diseases has a clear upward trend, and the incidence is growing moderately.
- The structure of circulatory diseases is mainly defined by hypertension, CAD, and cerebrovascular diseases.
- Circulatory diseases are statistically more common in women than in men.
- The mean annual rates of CDs vary significantly in different Kyrgyz regions and cities.
- Given these findings, it is necessary to strengthen preventive care and identify people with hypertension in a timely manner at the primary health care level, and motivate healthcare professionals to improve the quality of medical care for the population (prevention, detection, treatment of CVDs) in the Kyrgyz Republic.

No conflict of interest is reported.

The article was received on 17/10/19

REFERENCES

1. Piepoli MF, Hoes AW, Agewall S, Albus C, Brotons C, Catapano AL et al. 2016 European Guidelines on cardiovascular disease prevention in clinical practice: The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts) Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR). European Heart Journal. 2016;37(29):2315–81. DOI: 10.1093/eurheartj/ehw106
2. World Health Organization. WHO Mortality Database. [Internet] Available at: https://www.who.int/healthinfo/mortality_data/en/
3. Ibraimova D.D. Morbidity and mortality from diseases of the circulatory system in the Kyrgyz Republic. Herald of KRSU. 2014;14(10):117–20. [Russian: Ибраимова Д.Д. Заболеваемость и смертность от болезней системы кровообращения в Кыргызской Республике. Вестник Кыргызско-Российского Славянского Университета. 2014;14(10):117-20]
4. Kydyralieva R.B., Ryskeldieva E.F. Cardiology problems in Kyrgyzstan Republic. Russian Journal of Cardiology. 2007;12(5):83–7. [Russian: Кыдыралиева Р.Б., Рыскелдиева Э.Ф. Проблемы кардиологии в Кыргызской Республике. Российский кардиологический журнал. 2007;12(5):83-7]
5. Komarevskaya L., Zyus O., Temirov A. Comparative analysis of the structure of hospitalizations of patients with cardiovascular diseases in the context of regions. - Bishkek: Center for health policy analysis, 2016. - 42p. Av. at: http://hpac.kg/wp-content/uploads/2016/02/HospitalizationsRUSupdated.pdf. 2016. [Russian: Комаревская Л., Зюсь О., Темиров А. Сравнительный анализ структуры госпитализаций пациентов с сердечно-сосудистыми заболеваниями в разрезе регионов. - Бишкек: Центр анализа политики здравоохранения, 2016. - 42с. Доступно на: http://hpac.kg/wp-content/uploads/2016/02/HospitalizationsRUSupdated.pdf]
6. Askarov R.A., Davletshin R.A., Askarova Z.F., Sharipova I.A. The level and structure of mortality from diseases of blood circulation system in the regions of the republic of Bashkortostan (2002-2015). Health Care of the Russian Federation. 2019;61(6):300–8. [Russian: Аскаров Р.А., Давлетшин Р.А., Аскарова З.Ф., Шарипова И.А. Уровень и структура смертности от болезней системы кровообращения в регионах Республики Башкортостан (2002-2015 гг.). Здравоохранение Российской Федерации. 2017;61(6):300-8]. DOI: 10.18821/0044-197X-2017-61-6-300-308
7. Vishnevsky A., Andreev E., Timonin S. Mortality from cardiovascular diseases and life expectancy in Russia. Demographic review. 2016;3(1):6–34. [Russian: Вишневский А., Андреев Е., Тимонин С. Смертность от болезней системы кровообращения и продолжительность жизни в России. Демографическое обозрение. 2016;3(1):6-34]
8. Glezer M.G. Gender and Age Characteristics of Mortality from Diseases of the Circulatory System of the Moscow region. Data 2016 year. Kardiologiia. 2019;59(1):49–56. [Russian: Глезер М.Г. Половая и возрастная характеристика смертности от заболеваний системы кровообращения в Московской области. Данные 2016 года. Кардиология. 2019;59(1):49-56]. DOI: 10.18087/cardio.2019.1.10215
9. Federal State Statistics Service. The Demographic Yearbook of Russia 2019. 2019. [Russian: Федеральная служба государственной статистики. Демографический ежегодник России 2019] [Internet] 2019. Available at: https://www.gks.ru/bgd/regl/B19_16/Main.htm

ISSN 0022-9040. Kardiologiia. 2020;60(7). DOI: 10.18087/cardio.2020.7.n890

10. Starinskaya M.A., Samorodskaya I.V., Masyakin A.V. The Causes of Mortality and Years of Potential Life Lost Due to Circulatory Diseases in Economically Active Age. Medical technology. Evaluation and selection. 2017;1(27):23–34. [Russian: Старинская М.А., Самородская И.В., Масякин А.В. Нозологическая структура смертности и потерянных лет жизни от болезней системы кровообращения в экономически активном возрасте. Медицинские технологии. Оценка и выбор. 2017;1(27):23-34]
11. Boytsov S.A., Samorodskaya I.V., Efros L.A., Vatolina M.A. Problems one valuating and interpretating indexes of morbidity, mortality and disability as a result to blood circulation problems. Health manager. 2014;6:15–23. [Russian: Бойцов С.А., Самородская И.В., Эфрос Л.А., Ватолина М.А. Проблемы оценки и интерпретации показателей заболеваемости, смертности и инвалидности в результате болезней системы кровообращения. Менеджер здравоохранения. 2014;6:15-23]
12. Federal State Statistics Service. Health in Russia. 2019. Statistical book. -M.: Rosstat;2019. - 170 p. [Russian: Федеральная служба государственной статистики. Здравоохранение в России. 2019. Статистический сборник. - М.: Росстат, 2019. - 170с. Доступно на: https://www.gks.ru/storage/mediabank/Zdravoohran-2019.pdf]. ISBN 978-5-89476-470-2
13. Kamilova G.I., Ashurova N.S., Chudinov A.V., Gaibova M.G. Main factors determining primary disability in the Republic of Tajikistan. Avicenna Bulletin. 2015;3(64):102–6. [Russian: Камилова Г.И., Ашурова Н.С., Чудинов А.В., Гаибова М.Г. Основные факторы, обусловливающие первичную инвалидность населения Республики Таджикистан. Вестник Авиценны. 2015;3(64):102-6]
14. Sufishoev G., Odinaev F.I., Fayzullaev H.T., Odinaev Sh.F., Igamova M.G. Medico-social aspects of primary disability owing to coronary heart disease in the Republic of Tajikistan. Reports of the Academy of Sciences of the Republic of Tajikistan. 2013;56(8):667–70. [Russian: Суфишоев Г., Одинаев Ф.И., Файзуллаев Х.Т., Одинаев Ш.Ф., Игамова М.Г. Аспекты первичной инвалидности вследствие ишемической болезни сердца в республике Таджикистан. Доклады Академии наук Республики Таджикистан. 2013;56(8):667–70]
15. Mirhamidova S.M., Botirova N.B., Kambarova S.A. Features of prevalence of cardiovascular diseases. Young Scientist. 2016;21(125):73–6. [Russian: Мирхамидова С.М., Ботирова Н.Б., Камбарова С.А. Особенности распространенности сердечно-сосудистых заболеваний. Молодой учёный. 2016;21(125):73-6]
16. Crea F, Battipaglia I, Andreotti F. Sex differences in mechanisms, presentation and management of ischaemic heart disease. Atherosclerosis. 2015;241(1):157–68. DOI: 10.1016/j.atherosclerosis.2015.04.802
17. Abzaliev K.B., Aldangarova G.A., Abzalieva S.A., Aktaeva S.M., Musabekova Zh.B., Nasyrova N. Status of gender differences in heart disease and risk factors. The science of life and health. 2019;1:49–59. [Russian: Абзалиев К.Б., Алдангарова Г.А., Абзалиева С.А., Актаева С.М., Мусабекова Ж.Б., Насырова Н. Состояние вопроса гендерных различий при заболеваниях сердца и факторы риска. Наука о жизни и здоровье. 2019;1:49-59]. DOI: 10.24411/1995-5871-2019-10005
18. Ismayilova N.R. Influence of ethnicity on the Association of risk factors with coronary heart disease in the male population of 20-59 years of the Zakatala district of the Azerbaijan Republic. World of medicine and biology. 2011;7(3):085–90. [Russian: Исмайлова Н.Р. Влияние этнической принадлежности на связь факторов риска с ишемической болезнью сердца в популяции мужского пола 20-59 лет Закатальского района Азербайджанской Республики. Мир медицины и биологии. 2011;7(3):085-090]
19. Abuov D.Zh., Grzhibovsky A.M., Kalmantaeva Zh.A., Stepkina E.S., Rustemova A.Sh. Dynamics of providing antihypertensive drugs to privileged categories of the population in Almaty, Kazakhstan. Human ecology. 2014;12:21–5. [Russian: Абуов Д.Ж., Гржибовский А.М., Калмантаева Ж.А. Степкина Е.С., Рустемова А.Ш. Динамика обеспечения антигипертензионными препаратами льготных категорий населения в г. Алматы, Казахстан. Экология человека. 2014;12:21-5]