Original research

Peculiarities of cardiovascular diseases epidemiology in the Kyrgyz Republic

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Abstract

Objective: Cardiovascular diseases (CVDs) are the leading cause of premature mortality in all countries of the world. In the Kyrgyz Republic (KR), on average, more than 18,000 people die annually from CVDs.
The aim of the study was to analyze the trend of CVDs in Kyrgyz Republic for the period of 2022-2021 years.

Methods: This is an epidemiological retrospective study of the prevalence of morbidity (period 2002-2021) and mortality (period 2007-2021) from CVDs. In the present study, medical and statistical data on the number of new cases ("incidence"), prevalence ("prevalence"), and mortality from CVDs in the adult population were obtained from the Republican Medical Information Center (RMIC) and the Center for e-Health under the Ministry of Health of the Kyrgyz Republic. Absolute and relative indicators per 100,000 population were calculated for comparative analysis.

Results: Structure of CVDs in 2021 was largely determined by arterial hypertension - 53.0%, coronary heart disease - 27.5% and cerebrovascular diseases - 9.72%, For the analyzed period, the dynamics of CVDs prevalence in the Kyrgyz Republic annually shows a moderate growth rate (2.4%), however primary morbidity annually has a moderate rate of decrease (-0.3%). The population prevalence of CVDs for the period 2002 to 2021 averaged - 6588.7 (78.4) /00000. During the COVID-19 pandemic, the rates dropped significantly, amounting to 2020 and 2021 (- 5716.5 (73.4) /00000 and 5653.1 (73.0) /00000, respectively).
The primary incidence rates of CVDs in the KR population for the period of 2020 to 2021 averaged - 1130.1 (33.4) /00000. A significant decline in primary morbidity rates due to COVID-19 occurred in 2020 and 2021 amounting to - 894.6 (29.7) /00000 and 784.4 (27.8) /00000, respectively.
During the analyzed period, mortality from CVDs annually made a moderate rate of decrease (-1.2%). The share of deaths from CVDs on average was 315.4 (17.7) /00000. There was an increase in mortality rate due to COVID-19 in 2020 and 2021, amounting to - 317.8 (17.7) /00000 and 297.0 (17.2) /00000, respectively.

Conclusion: In Kyrgyz Republic, CVDs remain the leading cause of mortality. The prevalence of CVDs has a pronounced upward trend, while morbidity continues to increase at a moderate rate. The basic structure of CVDs is determined by arterial hypertension, CHD and CVD. In different oblasts and cities of the Kyrgyz Republic, the average annual CVDs indicators differ significantly and the capital of the state takes the first place. Thus, it is necessary to timely identify the precursors of CVDs development, to carry out preventive measures among the population at the primary level of medical care and develop protocols for secondary prevention of CVDs.

Key words: Epidemiology, cardiovascular diseases, cerebrovascular diseases, ischemic heart disease, hypertension, disability, mortality

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Introduction

Cardiovascular diseases (CVDs) are the leading cause of premature mortality in all countries of the world. According to the World Health Organization (WHO), 17.9 million people died from CVDs in 2016, accounting for 31% of all deaths worldwide (1). Overall, 85% of these deaths were due to heart attack and stroke (2- 4). For no other cause do as many people on the planet die each year as from CVDs. In developed countries, the expected total economic losses from all non-communicable diseases (NCDs) between 2011 and 2025 is approximately 7.8 trillion US dollars, and CVDs will account for almost half of these losses (5).

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Graphical abstract

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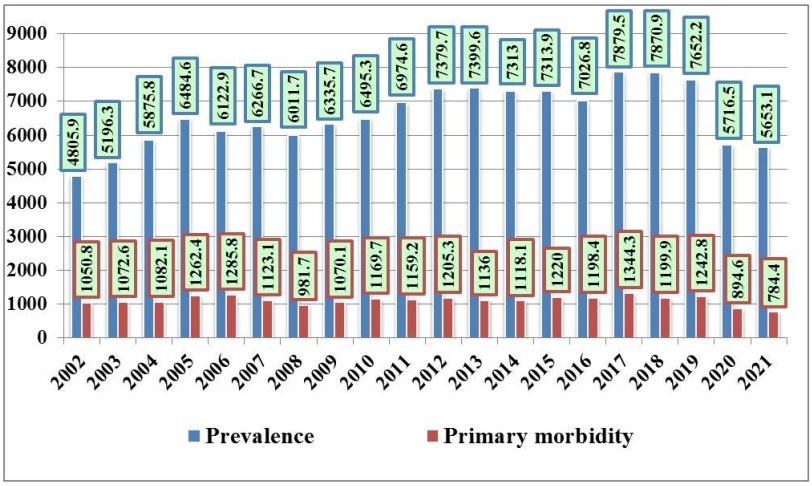
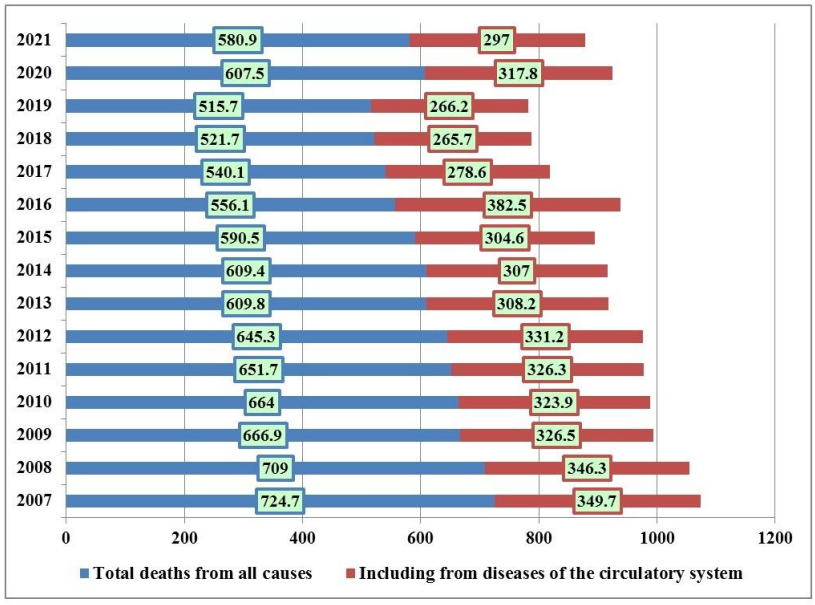


Dynamics of prevalence and primary incidence of CVDs in Kyrgyz Republic for period of 2002-2021

Structure of CVDs in Kyrgyz Republic in 2021

Arterial hypertension - 53.0%
Coronary heart disease - 27.5%
Cerebrovascular disease - 9.72%
Other - 9.71%



CVDs mortality data for 2007-2021 (Integral mortality rate)

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The statistics of CVDs draws attention to a critical problem: according to WHO data, 17 million people die annually from CVDs in the world, 4 million people die in Europe, 1.3 million people die in the Russian Federation (RF). According to the European Society of Cardiology, in Europe CVDs constituted 48% of fatal cases, in Russia - 53% of all fatalities (6).

WHO estimates that in 2016, the number of deaths from NCDs worldwide was 41 million, corresponding to 71% of the total number of deaths. The most frequent causes of death were four NCDs: CVDs (17.9 million), cancer (9.0 million), chronic respiratory diseases (3.8 million) and diabetes mellitus (1.6 million) (7).

Between 2000 and 2016, the probability of dying from any of the four major NCDs between the ages of 30 and 70 fell by 18% globally. In high-income countries, cancer became the leading cause of premature death. In low-income and lower-middle-income countries, CVDs continue to be the leading NCDs causing premature death (8).

According to WHO forecasts, by 2030, about 23.3 million people in the world will die from NCDs, mainly from heart disease and stroke, which will remain the main single causes of death. In the Russian Federation, 330 men and 154 women die from myocardial infarction (MI) for every 100,000 people, and 250 men and 230 women die from strokes (6). In the Kyrgyz Republic, on average, more than 18,000 people die annually from CVDs and about 50 people die every day (9).

The aim of the study was to analyze the trend of CVDs in Kyrgyz Republic for the period of 2022-2021.

Methods

Study design

An epidemiological retrospective study.

Study population and data source

In the present study, medical and statistical data on the number of new cases ("incidence"), prevalence ("prevalence"), and mortality from CVDs in the adult population were obtained from the Republican Medical Information Center (RMIC) of the Ministry of Health of the Kyrgyz Republic and the Center for e-Health under the Ministry of Health of the Kyrgyz Republic (CEH of the Ministry of Health of the Kyrgyz Republic).

Study variables

We extracted data on the incidence, prevalence and mortality from CVDs overall for Kyrgyz Republic and for 2 cities (Bishkek and Osh) and 7 regions of the country: The following CVDs were included in analysis: coronary heart disease (CHD), arterial hypertension, rheumocarditis, endarteritis, obliterative thrombangiitis, cerebrovascular diseases (CerVD), mitral valve prolapse, pulmonary embolism, other peripheral vascular diseases, other circulatory diseases.

Statistical analysis

Statistical processing of the results was performed manually, as well as using specialized computer programs Statistica 10.0, SPSS 11.5 (IBM, New York) and Microsoft Excel.

Absolute and relative indicators per 100,000 population were calculated for comparative analysis. An epidemiological retrospective study of the prevalence of morbidity (period 2002-2021) and mortality (period 2007-2021) from CVDs in dynamics with calculation of the rate of increase (decrease) using the method of least squares was carried out. The trend was estimated by the value of the rate of increase or rate of decrease: from 0 to ±1% - stable incidence; from ±1.1% to ±5.0% - moderate trend; more than ±5% - pronounced trend.

Results

The average annual number of permanent population of the Kyrgyz Republic on March 25, 2022 was 6 million 936 thousand people. Including 2 million 408 thousand - urban and 4 million 528 thousand - rural population.

Of the nosoforms presented in the records of the CEH of the Ministry of Health of the Kyrgyz Republic for 2021, the structure of CVDs is largely determined by arterial hypertension, the specific weight of which amounted to 53.0%, CHD - 27.5% and CerVD - 9.72% (Table 1). Rheumocarditis, endarteritis, thrombangiitis, mitral valve prolapse and other CVDs together accounted for only a minor part in the CVDs structure - 9.71%.

For the analyzed period, the dynamics of CVDs prevalence in the Kyrgyz Republic annually shows a moderate growth rate (2.4%). Dynamics of primary morbidity annually has a moderate rate of decrease of population morbidity (-0,3%). In Kyrgyz Republic, the population prevalence of CVDs for the period 2002 to 2021 averaged - 6588.7 (78.4) $/^{0}_{0000}$, minimally - 4805.9 (67.6) $/^{0}_{0000}$ in 2007 and maximally - 7879.5 (85.1) $/^{0}_{0000}$ in 2017 (Fig. 1). During the COVID-19 pandemic, the rates reduced significantly, amounting to 2020 and 2021. - 5716.5 (73.4) $/^{0}_{0000}$ and 5653.1 (73.0) $/^{0}_{0000}$ respectively, which was due to the global lockdown when populations around the world were forced to be under quarantine conditions (10).

The primary incidence rates of CVDs in the Kyrgyz Republic population for the period 2020 to 2021 averaged - 1130.1 (33.4) $/^{0}_{0000}$, minimally - 784.4 (27.8) $/^{0}_{0000}$ in 2021 and maximally - 1344.3 (36.4) $/^{0}_{0000}$ in 2017. A significant decline in primary morbidity rates due to COVID-19 occurred in 2020 and 2021 amounting to - 894.6 (29.7) $/^{0}_{0000}$ and 784.4 (27.8) $/^{0}_{0000}$ respectively.

Currently, there are 9 administrative-territorial units in the Kyrgyz Republic, including 7 oblasts and 2 cities of Republican significance. According to average annual data (for 2003-2021), of the nine administrative territories of the Kyrgyz Republic, the highest level of primary morbidity and prevalence of CVDs falls on Bishkek city (Fig. 2).

Table 1. Structure of the cardiovascular diseases for 2017-2021 (in percentages)

Nosologies	2017	2018	2019	2020	2021
Coronary heart disease	28.0	28.0	27.2	27.0	**27.5**
Arterial hypertension	51.2	51.7	52.8	55.7	**53.0**
Rheumocarditis	2.0	1.56	1.54	1.40	**1.56**
Endarteritis, obliterative thrombangiitis	0.2	0.15	0.13	0.09	**0.10**
Cerebrovascular diseases	10.0	9.63	9.10	8.80	**9.72**
Mitral valve prolapse	0.60	0.62	0.61	0.26	**0.50**
Pulmonary embolism	0	0	0	0.02	**0.02**
Other peripheral vascular diseases	0	0	0	1.13	**1.43**
Other circulatory diseases	8.0	8.12	8.50	5.44	**6.10**

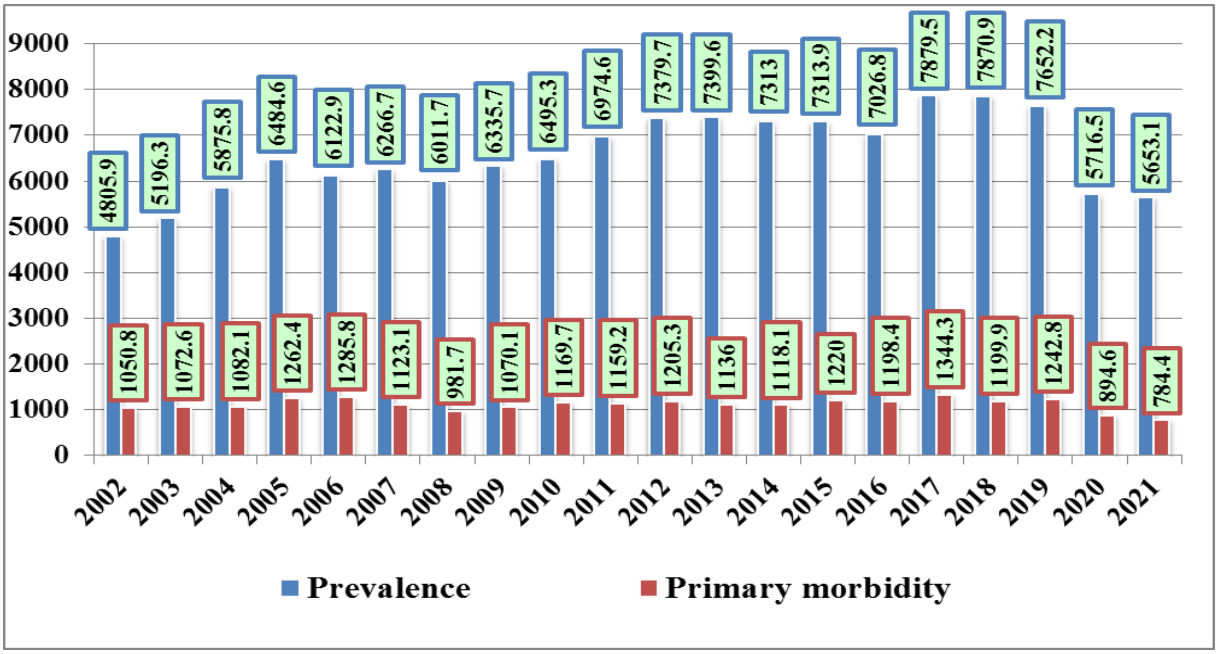

Figure 1. Multiyear dynamics of prevalence and primary incidence of CVDs in Kyrgyz Republic for 2002-2021 (integral indicator)

CVDs – cardiovascular diseases

The unfavorable situation of CVDs prevalence is observed in Chui and Naryn oblasts, amounting to 6628.9 (78.6) $/^{0}_{0000}$ and 6236.6 (76.4) $/^{0}_{0000}$ respectively. Then follow Issyk-Kul oblast - 6089.5 (75.6) $/^{0}_{0000}$ and Batken oblast - 6087.2 (75.6) $/^{0}_{0000}$. Osh city, Jalal-Abad and Osh oblasts have approximately similar level of average annual prevalence and incidence rates. Relatively low level of indicators is noted in Talas oblast.

The analysis of available statistical data of the CEH of the Ministry of Health of the Kyrgyz Republic showed that in the Kyrgyz Republic there is a tense epidemiological situation on CVDs, which are the main cause of mortality in the population, occupying the first place in the structure of total mortality of the population.

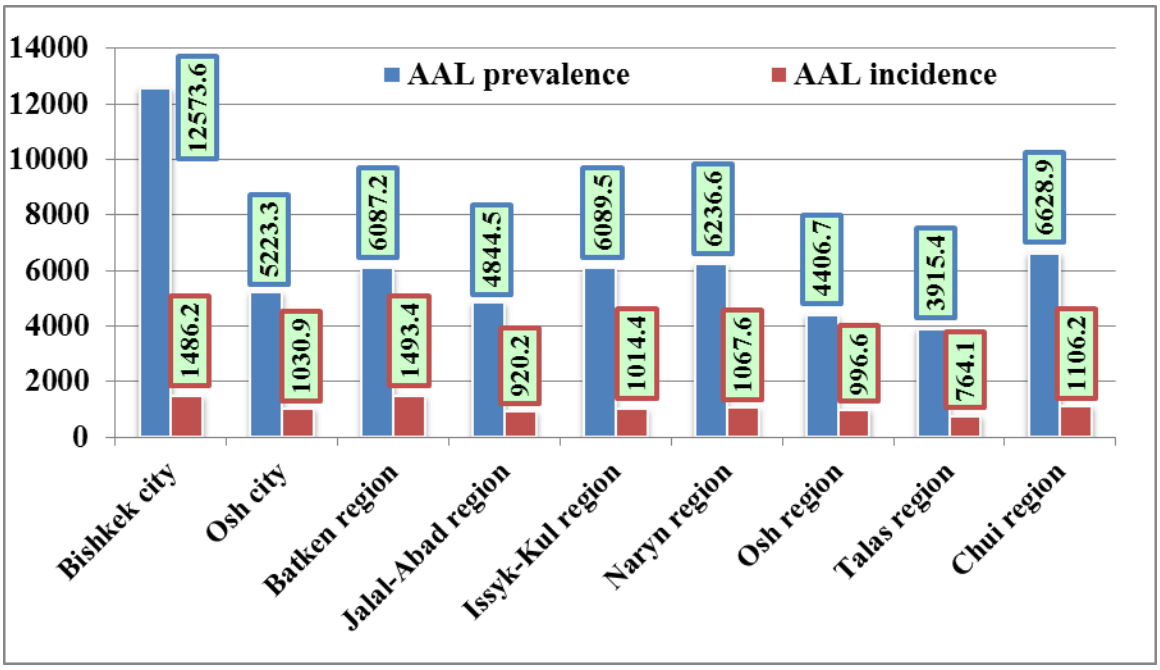

Figure 2. Average yearly level (for 2003-2021) of CVDs incidence and prevalence by administrative territories of the Kyrgyz Republic (per 100 thousand population)
AAL - average annualized level, CVDs – cardiovascular diseases

During the analyzed period, mortality from CVDs in the Kyrgyz Republic annually made a moderate rate of decrease in mortality of the population (-1.2%). The share of deaths from CVDs on average is - 315.4 (17.7) /$^{0}_{0000}$ (Fig. 3). For the analyzed period (2007-2021), the mortality rates from CVDs minimum value was - 266.2 (16.2) /$^{0}_{0000}$ in 2019 and maximum value was - 349.7 (18.6) /$^{0}_{0000}$ in 2007. There is an increase in mortality rate due to COVID-19 in 2020 and 2021, amounting to - 317.8 (17.7) /$^{0}_{0000}$ and 297.0 (17.2) /$^{0}_{0000}$ respectively. It is known that one of the fatal complications of COVID-19 is CVDs due to thrombosis in arteries and veins, resulting in MI, pulmonary embolism and other CVDs (11).

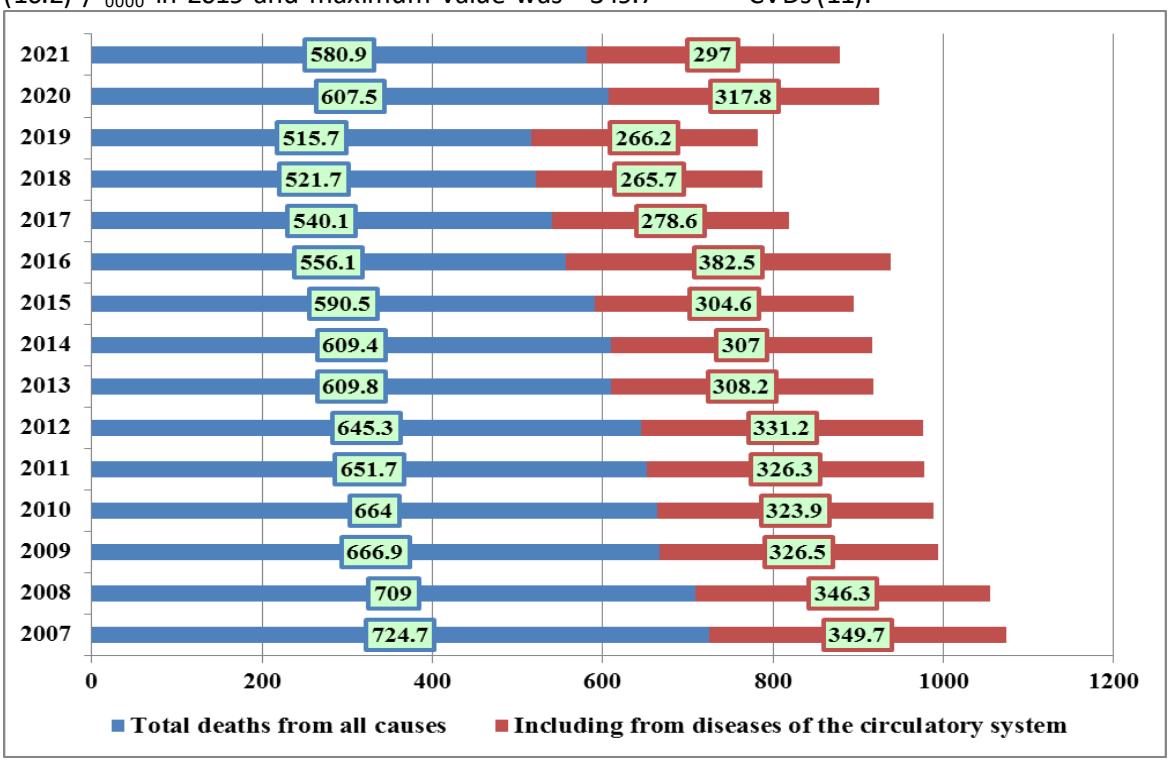

Figure 3. CVDs mortality data for 2007-2021 (Integral mortality rate)
CVDs – cardiovascular diseases

CVDs are both the main cause of mortality in the Kyrgyz Republic and also determine premature loss of working capacity and disability.

Discussion

In the structure of CVDs in Kyrgyzstan during the analyzed period hypertension prevails (52.9%), followed by CHD (27.54%), CerVD (9.45%) and other CVDs (10.0%). Our data are fully consistent with studies of other authors. According to Rosstat data, in the structure of causes of CVDs morbidity in the Russian Federation in 2020, arterial hypertension accounts for 7.15%, CHD – 3.27%, CerVD - 3.53% (12). There is no doubt that almost all epidemiologic studies have established that arterial hypertension is the main and leading risk factor for CHD. The prevalence of arterial hypertension among adult cohort in the Republic of Kazakhstan according to official statistical data varies from 15.2 to 27% depending on the region (7). In recent years, there has been a steady increase in the incidence of arterial hypertension in the Kyrgyz Republic.

Mean annual prevalence data in nine administrative territories of the Kyrgyz Republic from 2003 to 2021 range from 12573.6 (104.8) $/^{0}_{0000}$ (Bishkek city) to 3915.4 (61.3) $/^{0}_{0000}$ (Talas oblast), and morbidity - from 1493.4 (38.3) $/^{0}_{0000}$ (Batken oblast) to 764.1 (27.5) $/^{0}_{0000}$ (Talas oblast). The prevalence and morbidity rates have regional differences, which is apparently related to socio-economic, natural-climatic conditions and peculiarities of medical care of the population.

The Kyrgyz Republic is still among the countries at high risk of death from CVDs, along with such countries as Albania, Algeria, Armenia, Azerbaijan, Belarus, Bulgaria, Egypt, Georgia, Kazakhstan, Latvia, Macedonia, Moldova, Russian Federation, Syria, Tajikistan, Turkmenistan, Ukraine and Uzbekistan (13, 14).

According to WHO, the highest mortality rates from CHD among former CIS countries are registered in the Republic of Moldova - 496.16 $/^{0}_{0000}$, Ukraine - 491,91 $/^{0}_{0000}$, Kyrgyzstan - 444,59 $/^{0}_{0000}$, Russian Federation - 359,33 $/^{0}_{0000}$, Lithuania - 313,91 $/^{0}_{0000}$, Latvia - 248,88 $/^{0}_{0000}$, Estonia - 199,15 $/^{0}_{0000}$, Kazakhstan - 181,32 $/^{0}_{0000}$ (15).

Various programs have been developed in the Kyrgyz Republic to achieve a reduction in morbidity and mortality from CVDs in accordance with the state health policy: "Healthy heart for every Kyrgyz by 2010", "Manas Taalimi 2006-2010", "Den Sooluk" and "Comprehensive program for control of CVDs 2009-2013". However, despite the efforts made in the field of public health in the Kyrgyz Republic, CVDs remain at a rather high level and are the main cause of mortality among the population of the Kyrgyz Republic. Along with this, CVDs lead to disability of the population of the Kyrgyz Republic and cause enormous economic damage to the state (16-18).

The results of the analysis of statistical data on causes of mortality show that CVDs determine the total mortality of the population of the Kyrgyz Republic. For the period from 2007 to 2021, there is an increase in mortality from CVDs in the total mortality structure. In the period from 1991 to 1996, the authors of previous studies noted an increase in mortality from CVDs in the Kyrgyz Republic by 25%, which indicates that NCDs have long been the main causes of mortality in the Kyrgyz Republic and around the globe (17, 18).

Over the last 20 years, mortality from CVDs in young people aged 30-39 years has increased by 40.5%, and in people of working age 40-59 years on average by 18.1%. Similar data are reported by authors from other countries. Example from the Republic of Bashkortostan, where the main cause of death remains to be CVDs - 52% of deaths from the total number of deaths (19, 20). In the Republic of Buryatia in 2018. CVDs amounted to 445.9 (21.0) $/^{0}_{0000}$ in the structure of total mortality (21). In the Russian Federation, CVDs are still the main causes of death in the population (49.6% in women, 44% in men of all causes of death) (22).

Globally, CVDs remain the leading cause of premature mortality.

Arterial hypertension is known to be an independent CVDs, as well as a leading risk factor, largely determining the development of a large number of CVDs worldwide, such as CHD, heart failure, CerVD, peripheral arterial disease, chronic kidney disease and a frequent heart rhythm disorder - atrial fibrillation.

Overall, the prevalence of arterial hypertension in the adult population cohort (≥18 years) is approximately 30-45% and increases dramatically with age (13).

Study limitations

Our study has several limitations, as we did not perform the mortality analysis by regions of Kyrgyz Republic and shorter period than morbidity analysis was done. Further studies should be addressed.

Conclusions

- In Kyrgyz Republic, CVDs remain the leading cause of mortality.
- The prevalence of CVDs has a pronounced upward trend, while morbidity continues to increase at a moderate rate.
- The basic structure of CVDs is determined by arterial hypertension, CHD and CerVD.

- In different oblasts and cities of the Kyrgyz Republic, the average annual CVDs indicators differ significantly and the capital of the state takes the first place.
- In connection with the above, in the Kyrgyz Republic it is necessary to timely identify the precursors of CVDs development, to carry out preventive measures among the population at the primary level of medical care.
- Develop protocols for secondary prevention of CVDs, and pay special attention to the development of a protocol for secondary prevention in patients who have suffered an acute myocardial infarction.

Ethics: As the study was retrospective and include only statistical data, not patients, no Ethics committee approval nor obtained informed consent were necessary

Peer-review- External and internal

Conflict of interest- None to declare

Authorship: D.K.K., M.B.U, N.N.K., M.I.A., T.B.A., and B.B.S. equally contributed to the study and manuscript preparation, thus fulfilled all authorship criteria

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Availability of data and material: Contact authors. Any share should be in frame of Ethics, fair use with acknowledgement of source and/collaboration

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