MODERN PROBLEMS AND PROSPECTS OF HYGIENE AND EPIDEMIOLOGY IN PRESERVING PUBLIC HEALTH UNDER GLOBAL CLIMATE CHANGE CONDITIONS

Xolmurodov Boburjon Bobomurod o‘g‘li

Bukhara State Medical Institute named after Abu Ali ibn Sino

E-mail: bxolmurodov481@gmail.com

Qurbonova Aberabonu Matyoqib qizi

Bukhara State Medical Institute named after Abu Ali ibn Sino

E-mail: qurbonovaaberabonu@gamil.com

Abstract

This article scientifically analyzes the current problems of hygiene and epidemiology in the context of global climate change, urbanization, ecological degradation, and the emergence of new infectious diseases. Risk factors related to air pollution, drinking water safety, food hygiene, antimicrobial resistance, pandemics, and population migration are highlighted. In addition, modern strategies of preventive medicine, directions for improving sanitary-epidemiological control systems, and the prospects of digital epidemiology are discussed. The results of the study indicate the necessity of modernizing hygiene and epidemiology systems in accordance with global threats.

Keywords: hygiene, epidemiology, global health, climate change, pandemic, ecological risk, sanitation, prevention, antimicrobial resistance, public health.

INTRODUCTION

In the 21st century, one of the most important challenges facing humanity is ensuring global health security. The acceleration of urbanization, industrialization, ecological imbalance, and increasing international migration contribute to the emergence of new epidemiological threats worldwide. In particular, the COVID-19

pandemic demonstrated the critical importance of sanitary-hygienic and epidemiological control systems across the globe.

Hygiene and epidemiology play a fundamental role in preserving human health, preventing diseases, and promoting healthy lifestyles. Under modern conditions, the main task of these fields is not only disease control but also forecasting global risk factors and developing effective preventive measures.

MAIN PART

The Impact of Climate Change on Human Health

Global climate change has direct and indirect negative effects on human health. Rising atmospheric temperatures, changes in humidity, droughts, floods, and natural disasters complicate the sanitary-epidemiological situation.

Air pollution contributes to the increase of:

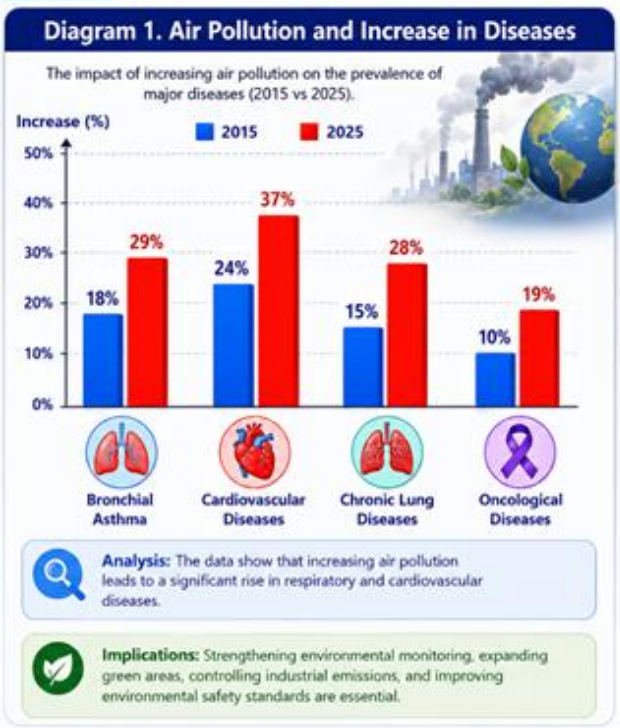
bronchial asthma;

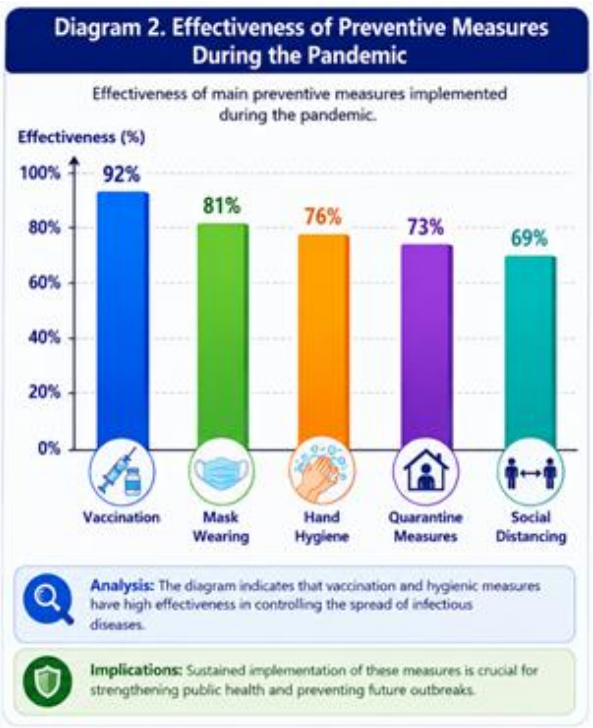
chronic obstructive pulmonary diseases;

cardiovascular diseases;

oncological diseases.

According to the World Health Organization, air pollution causes millions of premature deaths every year. In particular, PM2.5 and PM10 particles have highly toxic effects on the human body.





Analysis: The data show that increasing air pollution significantly contributes to the rise of respiratory and cardiovascular diseases.

From a hygienic perspective, it is important to strengthen ecological monitoring, expand green areas, control industrial emissions, and improve environmental safety standards.

Water Hygiene and Epidemiological Safety

Providing clean drinking water is one of the priority areas of global public health. Water pollution leads to the spread of intestinal infections, viral hepatitis, cholera, dysentery, and parasitic diseases.

The main causes of waterborne diseases include:

non-compliance with sanitary requirements;

insufficient wastewater disinfection;

excessive use of chemicals in agriculture;

deterioration of water supply infrastructure.

Modern epidemiology uses:

microbiological monitoring;

GIS technologies;

molecular diagnostics;

digital laboratory systems to control water quality.

Pandemics and the New Stage of Modern Epidemiology

The COVID-19 pandemic exposed weaknesses in epidemiological control systems. Due to rapid viral mutations and global migration, infections can spread internationally within a short time.

During the pandemic, the following preventive measures proved effective:

vaccination;

personal hygiene practices;

quarantine measures;

social distancing;

epidemiological monitoring.

Analysis: The diagram demonstrates that vaccination and hygienic measures showed high effectiveness in epidemiological control systems.

Modern epidemiology is increasingly developing based on artificial intelligence, bioinformatics, and Big Data technologies. Digital epidemiology enables early disease prediction and modeling of epidemic processes.

Antimicrobial Resistance – A Global Threat

Uncontrolled use of antibiotics increases microbial resistance to medications. Antimicrobial resistance (AMR) is currently one of the greatest challenges for global healthcare systems.

The main causes of AMR include:

self-medication with antibiotics;

widespread antibiotic use in veterinary medicine;

poor compliance with sanitary-hygienic standards in hospitals.

Scientific forecasts suggest that by 2050, AMR-related deaths may exceed 10 million annually if rational antibiotic use systems are not implemented.

Preventive measures include:

strengthening antibiotic therapy control;
improving hospital hygiene;
modernization of sterilization and disinfection systems;
increasing public sanitary awareness.

Food Hygiene and Safety

Biological and chemical contamination of food products increases epidemiological risks. Pesticides, nitrates, heavy metals, and microorganisms have toxic effects on the human body.

Currently, the “Food Safety” system includes:

HACCP system;
laboratory control;
food monitoring;
production hygiene.

A balanced and high-quality diet plays an important role in strengthening public immunity.

Digital Hygiene and the Future of Epidemiology

With the rapid development of information technologies, the concept of “digital hygiene” has emerged. The spread of false medical information became a serious issue during pandemics.

The main directions of future epidemiology include:

AI-based monitoring systems;
genomic epidemiology;

telemedicine;

mobile healthcare platforms;

global epidemiological databases.

Digital technologies enable rapid monitoring of epidemic processes, disease prediction, and epidemiological mapping.

CONCLUSION

Hygiene and epidemiology are strategically important sciences in ensuring global health security. Climate change, ecological problems, pandemics, and antimicrobial resistance are creating new challenges for preventive medicine.

Therefore, it is necessary to:

1. Modernize sanitary-epidemiological control systems;
2. Strengthen preventive medicine;
3. Expand ecological monitoring;
4. Improve public hygienic literacy;
5. Develop digital epidemiology.

These measures are essential for reducing global epidemiological risks and strengthening public health.

REFERENCES

1. World Health Organization. *Global Public Health and Environmental Protection Reports*. Geneva, 2024.
2. Centers for Disease Control and Prevention (CDC). *Principles of Epidemiology in Public Health Practice*. Atlanta, 2023.
3. Murray C.J.L. *Global Burden of Disease Study*. The Lancet, 2024.
4. Last J.M. *Public Health and Preventive Medicine*. New York, 2022.

5. Bekmuhamedov A.A. *Fundamentals of Hygiene and Ecology*. Tashkent, 2023.

6. Umarov Sh.S. *Modern Problems of Epidemiology*. Tashkent, 2024.

7. WHO. *Air Pollution and Human Health Report*. Geneva, 2024.

8. UNICEF & WHO Joint Monitoring Programme for Water Supply and Sanitation. 2023.

9. Fauci A.S. *Emerging and Re-Emerging Infectious Diseases*. Clinical Infectious Diseases, 2023.

10. Sanitary Legislation and Hygienic Standards of the Republic of Uzbekistan. Tashkent, 2025.