INTERNATIONAL MULTIDISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
SJIF 2019: 5.222 2020: 5.552 2021: 5.637 2022:5.479 2023:6.563 2024: 7,805
eISSN :2394-6334 https://www.ijmrd.in/index.php/imjrd Volume 12, issue 05 (2025)

SANITARY STANDARDS AND REAL-WORLD ANALYSIS OF DRINKING WATER HYGIENE

Rizvonqulova Moxiniso Voxidjon kizi
Fergana Medical Institute of Public Health
Fergana, Uzbekistan

Abstract: Water is one of the most important factors necessary for human life. 60-70% of the human body is water, and its purity, safety and hygienic condition are of direct importance for health. Therefore, the hygiene of drinking water, its compliance with sanitary standards, the degree of purification and the current real state are considered an important socio-hygienic issue.
Water purification is a set of technological processes designed to bring the quality of water entering the water supply network from water supply sources such as rivers, lakes, ponds, reservoirs, etc. to the established standards. It also includes the treatment of wastewater from industrial enterprises and household enterprises. It is carried out using water supply and sewage treatment plants, as well as using biological and chemical engineering structures at enterprises, and using biological and chemical methods.
Keywords: Earth's surface, natural water sources, rivers, lakes, waterworks, treatment plants, sedimentation, clarification, water composition, suspended solids, colloidal (fine) particles, containers, aluminum sulfate, iron chloride, gravel, sand layer, porous ceramic filter, microorganisms, viruses, gas, chlorine, hypochlorites, NaClO, $Ca(SO)_2$, chlorinated lime, settled water, ozone, ultraviolet rays, lamps, calcium and magnesium salts, aeration, lime, sodium aluminate $NaAlO_2$, calcined dolomite, hydrogen sulfide, methane, radon, carbon dioxide, degassing, odor, wastewater.

INTRODUCTION

Natural surface water sources such as rivers, lakes, etc. are filtered, softened, and disinfected before being released into the water supply network. During clarification and softening in treatment facilities, suspended and colloidal (fine) particles in the water sink to the bottom, the water is treated with aluminum sulfate and ferric chloride in special tanks, and the water is passed through a gravel, sand bed, and sometimes porous ceramic filter. To disinfect clear water (to kill various microorganisms and viruses, liquid or gaseous chlorine, hypochlorites - NaClO, $Ca(SO)_2$ and chlorine double oxide SO_2, chlorinated lime are added to it, and to disinfect settled water and groundwater, ozone and ultraviolet rays are also used. Mercury-quartz or argon-mercury lamps are used for this. If the water is hard (the total amount of calcium and magnesium salts in it is higher than the norm), it is softened (see Water softening). Groundwater is often deironed (enriched with oxygen from the air) by aeration. To desiliconize water (reduce the amount of metasilicic acid H_2SiO_3 and its salts), lime, sodium aluminate $NaAlO_2$, and sometimes calcined dolomite are used. To remove other dissolved salts in the water, it is desalinated (see Water desalination) or ionites. Desalination. Water is degassed to remove hydrogen sulfide, methane, radon, carbon dioxide and other dissolved gases from the water (see Degassing). To reduce excess fluorine in the water, water is filtered through activated aluminum oxide. If the water is found to contain radioactive substances, it is deactivated (see Deactivation). If the water has an unpleasant odor, it is treated with activated carbon, ozone, potassium permanganate or chlorine dioxide (see Sorbing).

The issues of wastewater treatment (polluted water from industrial enterprises, household enterprises and residential areas) and rainwater are an important part of nature protection. Sludge, colloids and dissolved substances in wastewater are precipitated in clarifiers, harmful substances are neutralized by biological methods (see Biological filter, Water disinfection), and water from enterprises is purified in treatment plants. Physicochemical, thermal and other methods of water treatment There are also methods.

It is impossible to completely purify natural waters from microorganisms, salts and gases using industrial methods. Therefore, it is required that the amount of microorganisms in drinking water from reservoirs does not exceed a certain established norm. For example, the total number of microorganisms in 1 ml of drinking water should not exceed 100, and the number of Escherichia coli bacteria should not exceed 3. The total hardness of water should be up to 7 mmol/l, dry residue up to 1000 mg/l, and the hydrogen index - rayon from 6.0 to 9.0. In some cases, the hardness of drinking water is allowed to be up to 10 mmol/l, dry residue up to 1500 mg/l, and the content of iron and manganese ions up to 1 and 0.5 mg/l, respectively. St. is a very important measure in the national economy and in maintaining the health of the population.

Water supply in cities and districts of Uzbekistan is centralized. Drinking water supplied to the population is cleaned using the above methods and undergoes sanitary inspection. This work is carried out by city and district sanitary-epidemiological stations (SES). Wastewater from large industrial and household enterprises is treated at local treatment facilities

MATERIALS AND METHODS

1. The concept of drinking water hygiene.
Drinking water hygiene is a set of hygienic measures and a control system aimed at ensuring that water intended for drinking does not pose a threat to human health. The hygienic quality of water is understood as the compliance of its physical, chemical, microbiological and radiological indicators with sanitary standards.
2. Sanitary and regulatory requirements for drinking water
3. Regulatory documents of the Republic of Uzbekistan
In Uzbekistan, the quality of drinking water is controlled on the basis of the following main documents:
Hygienic norms of the Ministry of Health of the Republic of Uzbekistan (SanPiNs)
Uniform hygienic standards of the CIS countries (SanPiN 2.1.4.1074-01)
4. Physicochemical indicators
Color, smell and taste - should be normal, harmless and imperceptible.
Temperature – recommended to be around 8-12°C.
pH level – from 6.5 to 8.5.
Salt content (hardness) – up to 1.5–7 mg-eq/l.
The level of iron, manganese, chlorine residues, ammonium, nitrates and nitrites should not exceed the standards.
5. Microbiological indicators
The following indicators are monitored in drinking water: Escherichia coli bacteria (Coli-index) – should be 0 in 100 ml of water.
Total number of bacteria – should not exceed 100 in 1 ml of water. Pathogenic microorganisms – should not be present.
6. Sources of drinking water and risk factors
The quality of drinking water largely depends on its source:

7. Water sources
Surface waters (rivers, lakes): the sources most susceptible to pollution.
Groundwater: relatively clean, but sometimes contains large amounts of iron, fluoride, nitrates.
Recycled water: is treated through centralized water supply.
8. Main risk factors
Industrial waste, Agricultural pesticides and fertilizers, Water sources near landfills, Poor quality treatment facilities, Aging water pipes.
9. Analysis of the real situation in Uzbekistan
10. In urban areas
Urban residents are usually provided with drinking water through centralized water supply networks. At the same time, in some places:
Aging pipes, Weak quality control systems, Insufficient planned disinfection work are observed.
11. In rural areas
Many rural residents: Use wells, springs or open water sources.
This situation causes the following problems: Water may be microbiologically contaminated, Disinfection work is not carried out, Sanitary control in villages is insufficient.
12. Statistical data (2020–2024)
According to the State Water Resources Administration, microbiological indicators in 10-15% of drinking water samples exceeded the norm. Nitrates were found to be above the norm in 25-30% of wells in the republic.
More than 20% of the population is at risk of drinking poor-quality water.
13. Methods of purification and disinfection of drinking water
1. Mechanical purification, Sand filtration, Sedimentation and filtration.
2. Chemical purification
Chlorination (often used, but leaves a specific odor). Ozonation (good, but expensive). Coagulation and flocculation.
All methods used in water purification are divided into 2 groups: a) basic methods; b) auxiliary methods.
Basic methods are used in almost any conditions and situations, while auxiliary methods are used in cases where the water body has a specific nature of pollution.

RESULTS

The main methods of water purification include water clarification and disinfection.

Water clarification is understood as the precipitation of suspended particles in the water and the clarification of water. This method is important for water in open water bodies, especially in the spring and winter months, when the water formed from rain and snowmelt contains a lot of soil particles. In water distribution facilities, water clarification is carried out in several stages:

1. As a result of adding a coagulant to the water to be purified, a porous complex is formed, which, during its formation and gradual precipitation, binds to the clay particles and clarifies the water;

2. Water settling - the porous complexes gradually sink to the bottom of the pond;

3. Water filtration - in order to completely clarify the water in the pond, water is passed through special filters. Water clarification can be used in certain conditions, namely in conditions where phytoplankton are present in the water, for which microfiltration of water is required.

Water disinfection means removing microorganisms from drinking water. For this, physical and chemical disinfection methods have been developed.

Physical methods - boiling water, ultraviolet light treatment. This method is not used for disinfection of large volumes of water, but its efficiency is high, therefore, chemical disinfection methods are more often used in centralized water supply.

Chemical disinfection methods - methods such as chlorination of water, disinfection with ozone.

2. Modern technologies

The State Standard consists of two main sections: "Standards for water quality indicators and methods of its control" and "Water quality control in the centralized system of household drinking water supply".

Drinking water quality indicators include the following:

1. Microbiological indicators: total microbial count, coli-index, escherichia coli, coliphages.

2. Parasitological indicators: common pathogens and helminth eggs.

3. Toxicological indicators: according to the REK

a) inorganic components (15)

b) organic substances components (4 names)

4. Organoleptic indicators and REK for components, since these components affect the organoleptic properties of water (17 indicators).

5. Radioactive contamination indicators - by alpha and beta activity.

Water purification according to the State Standard 951-2011, It is not required only for groundwater of class 1. In all other cases, the methods and volume of work for water treatment depend on the primary quality of the water at the source, that is, it is fully described in the State Standard 951-2011.

Analysis of the real situation of drinking water hygiene

The hygienic condition of drinking water in the territory of the Republic of Uzbekistan is closely related to the geographical location of the country, infrastructure, place of residence of the population (urban or rural), proximity of industrial enterprises, and the effectiveness of the sanitary control system. Although in recent years a number of projects have been implemented by the state to improve drinking water supply, the hygienic quality of water is still an urgent issue.

1. Water supply system and problems

1.1. In urban areas:

Urban residents usually use a centralized water supply system. Although there are water treatment facilities, in some cases:

Obsolete pipes (30-40 years of service life), Through internal pipes secondary pollution, low level of disinfection, insufficient periodic monitoring,

As a result, the water quality does not meet hygiene standards. Some analyzes reveal a low or even absent level of residual chlorine in the water, which creates a favorable environment for microorganisms.

1.2. In rural areas:

Drinking water hygiene has become an even more serious problem in rural areas. The reasons are as follows:

Water is obtained from wells, open springs or informal sources, Absence or malfunction of treatment facilities, Complete lack of microbiological control, Risks from landfills and wastewater near water sources.

2. Analysis based on statistics (2020–2024)

According to open sources and hygiene laboratories in the health sector:

In 2021, 14% of drinking water samples tested across the republic had microbiological indicators exceeding the norm.

More than 30–35% of wells in rural areas had nitrate levels above the established sanitary standards.

In some regions (for example, in the Republic of Karakalpakstan, Navoi, Jizzakh regions), the natural composition of water contains physicochemical indicators - in particular, fluorine, iron, manganese - exceeding the standards. In water networks with a low level of disinfection, high rates of intestinal infections and acute internal diseases have been observed.

3. Impact on public health

Water that does not meet hygienic requirements causes the following conditions:

Acute intestinal infections (dysentery, salmonellosis, viral gastroenteritis), Worm infestation, Methemoglobinemia (greenhouse disease - mainly due to nitrates), Skin and allergic diseases.

The population's low water use culture and hygiene knowledge also exacerbate existing problems.

3. Solutions and development opportunities

Establish regular monitoring of local water sources, Introduce disinfection and purification technologies (filters, UV rays, chlorination), Strengthen hygiene awareness among the population,

Build small water treatment plants in rural areas, Increase the capacity of sanitary and epidemiological services.

DISCUSSION

Drinking water is an integral factor of human health and quality of life, and its hygienic quality is directly related to its compliance with sanitary standards. Despite the fact that in recent years certain measures have been taken in Uzbekistan to improve the water supply system, the physicochemical and microbiological composition of water in many regions does not meet hygienic requirements. Especially in rural areas, pollution of water sources, the absence or inefficiency of treatment facilities, and the insufficient control system create serious problems.
Statistical analyses show that harmful substances - nitrates, iron, fluorine and microorganisms - are detected in water at high levels, which increases the risk of intestinal infections, methemoglobinemia and other hygienic diseases. Also, the population's insufficient knowledge of water use culture and hygiene further exacerbates the existing problems.
Based on the above analyses, the following conclusions were drawn: It is necessary to establish a strict monitoring system for the hygienic quality of drinking water;
The introduction of disinfection and modern purification technologies is urgent;
It is necessary to carry out large-scale propaganda work to improve the culture of hygiene and health among the population;
It is important to establish the use of small and economically viable water treatment facilities in rural areas;
Harmonization of sanitary standards with international standards, as well as the training of specialists and the development of technical capabilities are the requirements of today.
The issue of drinking water hygiene is of not only medical, but also environmental, social and economic importance, and requires a comprehensive and systematic approach to it. Only then will it be possible to achieve a healthy generation and sustainable development.
Drinking water should be safe for health from an epidemiological point of view, harmless in chemical composition, pleasant in organoleptic properties and radiation safe. The implementation of these requirements is achieved only when the State Standard of the State Water Resources and Sanitation Service of the Republic of Uzbekistan “Hygienic Requirements for the Quality of Drinking Water and Its Control” meets the requirements.

REFERENCES

1. Sharobidinovna, A. D., & Baxtiyor, S. (2022). ORGANIZMDAGI SUV BALANSINING SALOMATLIK UCHUN AHAMIYATI. *SO ‘NGI ILMIY TADQIQOTLAR NAZARIYASI*, *5*(1), 69-72.
2. Sharobidinovna, A. D., & Baxtiyor, S. (2020, December). THE IMPORTANCE OF WATER FOR THE SPORTS BODY. In *Конференции*.
3. Шерматов Р. М., Солиев Б., Атаджанова Д. Ш. ЭПИДЕМИОЛОГИЯ ПИЩЕВОЙ НЕПЕРЕНОСИМОСТИ У ДЕТЕЙ ДОШКОЛЬНОГО ВОЗРАСТА В ГОРОДСКОЙ И СЕЛЬСКОЙ МЕСТНОСТИ.
4. Шерматов Р. М., Солиев Б., Атаджанова Д. Ш. ОСОБЕННОСТИ КЛИНИЧЕСКОГО ТЕЧЕНИЯ ЖЕЛЕЗОДЕФИЦИТНОЙ АНЕМИИ У ДЕТЕЙ РАННЕГО ВОЗРАСТА.
5. Камбаров, Б. Б. (2024, November). ОСНОВЫ ЗДОРОВОГО ПИТАНИЯ. In *Russian-Uzbekistan Conference* (Vol. 1, No. 1).

6. Imaraliyevich, O. M. (2025). STUDYING THE SOUTH KOREA HEALTHCARE SYSTEM. *Ethiopian International Journal of Multidisciplinary Research*, *12*(01), 74-77.
7. Osbayov, M. I. (2024). ORGANIZING HEALTHY NUTRITION FOR CHILDREN. *Ethiopian International Journal of Multidisciplinary Research*, *11*(12), 336-338.
8. Osboyev, M. I. (2024). INTRODUCTION OF THE TERM ALLERGY INTO SCIENCE AND ALLERGIC CONDITIONS. *Ethiopian International Journal of Multidisciplinary Research*, *11*(12), 43-46.
9. Imaraliyevich, O. M. (2025). REPRODUCTIVE HEALTH PROMOTION ISSUES. *Ethiopian International Journal of Multidisciplinary Research*, *12*(01), 214-216.
10. Imaraliyevich, O. M. (2025). STUDYING THE IMPACT OF ECOLOGICAL FACTORS ON HUMAN HEALTH. *Ethiopian International Journal of Multidisciplinary Research*, *12*(01), 252-255.
11. Muhammadkadirovich, M. U. B. (2024). THE IMPORTANCE OF MICROELEMENTS IN A HEALTHY NUTRITION. *Ethiopian International Journal of Multidisciplinary Research*, *11*(12), 666-669.
12. Мараимов, У. М. (2024, December). ОСНОВЫ ГИГИЕНЫ ЗДОРОВОГО ОБРАЗА ЖИЗНИ. In *Russian-Uzbekistan Conference* (pp. 186-188).
13. Muhammadkadirovich, M. U. B. (2025). THE IMPORTANCE OF COMMUNAL HYGIENE IN PROTECTING HUMAN HEALTH. *Ethiopian International Journal of Multidisciplinary Research*, *12*(02), 367-372.
14. Tavakkalovich, I. D. (2025, January). EFFECTS OF POLLUTED AIR ON THE BODY. In *Ethiopian International Multidisciplinary Research Conferences* (pp. 121-126).
15. Tavakkal o‘g‘li, I. D. (2025). VITAMIN B12 DEFICIENCY IN CLIMACTERIC WOMEN WITH DIABETES MELLITUS. *SHOKH LIBRARY*.