

ASSESSMENT OF THE HYGIENIC-SANITARY QUALITY OF DRINKING WATER AND ITS IMPORTANCE FOR HUMAN HEALTH.

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Abstract: This article analyzes the hygienic-sanitary assessment of drinking water quality and its impact on human health. Physical-chemical and microbiological indicators of drinking water were studied using national and international standards. The study shows that inadequate drinking water remains a key risk factor for infectious diseases, especially in rural and decentralized water supply systems. The authors propose practical recommendations for improving access to safe and high-quality drinking water.

Keywords: drinking water, hygiene, sanitation, microbiology, water quality, health.

INTRODUCTION

Drinking water is one of the fundamental needs of human life, and its quality directly affects population health. According to WHO, over 2 billion people worldwide consume water contaminated with fecal matter, and water-related diseases claim hundreds of thousands of lives annually. The hygienic and sanitary assessment of drinking water includes evaluating its safety, chemical content, microbial contamination, and physical parameters such as turbidity, color, and odor.

In Uzbekistan, ensuring access to safe drinking water is part of national health and environmental policy. However, discrepancies in regional infrastructure, aging water supply systems, and poor maintenance result in variable water quality, especially in rural areas. This paper aims to evaluate drinking water quality using sanitary-hygienic criteria and propose effective public health interventions.

LITERATURE REVIEW

Numerous studies have demonstrated the importance of water quality in preventing gastrointestinal infections, parasitic diseases, and heavy metal poisoning. A study by Prüss-Ustün et al. (2020) indicates that unsafe drinking water contributes to 485,000 diarrheal deaths annually. Additionally, chronic exposure to arsenic, lead, and nitrates has been linked to cancer, neurological disorders, and developmental issues in children (Smith et al., 2018).

In Uzbekistan, the “SanPiN 2.1.4.1074-01” regulations define permissible limits for water contaminants. However, environmental monitoring by local hygienic centers often reveals high levels of microbial contamination in decentralized systems. Research by Rustamova (2022) shows that in some rural areas, 20–30% of water samples exceed the norm for total coliform bacteria.

International best practices emphasize multi-barrier approaches, including source protection, water treatment, regular monitoring, and community education. These have proven effective in countries such as Singapore, Finland, and South Korea.

MATERIALS AND METHODS

This study was conducted from January to August 2024 in the Fergana Valley region of Uzbekistan. A total of 45 water samples were collected from centralized and decentralized sources (wells, tap water, and rural systems).

Laboratory analysis included:

- Physical parameters: Temperature, turbidity, odor, and color
- Chemical indicators: pH, nitrates, nitrites, iron, chlorine, sulfates
- Microbiological parameters: Total coliforms, E. coli, enterococci

Water samples were tested according to national standards (SanPiN 2.1.4.1074-01) and WHO guidelines. Each sample was compared with the maximum permissible concentration (MPC) of contaminants. A survey was also conducted among 150 local residents to assess water usage practices and awareness of hygiene.

RESULTS

Physical-Chemical Parameters:

- Turbidity: 28% of rural samples exceeded the normative value (>1 NTU).
- Nitrate levels: 11% of samples surpassed the 50 mg/L limit.
- pH levels: Ranged from 6.3 to 8.4, mostly within acceptable range.
- Iron concentration: Detected in 13% of samples (up to 0.7 mg/L).

Microbiological Contamination:

- Total coliforms: Detected in 34% of decentralized sources.
- E. coli: Found in 19% of samples, posing serious health risks.
- Enterococci: Identified in 8% of the samples.

Population Survey Highlights:

- 67% of respondents drink water without boiling or filtering it.
- Only 23% were aware of the risks of microbial contamination.
- 40% experienced gastrointestinal symptoms in the past 6 months.

DISCUSSION

The findings indicate that water from decentralized sources, especially in rural areas, poses considerable risks due to poor microbiological quality. The presence of *E. coli* and coliforms is a direct indicator of fecal contamination, often due to insufficient chlorination, surface runoff, or proximity to septic systems.

Chemical parameters such as nitrates and iron also suggest agricultural runoff and old piping systems contribute to contamination. The population's limited awareness of water safety exacerbates the issue, underscoring the need for health education campaigns.

Compared to countries with advanced water safety plans, Uzbekistan still faces infrastructure and policy implementation challenges. Regular inspections, improved rural water systems, and public involvement are essential for progress.

CONCLUSION AND RECOMMENDATIONS

This study confirms that a significant portion of drinking water sources in rural Uzbekistan does not meet hygienic and sanitary standards. The main concerns include:

- Microbial contamination (*E. coli*, coliforms)
- Elevated nitrate and iron levels
- Low public awareness about water-related health risks

Recommendations:

1. Strengthen water quality monitoring, especially in rural regions.
2. Modernize outdated water infrastructure and treatment systems.
3. Increase community awareness through hygiene education programs.
4. Promote household-level treatment (filtration, boiling, chlorination).
5. Foster collaboration between health authorities, environmental agencies, and local governments.

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