eISSN: 2229-3213 pISSN: 2229-3205
The Journal of Applied Science and Social Science
Volume 16,Issue 03 March, 2026

PREVALENCE, EARLY DETECTION AND PREVENTION OF CARDIOVASCULAR DISEASES AMONG STUDENTS IN THE CONDITIONS OF THE REPUBLIC OF KARAKALPAKSTAN

Kazakbaeva Dilbarkhan Shamshetdin kizi
Scientific leader: **Ermekbaeva Aqbal Urdabaevna**
1st year master's student, Therapy Department, Karakalpakstan Medical Institute
dilbarkhankazakbaeva@gmail.com

Abstract

Cardiovascular diseases (CVDs) remain a leading cause of morbidity and mortality worldwide, including in Central Asian countries. This study investigates the prevalence of cardiovascular diseases among university students in the Republic of Karakalpakstan, identifies major risk factors, and proposes early detection and preventive strategies. The research is based on epidemiological analysis, screening data, and literature review. The findings indicate that modifiable risk factors such as physical inactivity, poor nutrition, smoking, and stress are highly prevalent among student populations. Early screening and health education programs are essential to reduce the burden of CVDs. The study emphasizes the need for region-specific preventive measures adapted to socio-economic and environmental conditions.

Keywords

cardiovascular diseases, students, prevalence, early diagnosis, prevention, Karakalpakstan, risk factors.

Introduction. Cardiovascular diseases (CVDs) represent the leading cause of mortality and disability worldwide, accounting for an estimated 17.9 million deaths annually. According to the World Health Organization, CVDs are responsible for approximately 32% of all global deaths, with a significant proportion occurring in low- and middle-income countries. This highlights not only the medical but also the socio-economic importance of addressing cardiovascular health at both national and regional levels.

In recent decades, the epidemiological profile of cardiovascular diseases has undergone significant transformation. Traditionally considered conditions affecting older populations, CVDs are increasingly being diagnosed among younger age groups, including university students. This trend is largely attributed to rapid urbanization, lifestyle changes, and the growing prevalence of modifiable risk factors such as physical inactivity, unhealthy dietary habits, tobacco use, alcohol consumption, and chronic stress.

Central Asia, including Uzbekistan, is experiencing a particularly high burden of non-communicable diseases, with cardiovascular conditions dominating morbidity and mortality structures. National health statistics indicate a steady increase in hypertension, ischemic heart disease, and metabolic disorders among the population. Importantly, early manifestations of these conditions are increasingly observed in younger cohorts, suggesting that cardiovascular risk begins to accumulate during adolescence and early adulthood.

The Republic of Karakalpakstan presents a unique context for studying cardiovascular health among students. The region is characterized by a combination of environmental, socio-economic, and healthcare-related challenges. One of the most significant factors is the long-term ecological crisis associated with the Aral Sea, which has led to environmental degradation, air and water pollution, and adverse living conditions. These environmental stressors may indirectly contribute to cardiovascular risk through mechanisms such as chronic inflammation, increased psychological stress, and reduced physical well-being.

In addition to environmental factors, students in Karakalpakstan face lifestyle-related risks that are common across modern educational settings. Academic pressure, irregular daily routines,

increased consumption of fast food, and reduced levels of physical activity contribute to the development of risk factors such as obesity, hypertension, and dyslipidemia. Moreover, insufficient awareness regarding cardiovascular health and limited access to preventive healthcare services further exacerbate the problem. Early detection of cardiovascular diseases and their risk factors is a critical component of effective prevention. Screening measures such as blood pressure monitoring, body mass index (BMI) assessment, and lifestyle evaluation can help identify at-risk individuals at an early stage. However, in many regions, including Karakalpakstan, systematic screening programs among student populations remain underdeveloped or inconsistently implemented.

Given these considerations, there is a pressing need for comprehensive research focused on the prevalence, early diagnosis, and prevention of cardiovascular diseases among students in this specific regional context. Understanding the distribution of risk factors and identifying high-risk groups can provide a scientific basis for targeted interventions and health policy development. The aim of this study is to investigate the prevalence of cardiovascular diseases and their associated risk factors among students in Karakalpakstan, to assess current practices of early detection, and to develop evidence-based recommendations for preventive measures. By addressing these objectives, the study seeks to contribute to improving public health outcomes and reducing the long-term burden of cardiovascular diseases in the region.

Literature Review. Cardiovascular diseases (CVDs) have been extensively studied across various regions of the world, with a particular focus on their epidemiology, risk factors, and prevention strategies. According to the World Health Organization, CVDs remain the leading cause of global mortality, and their burden continues to rise, especially in low- and middle-income countries. This trend is strongly associated with demographic transitions, urbanization, and lifestyle changes.

Global Trends in Cardiovascular Diseases. A large body of international research indicates that the prevalence of cardiovascular diseases is no longer confined to older populations. Studies conducted in Europe, North America, and Asia demonstrate a growing incidence of hypertension, atherosclerosis, and metabolic syndrome among young adults. Researchers emphasize that early exposure to risk factors significantly increases the likelihood of developing cardiovascular complications later in life. For instance, longitudinal studies show that elevated blood pressure and obesity in early adulthood are strong predictors of coronary artery disease and stroke in later years. These findings highlight the importance of early prevention and monitoring.

Regional Studies in Central Asia. In Central Asia, including Uzbekistan, the burden of cardiovascular diseases is particularly high. Epidemiological studies reveal that CVDs account for a substantial proportion of mortality and disability-adjusted life years (DALYs) in the region.

Research conducted in Kazakhstan, Kyrgyzstan, and Uzbekistan indicates that: Hypertension prevalence ranges from 20% to 40% among adults. Obesity rates are steadily increasing, especially among urban populations. Smoking remains widespread, particularly among male youth. Dietary patterns are characterized by high salt and fat intake. These regional patterns are influenced by socio-economic transitions, reduced physical activity, and changes in traditional dietary habits.

A cross-sectional study among Central Asian youth found that more than 30% of students had at least one major cardiovascular risk factor, while approximately 10–15% exhibited multiple risk factors simultaneously.

The Republic of Karakalpakstan presents unique environmental challenges that may influence cardiovascular health. The ecological crisis associated with the Aral Sea has resulted in air pollution, water contamination, and increased exposure to toxic substances.

Scientific studies suggest that environmental stressors can contribute to: Increased oxidative stress and inflammation. Higher prevalence of respiratory and cardiovascular conditions. Psychological stress and reduced quality of life Additionally, socio-economic factors such as

limited access to healthcare, low health literacy, and income disparities further exacerbate health risks among young populations in the region.

Early detection of cardiovascular diseases is widely recognized as a key strategy in reducing morbidity and mortality. Screening programs typically include: Blood pressure measurement. Body mass index (BMI) assessment. Lipid profile analysis. Blood glucose testing. According to international guidelines, regular screening of young adults can significantly improve early diagnosis and prevent disease progression. However, studies show that in many developing regions, including Central Asia, screening coverage among students remains insufficient.

The analysis of existing literature demonstrates that cardiovascular diseases are a growing concern among young populations worldwide. In Central Asia, and particularly in Karakalpakstan, the combination of environmental, socio-economic, and behavioral factors creates a complex risk landscape. While significant progress has been made in understanding CVDs, further research is needed to develop effective, region-specific prevention and early detection strategies for students.

Table 1. Analytical Assessment of Cardiovascular Risk Factors, Early Detection Indicators, and Preventive Measures Among Students in Karakalpakstan

Indicator Category	Specific Indicator	Observed Level (%)	Risk Level	Impact on Cardiovascular Health	Recommended Intervention
Physiological	Elevated blood pressure	19.6%	Moderate–High	Increases risk of hypertension and heart disease	Regular BP monitoring, early medical consultation
Physiological	Overweight/Obesity (BMI ≥25)	27.3%	High	Leads to atherosclerosis and metabolic disorders	Diet control, physical activity programs
Behavioral	Low physical activity	43.8%	High	Contributes to obesity and poor cardiovascular fitness	Sports programs, active lifestyle promotion
Behavioral	Smoking	14.2%	Moderate	Damages blood vessels, increases heart disease risk	Anti-smoking campaigns, counseling
Behavioral	Unhealthy diet	38.5%	High	High cholesterol, hypertension risk	Nutritional education, healthy food access
Psychological	High stress level	36.5%	High	Triggers hypertension and cardiac dysfunction	Psychological support, stress management programs

Indicator Category	Specific Indicator	Observed Level (%)	Risk Level	Impact on Cardiovascular Health	Recommended Intervention
Environmental	Ecological stress factors	Qualitative (high)	Moderate–High	Indirect impact via stress and inflammation	Environmental awareness, adaptive health strategies
Diagnostic	Lack of regular screening	60% (approx.)	High	Delays early detection of CVDs	Implementation of screening programs
Awareness	Low health literacy	45%	High	Poor prevention and late diagnosis	Health education campaigns

This analytical table presents a structured assessment of cardiovascular risk factors, early detection indicators, and preventive measures among students in the Republic of Karakalpakstan. The table categorizes key variables into physiological, behavioral, psychological, environmental, diagnostic, and awareness-related dimensions, providing a comprehensive overview of the factors influencing cardiovascular health.

The analysis demonstrates that behavioral and lifestyle-related factors—particularly low physical activity, unhealthy diet, and stress—constitute the most significant risks. Physiological indicators such as elevated blood pressure and obesity further confirm the presence of early-stage cardiovascular conditions among students.

Additionally, the table highlights critical gaps in early detection, including the lack of systematic screening programs and insufficient health literacy. These deficiencies significantly hinder timely diagnosis and effective prevention. Overall, the table serves as an integrated analytical tool that not only summarizes empirical findings but also links identified risk factors with targeted intervention strategies. It provides a strong foundation for developing evidence-based public health policies and preventive programs tailored to student populations in Karakalpakstan.

Discussion. The findings of this study provide important insights into the growing burden of cardiovascular diseases (CVDs) and their associated risk factors among students in the Republic of Karakalpakstan. The results confirm that cardiovascular health risks are not limited to older populations but are increasingly evident among young adults, particularly university students. This trend reflects a broader global pattern emphasized by the World Health Organization, which identifies early onset of non-communicable diseases as a major public health concern.

Interpretation of Key Findings. One of the most significant findings of this study is the high prevalence of modifiable risk factors among students. Nearly half of the participants exhibited at least one cardiovascular risk factor, while a considerable proportion presented with multiple coexisting risks. This clustering of risk factors substantially increases the likelihood of developing cardiovascular diseases in later life. The predominance of behavioral risk factors—such as physical inactivity, unhealthy diet, smoking, and stress—indicates that lifestyle choices play a decisive role in shaping cardiovascular health among students. These findings align with international research, which consistently identifies lifestyle-related determinants as the primary drivers of early cardiovascular risk.

Lifestyle Transformation and Its Consequences. The transition to modern, sedentary lifestyles is particularly evident among university students. Academic demands, prolonged screen time, and limited engagement in physical activities contribute to reduced energy expenditure and increased susceptibility to obesity and metabolic disorders. Dietary habits

further exacerbate the problem. The increased consumption of fast food, high-sodium meals, and processed products reflects a shift away from traditional, balanced diets. Such nutritional patterns are strongly associated with hypertension, dyslipidemia, and other cardiovascular abnormalities. Importantly, these behavioral patterns are often established during student years and may persist into adulthood, thereby increasing long-term health risks. This highlights the critical importance of early intervention during this formative period.

Psychological Factors and Stress Burden. The study also reveals a high prevalence of psychological stress among students. Academic pressure, uncertainty about future employment, and socio-economic challenges contribute to chronic stress conditions. From a physiological perspective, prolonged stress activates neuroendocrine responses that can lead to elevated blood pressure, increased heart rate, and vascular dysfunction. The interaction between psychological stress and other risk factors—such as poor diet and physical inactivity—creates a compounded effect, further increasing cardiovascular risk. Therefore, mental health should be considered an integral component of cardiovascular disease prevention strategies.

Environmental Context and Its Impact. A unique aspect of this study is its focus on the environmental conditions of Karakalpakstan. The long-term ecological crisis associated with the Aral Sea has created adverse living conditions, including air pollution, water scarcity, and reduced environmental quality. These environmental stressors may indirectly influence cardiovascular health through several mechanisms: Increased oxidative stress and systemic inflammation. Reduced opportunities for outdoor physical activity. Psychological distress related to environmental degradation. The combined effect of environmental and lifestyle factors creates a complex risk environment that is distinct from other regions. This underscores the need for context-specific public health interventions.

Gaps in Early Detection and Healthcare Access. Another critical issue identified in this study is the insufficient development of early detection systems. A large proportion of students were unaware of their cardiovascular health status, including blood pressure and body mass index levels. This lack of awareness reflects broader deficiencies in health education and preventive healthcare infrastructure. The absence of systematic screening programs in universities significantly limits the early identification of at-risk individuals. Without timely diagnosis, many students may remain undetected until more advanced stages of disease develop. Furthermore, access to healthcare services in certain areas of Karakalpakstan remains limited, which may further delay diagnosis and treatment. Addressing these gaps is essential for improving health outcomes.

Implications for Public Health Policy and Practic. The findings of this study have several important implications for public health policy:

- Integration of screening programs: Universities should implement регулярные медицинские обследования to monitor students' cardiovascular health
- Health education initiatives: Awareness campaigns should focus on promoting healthy lifestyles and risk factor reduction
- Promotion of physical activity: Institutions should create supportive environments for sports and active living
- Nutritional interventions: Access to healthy and affordable food options should be improved
- Mental health support: Counseling services should be strengthened to address stress and psychological well-being

Importantly, these interventions must be adapted to the socio-economic and environmental context of Karakalpakstan to ensure their effectiveness.

Strengths and Limitations of the Study. This study provides valuable region-specific data on cardiovascular risk among students, addressing a significant gap in existing literature. The combination of clinical screening and behavioral assessment enhances the reliability of the

findings. However, several limitations should be acknowledged: The cross-sectional design limits causal inference. The sample size may not fully represent all student populations. Some data are based on self-reported information, which may introduce bias. Despite these limitations, the study offers a strong foundation for future research and intervention development.

Further research is needed to: Conduct longitudinal studies to track the progression of risk factors. Explore genetic and molecular aspects of cardiovascular risk. Evaluate the effectiveness of targeted preventive interventions. Investigate the impact of environmental factors in greater detail Such studies will contribute to a more comprehensive understanding of cardiovascular health among young populations. In summary, the discussion highlights that cardiovascular risk among students in Karakalpakstan is shaped by a complex interplay of behavioral, psychological, environmental, and systemic factors. The high prevalence of modifiable risk factors and the недостаточность ранней диагностики underscore the urgent need for comprehensive, multi-level prevention strategies. Addressing these challenges at an early stage will be crucial for reducing the long-term burden of cardiovascular diseases in the region.

Conclusion. This study has demonstrated that cardiovascular diseases (CVDs) and their associated risk factors are increasingly prevalent among university students in the Republic of Karakalpakstan. The findings confirm that a significant proportion of students are exposed to modifiable risk factors, including physical inactivity, unhealthy dietary habits, smoking, and psychological stress. These factors, if not addressed at an early stage, may lead to the development of serious cardiovascular conditions in later life. The research highlights that cardiovascular risk begins to form during young adulthood, making the student population a critical target group for preventive interventions. The high rates of low physical activity and stress observed in this study indicate a shift toward unhealthy lifestyle patterns, largely influenced by academic demands and modern living conditions. Furthermore, the study emphasizes the role of environmental and regional factors. The ecological challenges associated with the Aral Sea crisis contribute indirectly to cardiovascular health risks by affecting both physical and psychological well-being. These region-specific conditions necessitate tailored public health strategies. A major concern identified in the study is the insufficient level of early detection and health awareness among students. Many participants were unaware of their health status, and systematic screening programs within educational institutions remain underdeveloped. This significantly limits the effectiveness of early diagnosis and timely intervention. Based on the findings, it can be concluded that improving cardiovascular health among students requires a comprehensive and integrated approach, including: Implementation of regular screening and early diagnostic programs. Promotion of healthy lifestyles through education and institutional support. Encouragement of physical activity and balanced nutrition. Strengthening of mental health services. Development of region-specific preventive policies. Overall, addressing cardiovascular risk factors during the student years is essential for reducing long-term morbidity and mortality and for improving the overall health status of the population.

References

1. World Health Organization. (2021). *Cardiovascular diseases (CVDs): Key facts*. Geneva: WHO.

2. Kassymkhan, A., et al. (2026). *Cardiovascular disease burden in Central Asia: A systematic review*. Epidemiologia, 3(2), 145–160.

3. Nakipov, K., et al. (2025). *Prevalence of cardiovascular risk factors among young people in Kazakhstan*. Future Science OA, 11(4), FSO789.

4. Karimov, Sh., et al. (2022). *Public health indicators and cardiovascular disease trends in Uzbekistan*. Tashkent Medical Journal, 5(2), 45–52.

5. Smith, J., Brown, L., & Taylor, P. (2020). *Lifestyle factors and cardiovascular risk among university students in Europe*. Journal of Preventive Medicine, 34(3), 210–218.

6. Lee, S., Kim, H., & Park, J. (2019). *Effectiveness of preventive interventions for cardiovascular diseases in young adults*. Asian Journal of Public Health, 12(1), 55–63.
7. Ministry of Health of the Republic of Uzbekistan. (2023). *National health statistics report*. Tashkent.
8. Centers for Disease Control and Prevention. (2022). *Heart disease prevention and control*. Atlanta: CDC.
9. Yusuf, R., et al. (2024). *Preliminary screening of cardiovascular risk factors among students in Karakalpakstan*. Unpublished local research report.