DRINK WATER QUALITY AND WATER SUPPLY PROJECTS EFFICIENCY EVALUATION: LABORATORY AND POPULATION HEALTH INDICATORS BASED ON LOCAL ANALYSES

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Abstract

Drink water of quality hygienic evaluation and water supply of projects efficiency world on a scale the most important from factors one divided , population health , epidemiological stability and socio-economic development for directly solution doer role World Health Organization storage According to the World Health Organization (WHO) according to the world according to water with related diseases every 485 thousand per year more than death to the state reason will be , especially drink water low quality in the regions diarrhea , bowel infections , parasitic diseases and especially children between high death level (WHO, 2023) . Also , polluted drink water with related was chemical dangers — nitrates , heavy metals (lead , arsenic , cadmium), pesticides and microbiological indicators out of the norm increase — many chronic diseases , that including kidney deficiency , oncological diseases and heart and blood vein diseases the risk noticeable at the level increases (Rahman et al., 2022).

Introduction

Uzbekistan drink in the context of water quality and water supply of projects stability central problem become The country remains some in the regions , in particular Karakalpakstan Republic , Bukhara , Kashkadarya and Surkhandarya in the regions centralized drink water supply systems enough at the level modernization not done , outdated pipes , drinking water sources microbiological and chemical pollution , as well as water delivery to give in the process secondary pollution existence record (UNICEF Uzbekistan WASH Report, 2022). This

situation many local epidemiological in indicators reflection is doing: intestine infections, parasitic diseases and in children diarrhea disease according to some in the region's growth is being monitored.

Local situations study this shows that water supply in projects many problems available: construction quality low, in design mistakes, water of pipes on time not interchangeable, not reactive (reactive), but proactive of control lack of modern monitoring systems lack of water disinfection to do technologies wear and tear, water sources protection zones non-preservability and ecological of the situation deterioration. Most considered " completed " in some cases made projects in practice complete does not work, water the pressure will be low or population to clean drinking water supply complete This water is not provided. on Water Safety international to principles absolutely contrary

Drink of water microbiological indicators — E.coli , total coliforms , intestinal stick in the group bacteria — many local in the regions out of the norm increase laboratory inspections through Chemical indicators between and nitrates and hardness level , some in the regions and sodium and chloride amount increase record WHO physiological risks according to assessment according to criteria (WHO Guidelines for Drinking-water Quality, 2022) , nitrates amount increase up to 5 years was in children methemoglobinemia the risk sharp increases , this and breath deficiency , cyanosis and death cases with related to be possible .

-   Water of quality hygienic at the price of following main directions applies to :
-   Physical indicators : color, odor, turbidity , general hardness .
-   Microbiological indicators : E.coli , total coliforms , enterococci .
-   Chemical indicators : nitrate , nitrite , ammonium , chloride , sulfate , heavy metals .
-   Organoleptic indicators : taste and smell.
-   Radiological indicators : α and β radioactivity.

These indicators every one of water human to your health the impact by designating gives. Uzbekistan sanitation standards these indicators according to hard to the requirements has although many laboratory analyses current infrastructure and of control weakness because of from the standards aside exit confirms.

Drink water quality population health indicators with directly by UNICEF and USAID take visited to research according to , water low quality in the regions the following clear observed:

- in children diarrhea 2–4 times more likely to develop the disease growth
- parasitic diseases , especially giardiasis and amoebiasis height
- pregnant in women dangerous anemia cases
- population between microbial infections and dehydration indicators increase

USA National Health Save According to the Centers for Disease Control and Prevention (CDC, 2021) according to , water through contagious diseases epidemiological in terms of the most fast spreading diseases type enters .

Uzbekistan " Drinking " of the Republic water supply and sewage the waters remove send "about" The law also applies to drinking. water of quality guaranteed of the state directly obligation that it is But practical analyses this shows that water supply in projects developments and control mechanisms enough at the level current Local water supply in projects main from dangers one is monitoring of the project only construction to the stage focus , but exploitation in the process regular of control absence

This of the research relevance from that consists of drinking water quality still many to the population impact indicator epidemiological danger factor become remains , especially village in places water of quality decrease and water supply projects efficiency low systematic problems Therefore , this scientific of the research purpose — laboratory analyses and population health indicators based on drink water quality and water supply the real effectiveness of projects assessment , available shortcomings determination and water danger index formation for scientific based approach offer to do .

Also, this of the research scientific importance is that it is water quality evaluation integrative approach — laboratory indicators + epidemiological indicators + project efficiency indicators added without complex analysis done This approach increases ecological hygiene, sanitation epidemiology and health storage in politics so far enough at the level not applicable.

2. Methods

This research drink water quality hygienic assessment , water supply the real effectiveness of projects determination and population health to study the relationship with for complex , multi- stage methodology based on take Research design international standards — WHO (2022) "Guidelines for Drinking-water Quality", UNICEF WASH Monitoring Framework (2022), US EPA Drinking Water

Assessment Protocol (2021) — and Uzbekistan current sanitation standards requirements based on working Methodology three main from the block consists of :

- **Laboratory analyses** ;
- **Epidemiological and health indicators analysis** ;
- **Water supply of projects efficiency and the dangers analysis** to **do**

This three component mutual integration made without " water" danger index " (Water Risk Index) . to form service did .

Research Uzbekistan typical local to the territory — centralized and partially decentralized drink water system there is 3 of which to the district focused (names (disclosed). Areas when choosing following criteria used :

- population water with provision level various was regions ;
- water sources (land underground → artesian ; well ; water warehouses) various was ;
- there is water supply projects last 10 years inside done increased or partially done ;
- epidemiological in indicators (intestinal infections , diarrhea , hepatitis A and parasitosis) difference there is regions .

Each 12 villages in the district or MFY (total 36 points) was selected .

Research Term : **2021–2024 interval** . This time inside there is water of projects exploitation level , water quality and health in the indicators changes compared .

3. Results

This research during 2021–2024 between three from the district total 144 water sample analysis Also , the regions for 2018–2024 epidemiological indicators , water supply projects fulfillment level and technician status according to auditing results studied . Below every one direction according to main results statement is being done .

Microbiological analyses this showed that the samples **noticeable part normative to the requirements answer gives** , but some at points drink water quality according to caution strengthen necessary . In particular :

Samples important in part **E. coli and general coliforms not determined** , this and water sources one part enough at the level protected shows .

With this together , some village at points coliforms and the presence of E. coli it is determined that regions for **preventive measures reinforcement** the necessity showed .

Chemical analyses to the results according to :

Many in samples **pH, hardness , chloride and sulfates** standard inside it has been Some at points nitrates and some metals amount standard to the border approaching record was done , this and **systematic monitoring continue to hold and preventive control reinforcement** the necessity indicates .

Physics and organoleptic There are also many indicators (color, odor, turbidity) in samples water consumption for comfortable that is was determined , only some on the networks turbidity and metal taste such as situations observed , **internal pipes step by step update** recommendation is being done .

Water supply projects analysis to do this showed that :

Latest in years one row in the regions **new pipes weighed , water facilities reconstruction made** and population coverage increased .

With this together , some on the networks old from pipes use , water pressure unevenness and disinfection equipment regular malfunction These cases were observed . **systematic technician service show and planned requires modernization** .

In general projects done increased in the regions population for to the water was physical entrance opportunity improved , but the quality permanent control to do mechanisms reinforcement necessary .

Population health indicators for 2018–2024 dynamics this shows that :

Some in years water with related diseases a little increased although **preventive measures reinforced in periods indicators stabilization or decrease** observed .

Fresh water networks to work lowered and disinfection improved in the neighborhoods children diarrhea of the circumstances decrease record was done .

These results drink water quality and water supply systems **step by step improvement population to your health positive impact to show possible** shows. With this together , some danger in the zones regular laboratory control , sanitation and hygiene propaganda and technician modernization harmonization necessary .

4. Discussion

This research results drink water quality , water supply systems status and population health between **integral dependency existence** shows . Obtained information this means that in the regions water quality according to general situation satisfactory to be despite some at points to the surface arrived limited problems **targeted prevention and technician service to show reinforcement** through effective eliminate to be possible .

In the analyses samples noticeable part sanitation to the standards answer given in the area water sources main part enough at the level protected shows . This is available water infrastructure in general when receiving stable from working evidence . With this together , some at points coliforms or E. coli found internal on the networks or some in sources **local sanitation measures and preventive** for **disinfection** need that there is International exactly the same in literature village in the regions pipes age and technician service show to the level looking at local microbiological changes observation natural case as record This means that situations systematic danger not , maybe **clear addressed** requiring **control** are factors .

Many in samples chemical indicators in moderation happened water sources geochemical stable that it is shows . Nitrates or some of metals standard to the border approached some at points and monitoring regular continue to hold important . These processes to international WASH recommendations complete suitable comes – that is , water quality in the standards although , **constantly observation and early warning system** is required . Organoleptic indicators most satisfactory happened population water consumption according to to difficulties face that he is not coming shows .

Learned in the regions last in years row water supply of projects done increased and new of buildings to work lowered positive change as This population is estimated clean to the water physical entrance opportunity expanded . Some in places network outdated joints , water pressure unevenness or disinfection of equipment sometimes interrupted to remain such as situations determined although they system according to serious from the trail exit not , maybe **planned technician service show with eliminate attainable usual situations** is . Accordingly , there is projects modernization to do and service show process improve through of the system stability further increase possible .

Epidemiological indicators regions in the section differentiated although , in general in dynamics water quality improved in periods diseases the number has also stabilized observed . This is water. supply in the system positive changes population in health noticeable result to give shows . Local increases and global trends typical is seasonal factors , hygiene culture and internal on the networks changes with is explained . With this together , prevention measures increase , laboratory monitoring regularity and disinfection systems improvement this indicators stable low level hold to stand help gives .

In general in the research results this shows that :

- in the regions drink water quality **many in cases satisfactory** ,
- some at points observed limited problems and **technician service show and sanitary and preventive measures events reinforcement through fast eliminate to be possible** ,
- water infrastructure update health indicators **positive impact** showing .

Results water supply in the system consistent monitoring, technical modernization and sanitation culture increase through **further high quality to the level achieve possible** shows .

5. Conclusion

This research results drink water quality , water supply systems technician status and population health between directly and integral dependency existence again one there is confirmed . Received information this showed that the studied in the regions drink water quality according to general situation many at points satisfactory is the main chemical and physicist indicators normative at the borders are being preserved . In these areas water sources natural-geological stability , pipes network partially updated to be and some in places technician service to show improvement positive results giving means .

With this together , research some local at points microbiological and chemical in indicators to the standards approach or some deviations to be observed record These situations of the system general stability does not break , but **is purposeful and regular monitoring reinforcement** the necessity In particular , some in pipes second level contamination probability there is happened for internal on the networks planned disinfection , pipes sanitation wash works and population with hygiene according to explanation of work continue to be carried out important .

Water supply projects analysis to do this showed that the last in years done increased infrastructure works as a result one row in the regions to the water was physical entrance opportunities improved , new pipes weighed and water sources protection increased was noticed . With this together , some in places water pressure reduction , disinfection systems occasionally with interruption or old networks existence such as situations encountered These are the disadvantages . systematic not , maybe technician service show process regularity with related are , they are **planned modernization and exploitation culture reinforcement through eliminate to be possible** .

Population health according to taken information this shows that water quality improved in the regions intestine infections and children diarrhea indicators decreased or stabilized . This is water supply system right on the road to put and disinfection processes regular control to do efficiency confirms . Some at points diseases number a little growth and seasonal factors , hygiene in habits differences and internal pipes status with explained .

In general in short , research this shows that :
- drink water quality average at the level stable ,
- there is problems to the regions typical local from cases consists of ,
- water supply infrastructure step by step update health indicators positive impact showing ,
- the most important task — system **continuous monitoring** , **technical service display** , **disinfection order improvement** ,
- population for hygiene according to recommendations is to strengthen .

This search results in the future territorial water safety increase , water supply of projects efficiency strengthening , epidemiological control improve and drink water quality further stabilization for scientific basis become service does .

Below in the IMRAD parts of the article used real scientific Vancouver style sources presented I am . Sources international magazine , WHO, UNICEF and other good quality scientific from platforms taken .

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