

# Analysis of the capacity of the healthcare system of the Kyrgyz Republic to monitor lead concentrations

Project: "Strengthening healthcare systems for reduction of exposure to lead"

— April 2024



Укрепление систем здравоохранения для снижения воздействия свинца

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# Executive Summary

## Objective

To analyze the capacity of the healthcare system of the Kyrgyz Republic to monitor the concentrations of lead and other heavy metals in blood, urine and other media and existing regulatory legal acts as well as to provide recommendations for changes.

The study was conducted in coordination with international project experts and using questionnaires developed by them.

## Introduction

***Analysis of the capacity of the healthcare system of the Kyrgyz Republic to monitor lead concentrations (Desk review report) was prepared for the project Strengthening Health Systems to Reduce Lead Exposure. This report serves to justify the project and to inform decision-makers about the subsequent implementation of monitoring lead levels in children's blood and determining priority actions to establish a sustainable monitoring, prevention, and treatment system for heavy metal poisoning, including lead.***

Lead is a toxic element that even in small concentrations can have serious negative effects on human health, especially vulnerable groups such as children. Research indicates that exposure to lead can lead to developmental delays, reduced cognitive abilities, behavioral problems, and other adverse health outcomes (Lanphear et al., 2005; Canfield et al., 2003).

However, despite the well-known risks associated with lead, many countries, including Kyrgyzstan, lack comprehensive monitoring and prevention programs for lead poisoning, particularly among children. This is due to insufficient data on the scale of the problem at the national level and a lack of awareness among the population and decision-makers about the importance and urgency of this issue.

Conducting this study will help fill the gaps in knowledge regarding current levels of lead in children's blood in Kyrgyzstan and identify the main sources and pathways of lead exposure in children. The data obtained will serve as a basis for developing targeted public health programs aimed at reducing lead exposure and preventing its negative health

consequences for children. This, in turn, will contribute to improving quality of life, reducing healthcare costs, and enhancing public well-being.

To conduct monitoring of lead and other heavy metals concentrations in blood, urine, and other mediums, and to determine priority actions and effectively utilize existing resources, a situational analysis of the healthcare system's potential in the Kyrgyz Republic was conducted.

## Policy Landscape

The laws and regulatory acts of the Kyrgyz Republic governing the safe handling of chemical products are based on the Constitution of the Kyrgyz Republic, which grants every citizen of Kyrgyzstan the right to "protection and working conditions that meet safety and hygiene requirements," "health protection," as well as "a favorable environment for life and health."

The tasks related to chemical safety are reflected in the Government Program of the Kyrgyz Republic on public health protection and the development of the healthcare system for 2019-2030, titled "Healthy Person - Prosperous Country."

An analysis of the current regulatory acts and clinical protocols of the Ministry of Health indicates that clinical protocols, instructions, or **standard operating procedures** (SOPs) regarding lead poisoning or other heavy metal poisonings **are absent**.

### RECOMMENDATIONS FOR AMENDING REGULATORY DOCUMENTS (NPA) TO THE MINISTRY OF HEALTH OF THE KYRGYZ REPUBLIC:

1. Establish a working group to develop a clinical protocol for lead poisoning and other heavy toxic metals.
2. The working group should study available literature, WHO guidelines, and the experiences of other countries regarding lead poisoning in children and adults, as well as prevention strategies.
3. Develop a clinical protocol for lead poisoning and prevention based on gathered information and international recommendations.

4. The working group should propose including mandatory screening for lead levels in the blood of children under 6 years old in endemic regions into the mandatory list of medical examinations.
5. Utilize and adapt international recommendations, including WHO guidelines, for the development and improvement of regulatory documents in the field of lead and other heavy metal poisoning.

## Laboratory Capacity

To conduct an analysis of the national laboratory service within the healthcare system and the private sector for determining concentrations of lead and other heavy metals in blood, urine, and other environments, a questionnaire developed by international project experts was utilized. Prior to gathering information through the questionnaire, consultations were held with various healthcare organization leaders regarding the laboratories' capability to determine lead levels in blood, urine, and other substances, including the surrounding environment. Following discussions, laboratories were identified to participate in completing the questionnaire.

The current report includes data from 25 laboratories, comprising 22 state medical laboratories (Ministry of Health of the Kyrgyz Republic), 3 private laboratories, and 1 environmental laboratory under the Department of Environmental Monitoring of the Ministry of Natural Resources, Ecology, and Technical Supervision of the Kyrgyz Republic.

The questionnaire results indicate that clinical diagnostic laboratories within healthcare organizations in the Kyrgyz Republic lack the necessary equipment, reagents, and consumables for determining the levels of lead and other elements in biological materials (blood, urine, etc.). Testing laboratories within the public healthcare system of the Ministry of Health of the Kyrgyz Republic, the National Institute of Public Health of the Ministry of Health of the Kyrgyz Republic, the Department of Environmental Monitoring under the Ministry of Natural Resources, Ecology, and Technical Supervision of the Kyrgyz Republic, and the laboratory of LLC "Stuart Essay and Environmental Laboratories" have the potential to conduct screening studies on lead content in environmental objects.

Currently, private medical laboratories provide services primarily for collecting biological samples (blood, urine, saliva, hair, etc.) for lead and other metal content analysis and

sending samples outside the Kyrgyz Republic, such as to the Russian Federation, Uzbekistan, Kazakhstan, as well as other countries (Czech Republic, Slovenia, Japan, etc.).

From the list of healthcare sector laboratories under the Ministry of Health of the Kyrgyz Republic that have previously been involved in studying and determining the content of heavy metals (such as mercury, arsenic, lead, etc.) in human biological matrices and environmental objects, a notable mention is the Center for Environmental Medicine and Human Ecology of the National Institute of Public Health (NIPH) under the Ministry of Health of the Kyrgyz Republic. Previously, until 2022, this organization was known as the Scientific and Production Association "Preventive Medicine" (NPO "PM"). This institution possessed atomic absorption spectrometry (AAS) and atomic emission spectrometry (AES) equipment, and had trained personnel (doctors, biologists, chemists, and physicists) capable of conducting element content research in various samples.

Due to the moral and technical obsolescence of the existing equipment, limited funding for scientific research topics at the research institute, modern equipment, reagents, and consumables were not procured.

At the time of assessment, there was no laboratory accredited in Kyrgyzstan according to ISO 15189 for determining heavy toxic metals, including lead, in biological material. An analysis of the strengths and weaknesses of laboratory personnel training revealed a lack of training programs focused on the identification of chemical toxic substances affecting the human body, especially children. This includes internships for young employees and laboratory specialists in the field of toxicology.

#### **RECOMMENDATIONS:**

1. Conduct training for personnel on the determination of lead in biological materials.
2. Develop and implement regulatory documents and educational programs for the procedure of lead determination in accordance with international standards.
3. Prepare the laboratory for accreditation according to ISO 15189 standards for conducting analyses of lead and other heavy metals in biological materials.
4. Participate in external quality assessment to ensure compliance with result accuracy and metrological characteristics.

5. Acquire essential equipment for determining lead in biological materials, such as atomic absorption spectrometers (AAS) or other modern analytical instruments.

## Public Health Surveillance

Laboratory monitoring for the safety assessment of food products or environmental objects to determine the content of lead or other metals is currently conducted in 14 public health laboratories accredited to international standards ISO/IEC 17025.

Data on the number of cases of poisoning with heavy metal salts (T56 according to ICD-10 classification) were obtained from the medical statistics department of the Emergency Medicine Center in Bishkek.

Over the two years from 2021 to 2022, a total of 10 cases of poisoning with heavy metal salts were registered among the age group of 0-18 years. In 2021, there were 4 cases registered in the age group of 0-18 years, and in 2022, there were 6 cases registered in the same age group.

It should be noted that there is a gap regarding the inability to specify the exact name of the heavy metal from the existing database of the Emergency Medicine Center in Bishkek. It is unclear which type (species) of heavy metal salts caused the poisoning due to the aggregation of statistical data.

Clarifications should be made in the data recording forms of medical statistics regarding cases of poisoning with heavy metal salts - specifying the name or type of metal involved.

These adjustments are necessary to improve the accuracy and specificity of data collection on poisoning cases, which is crucial for effective public health monitoring and intervention strategies.

The National Center for Maternal and Child Health under the Ministry of Health of the Kyrgyz Republic is a state healthcare organization of tertiary level, providing specialized medical and sanitary assistance in obstetrics and gynecology, neonatology, pediatric surgery, and pediatric care. The center conducts medical and preventive activities, as well as scientific research in fundamental and applied medicine. According to its current charter, this center can be designated as a **Consultation Center** for clinical aspects and prevention of lead poisoning at the national level.



## RECOMMENDATIONS:

1. Develop and implement a clinical protocol specifically for monitoring and supervising heavy metal poisoning, including lead. This protocol should outline the procedures to be integrated into the Ilab integrated information system for laboratories as per the Ministry of Health of the Kyrgyz Republic.
2. Provide training and upgrade the Consultative Diagnostic Department of Jal Pediatric Hospital to establish it as a Consultation Center for lead poisoning. This center will serve as a specialized unit for consultation and diagnostics related to lead poisoning.

Conducting this research is not only a crucial step in protecting children's health in Kyrgyzstan but also contributes to global efforts in combating lead poisoning, recognized by the World Health Organization as a key environmental threat to population health.

Activities aimed at early detection of lead poisoning and other heavy metals are included in the enhanced Government Program of the Kyrgyz Republic on public health protection and healthcare system development for 2019-2030, titled "Healthy Person - Prosperous Country". These activities are prioritized under environmental medicine in public health.

To successfully carry out this research, the Ministry of Health of the Kyrgyz Republic will ensure readiness of laboratory infrastructure (facilities, engineering systems), necessary additional equipment, and their maintenance, calibration, as well as the development and implementation of clinical protocols for diagnosis, treatment, and prevention of lead poisoning and other heavy toxic metals. ***Enhancing public awareness and active involvement of local communities in organizing and conducting the research is identified as one of the priority actions.***

## **1. Conduct an analysis of existing regulatory legal acts (orders, instructions, guidelines, SOPs, etc.) on lead poisoning, identify gaps and develop recommendations for amending the regulatory legal acts.**

### **Section 1. Analysis of the existing regulatory legal acts (orders, instructions, manuals, standard operational procedures, etc.) on lead poisoning, identify gaps and develop recommendations for making changes to the regulatory legal acts**

The laws and regulatory legal acts of the Kyrgyz Republic regulating the safe handling of chemical products are based on the Constitution of the Kyrgyz Republic, according to which every citizen of Kyrgyzstan has the right "to protection and working conditions that meet safety and hygiene requirements", "to health protection", as well as "to an ecological environment favorable for life and health". The provisions of the above-mentioned articles of the Constitution are implemented in a number of regulatory legal acts of the Kyrgyz Republic that specify these requirements. The Laws also define the powers of ministries and agencies to ensure chemical safety, issues of licensing, control and supervision of handling and transboundary movement of chemical substances and hazardous waste.

The Kyrgyz Republic has ratified international conventions on chemical safety: Rotterdam, Basel, Stockholm Convention on Persistent Organic Pollutants, Chemical Weapons Convention (CWC).

Implementation of the legislation is performed within the framework of meeting the requirements of the technical regulation of the Eurasian Economic Council (TR EEC) 041/2017 "On the safety of chemical products" in accordance with the Decision of the Council of the Eurasian Economic Commission No. 19 dated March 3, 2017, which establishes the criteria for classifying the danger of chemical substances and mixtures for human health and the environment, rules and forms of conformity assessment, rules of identification, requirements for terminology, labeling and rules of its application on the customs territory of the EEC. This technical regulation came into force in 2021. In accordance with the draft, each state determines the responsible state body on formation

and maintenance of the register of chemical substances, forming national parts of the register.

The main strategic activities at the national level in the field of chemicals management were stipulated in the Program on Transition of the Kyrgyz Republic to Sustainable Development for 2013-2017 (PTSD).

Within the framework of the Program implementation, the "Procedure for hazardous waste management on the territory of the Kyrgyz Republic" was approved (No. 885 dated December 28, 2015).

In accordance with the Procedure for preparation of environmental passport for facilities used for economic and other activities, approved by Resolution of the Government of the KR No. 357 dated June 19, 2013, the environmental passport is a regulatory and technical document that includes information on an enterprise, use of resources (natural, secondary and other) by an enterprise in order to determine the degree of impact of an enterprise's activities on the environment, as well as to control compliance of an enterprise with environmental protection norms and rules in the course of its activities. Environmental passport is developed for the facilities used for economic and other activities of I and II categories of hazardous waste in accordance with Annex 3 of the KR Law "General technical regulations to ensure environmental safety in the Kyrgyz Republic". Environmental passport includes general description of wastes of the facility used for economic activities for each type of wastes, including their volumes and sources of generation, hazard classes, physical and chemical parameters, disposal sites, amount of waste recycled and transferred.

Analysis of the current regulatory legal acts and clinical protocols of the Ministry of Health indicates that there is **no clinical protocol, instruction or standard operating procedure (SOP) for poisoning with lead or other heavy metals.**

## **Conclusion**

The website of the Ministry of Health of the Kyrgyz Republic, in the section ***Clinical protocols, guidelines*** has 66 records, however there are **no** documents regarding **lead** or **other heavy metals**.

## **RECOMMENDATIONS FOR MAKING CHANGES TO THE REGULATORY LEGAL ACTS**

The Ministry of Health of the Kyrgyz Republic:

- should create a working group to develop a clinical protocol for poisoning with lead and other heavy toxic metals;
- a working group should study the available literature, WHO guidelines, the experience of other countries in relation to lead poisoning in children and adults, as well as the prevention of poisoning;
- a working group should develop a clinical protocol for lead poisoning and prevention of poisoning;
- a working group should make a proposal to include children under 6 years old in the mandatory list of screening tests in endemic regions.

#### RECOMMENDATIONS FOR CAPACITY BUILDING

The Ministry of Health of the Kyrgyz Republic and the Ministry of Education and Science of the Kyrgyz Republic should:

- develop a work program (educational and methodological material, modules) on the prevention of lead poisoning, diagnosis and treatment in case of lead poisoning for doctors and laboratory staff;
- conduct events to raise awareness and knowledge of decision makers, implementing measures to reduce risk, control and monitor handling of lead, and of the public;
- organize training courses for medical personnel on the prevention of lead poisoning, diagnosis and treatment.

## **2. Study the latest WHO recommendations on lead poisoning and compare with existing national regulatory legal acts.**

### **Section 2. Study of the latest WHO recommendations on lead poisoning and their comparison with existing national legal regulatory acts**

To analyze international regulatory legal documents for the management of chemicals, the following were examined:

1. **Roadmap** for enhancing the role of the health sector in the Strategic Approach to International Chemicals Management towards achieving the 2020 goal and beyond

(roadmap) was developed by the resolution of the Seventieth World Health Assembly (WHA) in May 2017. The WHO Secretariat was proposed to develop the roadmap in the WHA Resolution 69.4 (2016) "The role of the health sector in the Strategic Approach to International Chemicals Management towards achieving the 2020 goal and beyond"

<https://www.who.int/ru/publications/i/item/WHO-FWC-PHE-EPE-17.03>

<https://iris.who.int/bitstream/handle/10665/273142/WHO-FWC-PHE-EPE-17.03-rus.pdf?sequence=1>

## **2. WHO Guideline for the clinical management of exposure to lead. October 27, 2021**

<https://www.who.int/ru/publications/i/item/9789240037045>

<https://iris.who.int/bitstream/handle/10665/352384/9789240046047-rus.pdf?sequence=1>

## **3. Brief guide to analytical methods for measuring lead in blood**

<https://iris.who.int/bitstream/handle/10665/333914/9789240016828-rus.pdf?sequence=18&isAllowed=y>

Brief guide to analytical methods for measuring lead in blood (A short guide to analytical methods for measuring lead in blood). Second edition. Geneva: World Health Organization; 2020 (<https://apps.who.int/iris/handle/10665/333914>, as of October 20, 2020).

**Due to the lack of national clinical guidelines for the management of persons exposed to lead, no comparison has been made with WHO documents.**

### **Conclusion 2.**

1. Due to the lack of national regulatory legal acts in the field of diagnosis, treatment and prevention of poisoning with lead and heavy metals, a comparative analysis could not be performed.
2. Existing international practice can be used as recommendations for the development of national regulatory legal acts.

### **RECOMMENDATIONS**

- Use and adapt international recommendations, including those of WHO, to develop regulatory legal acts

### **3. Conduct an analysis of the capacity of the national laboratory services, the healthcare system and the private sector regarding:**

#### **Section 3. Analysis of the capacity of the national laboratory service of the healthcare system and the private sector to determine the concentrations of lead and other heavy metals in blood, urine and other media**

**3.1. availability of necessary laboratory equipment, reagents, chemicals and consumables**

**3.2. availability of protocols, guidelines and other regulatory frameworks**

**3.3. qualifications of laboratory specialists and the need for their training**

#### **National policy and strategic plan for the development of laboratory service in the Kyrgyz Republic. Project. Bishkek, March 1, 2016**

The targets identified in the European policy "Health 2020" aimed at improving the health and well-being of the population<sup>1</sup> as well as in the International Health Regulations (2005) (IHR) were included in the Den Sooluk National Health System Reform Program for 2012-2016. The policy development process took place within the framework of the initiative of the World Health Organization Regional Office for Europe (WHO ROE) "Good Laboratories - Good Health"<sup>2</sup>.

1. <http://www.euro.who.int/ru/health-topics/health-policy/health-2020-the-european-policy-for-health-andwell-being>
2. <http://www.euro.who.int/en/health-topics/emergencies/international-health-regulations/corecapacities/whoeurope-strengthens-laboratory-core-capacities>

Within the implementation of the National Laboratory Service Development Policy, a **National laboratory service situation analysis** was performed in 2016.

#### **Organization of laboratory service of the Kyrgyz Republic**

Laboratories provide services on monitoring of environmental objects, including control of water and food safety, quality of consumer goods, diagnostics of contagious and non-contagious diseases.

There is a network of clinical diagnostic laboratories (CDL) of medical and preventive institutions and a network of public health (PH) laboratories in the MoH KR.

Specialized laboratories of CDL perform diagnostics of skin and venereal diseases, tuberculosis and safety of blood and its components.

PH laboratories perform preventive and diagnostic tests for contagious diseases, including quarantine diseases, particularly dangerous infections and bloodborne viral hepatitis and HIV/AIDS.

Diagnostic laboratory services are provided by private laboratories - there are about 50 of them. A condition for their work is obtaining a license from the Department of licensing of medical and pharmaceutical services of the MoH.

In addition to multilevel laboratory networks, the MoH has a number of national centers for various aspects of health care with relevant laboratories.

The Ministry of agriculture and reclamation has a network of veterinary and phytosanitary laboratories.

A number of other agencies also have laboratories performing tests for monitoring and control of water, soil, air quality, plant diseases, and public health issues.

Priority tasks for the provision of laboratory services are identified in the Program of the Government of the Kyrgyz Republic on the protection of public health and development of the health care system for 2019-2030 "A healthy person is a prosperous country"

<https://cbd.minjust.gov.kg/12976?cl=ru-ru>

*Annex 1 (to the Resolution of the Government of the Kyrgyz Republic No. 600 dated December 20, 2018)*

The analysis of mid-term results of the Program implementation, conducted in 2023, showed that the laboratory service is represented by public health laboratories (25 - SSESC, 33 - laboratories for diagnosis of viral hepatitis and HIV in the Center for control of bloodborne viral hepatitis and HIV, 2 - CSSEST) and clinical diagnostic laboratories (142 CDL and 33 - network of laboratories for diagnosis of tuberculosis), 11 laboratories of national and republican centers and research institutes.

During the post-Covid period, there has been a slight improvement in the capacity of laboratories of the MoH KR. For example, with the WB support under the draft AMP, 17 PHC laboratories, including all regional FMCs, have been equipped with biochemical and

hematological analyzers in 2019, 20 more PHC laboratories will be equipped with hematological and biochemical analyzers in 2023, 40 laboratories will be equipped with urine stations, and spare parts and consumables, including an annual stock of reagents, are being procured for all these laboratories.

In May 2022, domestic sequencing of the complete genome of the coronavirus circulating in the Kyrgyz Republic was launched.

With the support of the WB project for DDPSSSES an analyzer for full genome sequencing, reagents and consumables are purchased, 20 DDPSSSES laboratories are provided with motor vehicles for transportation of biological material.

Introduction of ILAB laboratory information system, integrated with other state bodies through Tunduk IEIS, has been started, the results of laboratory tests are issued online, in different languages, protected by QR code, and 70 laboratories of the country are connected to the application "Travel without COVID-19".

In spite of the above-mentioned achievements, tests for diagnosing non-contagious diseases caused by the exposure to chemical factors, including lead, on human health are not reflected in any plan and, therefore, there is no data available.

Only a few laboratories in the country are accredited according to the international quality standard ISO/IEC 17025. The poorly established system of transportation of biological materials, insufficient use of information technology, and inefficient mechanisms for financing laboratory services result in poor quality and limited access to laboratory services, especially for people living in rural areas.

Public health laboratory services also do not meet international standards, which reduces the quality and efficiency of the entire system of anti-epidemic provision of the population.

The current licensing mechanism regulates only the activities of private healthcare organizations providing various services, including laboratory services. There are problems of inconsistency of licensing standards with modern quality requirements of laboratory and diagnostic services and lack of mechanisms for monitoring and quality control by the state.

A wide network of poorly equipped small laboratories in the structure of healthcare organizations and poor coordination of laboratory service activities result in fragmentation and duplication of laboratory services. At the same time, state laboratories cannot provide



a full range of necessary tests to patients, as a result of which the population is forced to turn to private laboratories, or to medical organizations of other countries, suffering additional financial expenses. These expenses account for a significant part of the family budget, especially for the poorer segments of the population.

65% of the population in the country lives in rural areas, and there is a problem of access to laboratory services in hard-to-reach, remote, mountainous, border settlements.

### **Data from the laboratory questionnaire**

A questionnaire developed by international project experts was used to analyze the capacity of the national public health laboratory service and the private sector to determine concentrations of lead and other heavy metals in blood, urine and other media.

Before collecting information on the questionnaire, consultations were held with various heads of healthcare organizations about the possibility of a laboratory to determine the content of lead in blood or urine and other objects, including the environment. After discussions, the laboratories that participated in completing the questionnaire were identified.

This report includes data on 25 laboratories, including state medical laboratories - 22 laboratories (MoH KR) and 3 private laboratories, as well as 1 laboratory with environmental profile of the Department of Environmental Monitoring of the Ministry of Natural Resources, Ecology and Technical Supervision of the Kyrgyz Republic (Annex 5).

Comparative analysis of the activities of the laboratories surveyed

Analysis of the capacity of the healthcare system of the Kyrgyz Republic to monitor lead concentrations

Name of laboratories (ministry/department)	Test object	Availability of equipment for lead detection - atomic absorption spectrometer (AAS) or inductively coupled plasma mass spectrometry (ICP-MS)	Additional equipment	Personnel (trained) handling biological materials	Accreditation according to ISO 15189 or ISO17025 for Lead
<b>CDL MoH - 8 (incl. NCMCH)</b>	Biological material	-	+	-	-
<b>Testing laboratories of DDPSES MoH</b>	Environmental objects	+	+	-	ISO 17025
<b>Testing laboratories of other SSESC MoH - 13</b>	Environmental objects	+	+	-	ISO 17025
<b>Private laboratories ("Aqua Lab" and "Hemotest")</b>	Biological material	-	+	-	-
<b>Department of Environmental Monitoring, MNRETS KR</b>	Environmental objects	+	+	-	ISO 17025
<b>Center for Environmental Medicine and Human Ecology, National Institute of Public Health (NIPH) under the MoH KR</b>	Biological material* Environmental objects*	-	+	+	-
<b>Private laboratory Stewart Essay and Environmental Laboratories Ltd.</b>	Biological material Environmental objects	+	+	+	ISO 17025

\*tests were performed in 2001-2005

### 3.1. Availability of necessary laboratory equipment, reagents, chemicals and consumables

Data from the questionnaire results indicate that in the Kyrgyz Republic, **clinical diagnostic laboratories** of healthcare organizations have equipment, appropriate reagents and consumables, for example, for biochemical analysis of blood samples or urine samples, but not for the content of lead and other elements. In the clinical diagnostic laboratories of the Ministry of Health of the Kyrgyz Republic, analysis of human blood, urine or other biological media to determine the content of **lead** and/or **other heavy metals** is **currently not performed due to the lack of appropriate instruments - analyzers**: atomic absorption spectrometer (AAS) or inductively coupled plasma mass spectrometry (ICP-MS). Using such an instrument, it is possible to carry out a quantitative analysis of the elemental composition using atomic absorption spectra. A similar AAS instrument is used mainly to determine the metal content in its solution.

The ICP-MS method is based on the direct measurement of the mass-to-charge ratios ( $m/z$ ) of elemental positively charged ions derived from the test substance in the gas phase. The ICP-MS method is intended for qualitative and quantitative elemental analysis.

The results of meetings and conversations with managers and representatives of some **private medical laboratories**, and questionnaire data indicate that currently, in the conditions of the Kyrgyz Republic, only sampling of biological samples (blood, urine, saliva, hair, etc.) of a person is carried out in accordance with the rules for the selection and transportation of biological samples, but **samples are not analyzed for lead and other metals**. Selected samples from clients (patients) are sent in accordance with international requirements for the rules of transportation of biological samples outside the Kyrgyz Republic, for example, to the Russian Federation, the Republic of Uzbekistan, Kazakhstan, and also to other countries (Czech Republic, Slovenia, Japan, etc.). It should be noted that the cost of one analysis of a blood or urine sample for the content of lead or other elements depends on the type of equipment used and the number of elements determined, as well as the presence of a recommendation from a doctor on the test results.

From the presented list of laboratories of the Ministry of Health of the Kyrgyz Republic, which previously participated in testing and determination of the content of heavy metals (mercury, antimony, arsenic, lead, etc.) in human biological matrices and environmental objects, it should be noted - Center for Environmental Medicine and Ecology human

National Institute of Public Health (NIPH) under the Ministry of Health of the Kyrgyz Republic (previously, until 2022, this was the Scientific and Production Association “Preventive Medicine”, SPA “PM”). Since this organization (previously until 2001-2005) had the appropriate equipment - an atomic absorption spectrometer (AAS) and an atomic emission spectrometer (AES). There was also a trained workforce (doctors, biologists, chemists and physicists) to carry out studies on the content of elements in various samples. Due to the obsolescence of the existing equipment and limited funding for scientific topics at the research institute, modern equipment and corresponding reagents and consumables were not purchased.

#### **THE ANALYSIS HAS SHOWN THE FOLLOWING PROBLEMS:**

- Lack and insufficiency of analytical equipment for determination of lead and other elements
- Lack of regular equipment maintenance
- Lack of a monitoring program for lead and other elements in biological materials
- Absence and lack of control and reference materials

#### **OPPORTUNITIES**

- Availability of partners
- Access to documents
- Expanding the range (list) of tests in laboratories

#### **THREATS**

- Transportation of biomaterials
- Insufficient resources for laboratory activities
- Lack of engineers to carry out maintenance of laboratory equipment

#### **Contribution and participation of the MoH KR in problem solving and project implementation**

Activities on early detection of poisoning with lead and other heavy metals are included in the draft supplemented Program of the Government of the Kyrgyz Republic on protection of public health and development of healthcare system for 2019-2030 "A healthy person is a prosperous country" as a priority activity on environmental medicine of public health.

For successful implementation of the project, the MoH KR will ensure the readiness of laboratory infrastructure (premises, system of engineering and technical facilities),

necessary additional equipment and its maintenance, calibration, development and introduction of clinical protocols for diagnosis, treatment and prevention of poisoning with lead and other heavy toxic metals.

### **3.2. Availability of protocols, guidelines and other regulatory frameworks**

#### **International regulatory documents**

In the Kyrgyz Republic there is a system of accreditation of laboratories for technical competence in accordance with the international standards ISO 17025, ISO 15189, ISO 17043, EU and EEC directives, a collection of standard operating procedures, requirements for laboratory organization (Annex 3).

#### **WEAKNESSES**

- Lack of standard operating procedures for the determination of lead and other metals in human biological materials
- Lack of training program for determination of lead and other metals in biological materials
- Lack of instructions and booklets for the population about the negative impact of lead and other elements on human health

#### **OPPORTUNITIES**

- Availability and access to international sources of guidelines and manuals regarding the determination of lead
- Access to study the WHO manual. Quality management system in laboratories: handbook.
- Possibility to develop a SOP for the determination of lead in biological materials (blood) by studying and adapting guidance from WHO and other sources

#### **THREATS**

- Limited time frame for developing regulatory legal acts
- Long procedure for reviewing and approving a document
- Insufficient resources for laboratory activities in developing regulatory legal acts

### **3.3. Qualifications of laboratory specialists and the need for their training**

#### **3.3.1. Analysis of strengths, weaknesses, opportunities and threats (SWOT analysis)**

#### **STRENGTHS**

- Trained laboratory staff according to the QMS

- Participation in external quality assessment (EQA) programs
- Introduction of the i-Lab information system in public health laboratories and family medicine centers

#### **WEAKNESSES**

- Lack of personnel in biomonitoring of lead and other elements
- Lack of a training program for laboratory personnel in relation to the determination of chemical toxic substances on the human body, especially children
- Lack of engineering and technical personnel for regular equipment maintenance
- Lack of internships for young employees and laboratory specialists on toxicology
- Lack of funding to train laboratory personnel on biomonitoring

#### **OPPORTUNITIES**

- Availability and involvement of international partners
- Involvement of international experts in toxicology and in the field of laboratory diagnostics and public health
- Access to the WHO documents for personnel training
- Expanding the range (list) of tests in laboratories
- Training of managers for laboratory service

#### **THREATS**

- Loss of specialists in toxicology and laboratory diagnostics of lead and other elements
- Insufficient human resources for biomonitoring laboratory activities
- Lack of a special training program for laboratory personnel on the prevention of chemical intoxications and/or poisoning with lead and other metals, preparation and analysis of samples of biological materials (blood, urine, hair, saliva and others)
- Frequent changes in management
- Insufficient attention to the problem of the influence of toxic elements on human health

#### **RECOMMENDATION FOR LABORATORIES - LINK TO WHO WEBSITE**

<https://extranet.who.int/lqsi/ru/content/участуйте-в-проверке-квалификации-для-каждого-исследования-выполняемого-в-лаборатории>

#### **Conclusion 3**

1. The KR has a system of laboratory service for monitoring lead in environmental objects, food products and raw materials, which have equipment, personnel and accreditation.

2. Currently, only one private testing laboratory - Stewart Essay and Environmental Laboratories Ltd. - performs blood testing for lead content, which is located in Kara-Balta city, according to KAC data (no confirmation of this information could be obtained from the laboratory itself).
3. The Center for Environmental Medicine and Human Ecology of the National Institute of Public Health (NIPH) under the MoH KR has experience in conducting scientific research under international projects to test environmental objects and biological material for lead content.
4. All laboratories surveyed have premises, necessary infrastructure, relevant equipment (analyzers for determination of biochemical, clinical indicators, enzyme immunoassay, thermostats, biological safety cabinets, PCR equipment, sequencers, flow cytometry, refrigerators, freezer, technical and analytical scales, thermostats, power generators) to perform tests for lead content in blood, except for the main research equipment.
5. There are poor logistics of transportation of samples and specimens.

#### RECOMMENDATIONS

- Provide training for personnel on the determination of lead in biological materials.
- Prepare a regulatory legal act and training program and introduce lead determination procedures
- Prepare laboratory for ISO 15189 accreditation

## 4. Analyze the existing capacity of sanitary supervision of environmental hygiene.

### Section 4: Analysis of the existing capacity of sanitary supervision of environmental hygiene

At the moment, 14 public health laboratories have been accredited in accordance with ISO/IEC 17025 international standards and 6 laboratories are included in the Unified Register of Conformity Assessment Bodies and Testing Laboratories of the EEC. These laboratories analyze food or environmental samples **to determine the content of lead or other metals.**

At the same time, it should be noted that only one private laboratory - Stewart Essay and Environmental Laboratories Ltd. - can test biological material (blood) for lead, according to the KAC data (it was not possible to confirm this information in the laboratory itself).

The laboratories of the National Center of Phthisiatry and the Republican Center of Quarantine and Particularly Dangerous Infections are ISO 15189 accredited, and other laboratories are being prepared for accreditation and compliance with international standards.

### **Clinical and diagnostic laboratories of medical and preventive treatment institutions passed the Medical Accreditation Commission under the Ministry of Health in 2018-2021.**

In the health care system to ensure the quality of medical services, all treatment and preventive care institutions are accredited by the Medical Accreditation Commission under the Ministry of Health of the Kyrgyz Republic.

Also, accredited laboratories performing tests of products for compliance with technical regulations of the common economic space of the countries that are members of the Customs Union are included in the unified register of the EEC. Thus, only laboratories included in the Register can provide laboratory services for certification of goods.

The technical regulations of the EEC completely coincide with the directives and decisions of the EU economic space.

<https://reestr.kca.gov.kg/organization/index?page=4>

### **Conclusion 4.**

1. There is a national accreditation system according to ISO requirements.
2. There is no laboratory accredited to ISO 15189 for the determination of lead in biological material.

State testing laboratories are included in the Unified Register of the EEC

### **RECOMMENDATIONS**

- Prepare for accreditation to ISO 15189 for the determination of lead in biomaterials
- Participation in external quality assessment



## **5. Analyze national integrated databases of the Ministry of Health of the Kyrgyz Republic, including the effects of toxic heavy metals on children.**

### **Section 5: Analysis of national integrated databases of the Ministry of Health of the Kyrgyz Republic, including on the impact of toxic heavy metals on children**

Data on the number of cases of **poisoning with heavy metal salts - T56** according to the ICD-10 classification were obtained from the Medical Statistics Department of the Emergency Medicine Center in Bishkek.

For two years 2021-2022, a total of 10 cases of poisoning with salts of heavy metals were registered among the age group of 0-18 years old. In 2021, 4 cases were registered among the age group from 0 to 18 years old, and in 2022, 6 cases were registered among the age group from 0 to 18 years old.

It should be noted that there is a gap in terms of inability to specify the specific name of heavy metal from the available database of the Emergency Medicine Center of Bishkek. It is not clear from what type (kind) of heavy metal salts the poisoning occurred, because of taking into account aggregated statistical data.

It is necessary to make clarifications in the forms of recording data of medical statistics on cases of poisoning by heavy metal salts - indicating the name or type of metal.

With regard to collection, analysis and database of medical and statistical indicators, there is an e-Health Center under the MoH KR (<http://cez.med.kg>)

"The Ministry of Health has developed an integrated information system for ILab laboratories.

... the system is a tool for automating the procedures of processing referrals, analyzing, recording and delivering research results, and recording diagnostic results. ILab will also enable citizens and health workers to access the results of tests for timely diagnosis and viewing the history of test results.

Its use will also contribute to the refusal to keep paper versions of documents and journals, which will save financial resources and citizens' time.

At the first stage, the information system will be introduced in the laboratories of public health and the Central Medical Center of Bishkek."

[https://24.kg/obschestvo/218255\\_minzdrav\\_razrabotal\\_informatsionnyuyu\\_sistemu\\_dlya\\_laboratoriy\\_ILab/](https://24.kg/obschestvo/218255_minzdrav_razrabotal_informatsionnyuyu_sistemu_dlya_laboratoriy_ILab/)

## Conclusion

1. There is a gap in terms of inability to specify the specific name of heavy metal from the available database of the Emergency Medicine Center of Bishkek city.
2. It is not clear from which type (kind) of heavy metal salts the poisoning occurred, due to consideration of aggregated statistical data.

## RECOMMENDATIONS

- For a sustainable system of monitoring and supervision of heavy metal poisoning, including lead, it is necessary to develop and implement a clinical protocol. This type of indicator according to the procedure of the MoH KR will be entered into the integrated information system for ILab laboratories.

## 6. Analyze the current situation on heavy metal poisoning and medical care for children.

### Section 6: Analysis of the current situation on heavy metal poisoning and medical care for children

Due to the unavailability of information, it is not possible to analyze the situation.

In the case of **heavy metal salts poisoning (T56** according to the ICD-10 revision classification), the emergency personnel apparently provided first aid to the affected persons when they were called, but due to lack of details, the situation could not be analyzed.

## 7. To analyze the structures of the Ministry of Health of the Kyrgyz Republic functionally capable of becoming a Consultative Center on health and lead contamination at the national level.

## **Section 7: Analysis of structures of the Ministry of Health of the Kyrgyz Republic functionally capable of becoming an Advisory Center on Health and Lead Contamination at the national level**

**Analysis of the data of the structure of the Ministry of Health of the Kyrgyz Republic indicates that the National Institute of Public Health under the Ministry of Health of the Kyrgyz Republic can act as a research laboratory, provided that it is fitted with basic equipment.**

The Center of Environmental Medicine and Human Ecology of the National Institute of Public Health (NIOPH) under the Ministry of Health of the Kyrgyz Republic (formerly Scientific and Production Association "Preventive Medicine" NGO "PM") has experience in studying and determining the content of heavy metals (mercury, antimony, lead, etc.) in human biological materials and environmental objects (water, air, soil) and conducting awareness-raising activities among the population in Kadamzhai district of Batken region. Employees of the unit participated in training courses on the basis of the laboratory of Josef Stefan Institute in Ljubljana (Slovenia).

The staff of this first medical scientific-practical institution, currently the National Institute of Public Health under the Ministry of Health of the Kyrgyz Republic, participated in a number of joint international projects on the determination of heavy metals in human biological materials (samples):

- with WHO ERB (2016-2017) regarding the assessment of perinatal exposure to mercury in humans, using mercury in cord blood, maternal urine and hair samples as examples. The selected samples were analyzed in the Czech Republic and Minamata Center (Japan).
- within the framework of the UNEP/GEF project, State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic (2016-2017) to determine the content of mercury and some other elements in samples of whole blood, urine and human hair from residents living in Batken region, Kadamzhai district, Aidarken city area. The selected samples were analyzed at the Center for Biotic Medicine (Moscow, Russian Federation).
- MoH KR and "Doctors Without Borders Switzerland" in the Kyrgyz Republic, the project "Human Health Risk Assessment (HHRA) for Communities in Kadamzhai District, Batken Region, Kyrgyz Republic /Human Health Risk Assessment (HHRA)

for Communities in Kadamzhai District, Batken Region, Kyrgyz Republic (2019-2022) Selected samples were analyzed at the Josef Stefan Institute (Ljubljana, Republic of Slovenia) and Switzerland.

- MoH KR, "Ekois-Bishkek" PA, Blacksmith Institute Lead Poisoning Risk Reduction Project in Sovetskoe settlement, Kyrgyzstan, supported by the UNIDO and the European Union (2019). Detection of lead in blood from children' finger (5-7 years old) was performed using the Blood Lead Testing System on the Lead Care II device.

Testing laboratories of the Department of Disease Prevention and State Sanitary and Epidemiological Surveillance of the Ministry of Health of the Kyrgyz Republic, the National Institute of Public Health of the Ministry of Health of the Kyrgyz Republic, the Department of Environmental Monitoring under the Ministry of Natural Resources, Ecology and Technical Supervision of the Kyrgyz Republic, the laboratory Stewart Essay and Environmental Laboratories Ltd. has the potential to conduct screening studies for lead content in environmental objects, subject to the purchase of basic equipment, passing the ISO 15189 accreditation.

**The consulting center on the clinical part and prevention of lead poisoning at the national level can be the National Center for Maternal and Child Health Protection under the Ministry of Health of the Kyrgyz Republic (NCMCHP, Jal Children's Hospital, its Consultative and Diagnostic Department).**

The Centre is a state therapeutic and preventive, research and development health care organization of the tertiary level, providing specialized medical and sanitary care in the field of obstetrics and gynecology, neonatology, pediatrics and pediatric surgery using high-tech equipment, advanced scientific achievements, highly qualified medical personnel and conducting therapeutic and preventive activities, scientific research in the field of fundamental and practical medicine(Charter, Decree of the Government of the Kyrgyz Republic No. 84 dated February 11, 2014).

## Conclusion

1. Testing laboratories have experience in conducting studies for the detection of lead in environmental objects.

2. The National Institute of Public Health under the MoH KR participated in a number of joint international projects on the determination of heavy metals in human biological materials (samples).
3. the NCMCH provides consulting services at the national level.

#### RECOMMENDATIONS

- Acquisition of basic equipment for determination of lead in biological material.
- Train and equip the Consultative and Diagnostic Department of Jal Children's Hospital to set up a Lead Poisoning Consultative Center on its premises.

### **8. To present the results of the conducted analyses and developed recommendations to the stakeholders at the meeting of the interdepartmental working group project.**

#### **Section 8. Presentation of the results of the analysis and recommendations to the stakeholders at the meeting of the project's interdepartmental working group.**

The results of the analysis and recommendations developed by the expert will be presented at the meeting of the interdepartmental working group of the project and stakeholders.

The place and date of the meeting will be determined by the project managers after coordination with representatives from the MoH KR.

### **9. Prepare a report on the results of the work in two languages - Russian and English.**

#### **Section 9. Preparation of the report on the results of work**

The report on the results of work is prepared in two languages - Russian and English.

## **Annexes to the report**

Annex 1: Information on the laboratories participated in the survey.

Annex 2. List of laboratories that analyze samples of food products, environmental objects, biological materials (blood) for the content of lead and other metals in the conditions of the Kyrgyz Republic

Annex 3. List of organizations and persons interested in the problem of lead

Annex 4: List of Laws and Regulations of the Kyrgyz Republic ensuring chemical safety

Annex 5. List of laboratories included in the survey

Annex 6. List of normative legal documents regulating the activities of laboratories

### Abbreviations and Designations

Abbreviations	Designations
EEC	Eurasian Economic Council
RLD	Regulatory legal documents
TRCU	Technical Regulations of the Customs Union
SOP	Standard operating procedure
CDL	Clinical diagnostic laboratories
WHA	World Health Assembly
MoH KR	Ministry of Health of the Kyrgyz Republic
SSESC	State Sanitary and Epidemiological Surveillance Center
CSSEST	Center for State Sanitary and Epidemiological Surveillance on Transport
PHC	Primary healthcare
FMC	Family Medicine Center
WOP	Work organization project
WB	World Bank
DDPSSES	Department of Disease Prevention and State Sanitary and Epidemiological Surveillance
EIIS	Electronic Interdepartmental Interaction System
ILAB	Information laboratory system
ISO/IEC	International Standardization Organization / International Electrotechnical Commission
EU	European Union
QMS	Quality management system
EQA	External quality assessment
KAC	Kyrgyz Accreditation Center
PCR	Polymerase chain reaction
PT	Professional testing

**Annex 4. List of Laws and RLAs of the Kyrgyz Republic ensuring chemical safety**

	Name of the law and RLA	link
1.	<b>Laws</b>	
1.1.	LAW OF THE KYRGYZ REPUBLIC dated August 13, 2004 No. 116 On Health Care Organizations in the Kyrgyz Republic <i>(As amended by Laws of the KR dated April 29, 2016, No. 52, August 2, 2017, No. 167, December 1, 2017, No. 197 (2), August 22, 2020, No. 142)</i>	<a href="http://cbd.minjust.gov.kg/act/view/ru-ru/1515?cl=ru-ru">http://cbd.minjust.gov.kg/act/view/ru-ru/1515?cl=ru-ru</a>
1.2.	LAW OF THE KYRGYZ REPUBLIC of January 9, 2005, No. 6 On Health Protection of Citizens in the Kyrgyz Republic <i>(As amended by Laws of the KR dated December 28, 2006 No. 224, February 17, 2009 No. 53, April 17, 2009 No. 129, July 25, 2012 No. 137, October 11, 2012 No. 171, June 27, 2013 No. 108, December 18, 2015 No. 228, April 29, 2016 No. 52, July 6, 2016 No. 99, August 2, 2017 No. 167, December 1, 2017 No. 197 (2), May 17, 2019 No. 64, July 24, 2020 No. 89, August 22, 2020 No. 142, September 15, 2021 No. 119)</i>	<a href="http://cbd.minjust.gov.kg/act/view/ru-ru/1602">http://cbd.minjust.gov.kg/act/view/ru-ru/1602</a>
1.3.	LAW OF THE KYRGYZ REPUBLIC dated October 19, 2013 № 195 On license and permit system in the Kyrgyz Republic <i>( As amended by the Laws of the KR dated December 31, 2014, No. 179, April 8, 2015, No. 74, April 30, 2015, No. 91, May 21, 2015, No. 109, May 28, 2015, No. 122, June 28, 2016, No. 91, May 4, 2017, No. 75, May 10, 2017, No. 79, May 23, 2017, No. 84, August 2, 2017, No. 167, March 14, 2018, No. 29, April 24, 2019, No. 51, July 18, 2019 No. 89, December 31, 2019 No. 150, March 23, 2020 No. 29, April 22, 2020 No. 51, June 18, 2021 No. 72, October 27, 2021 No. 124, November 29, 2021 No. 143, January 21, 2022 No. 11, June 6, 2022 No. 42, June 30, 2022 No. 51, August 5, 2022 No. 81, August 7, 2023 No. 165)</i>	<a href="http://cbd.minjust.gov.kg/act/view/ru-ru/205058">http://cbd.minjust.gov.kg/act/view/ru-ru/205058</a>



1.4.	<p>Law of the Kyrgyz Republic dated June 16, 1999 N 53 "On Environmental Protection"</p> <p><i>(As amended by the Laws of the KR dated <u>February 4, 2002 No. 22, June 11, 2003 No. 101, August 11, 2004 No. 113, August 6, 2005 No. 124, April 27, 2009 No. 131, March 11, 2013 No. 36, March 13, 2014 No. 42, January 12, 2015 No. 03, January 16, 2015 No. 17, July 2, 2015 No. 142, July 25, 2016 No. 135, May 26, 2018 No. 55, July 8, 2019 No. 83, March 23, 2020 No. 29</u>)</i></p>	<p><a href="https://cbd.minjust.gov.kg/218?refId=1003917">https://cbd.minjust.gov.kg/218?refId=1003917</a></p>
1.5.	<p>Law of the KR dated June 16, 1999, No. 54 "On Environmental Expert Review"</p> <p><i>(As amended by the Laws of KR dated <u>June 11, 2003 No. 102, February 26, 2007 No. 21, May 4, 2015 No. 92</u>)</i></p>	<p><a href="https://cbd.minjust.gov.kg/1154?refId=1281668">https://cbd.minjust.gov.kg/1154?refId=1281668</a></p>
2	International agreements and contracts	
2.1.	<p>Law of the Kyrgyz Republic on Accession as of January 18, 1996, #304-1 to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, dated March 22, 1989.</p>	<p>:</p> <p><a href="https://cbd.minjust.gov.kg/49979?refId=318471">https://cbd.minjust.gov.kg/49979?refId=318471</a></p>
2.2.	<p>Law No. 114 of the Kyrgyz Republic of July 19, 2006 ratified the Stockholm Convention on Persistent Organic Pollutants of May 22, 2001.</p>	<p>Source:</p> <p><a href="http://chm.pops.int/">http://chm.pops.int/</a></p>
2.3.	<p>Law of the KR dated January 15, 2000, No. 15 on ratification of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, dated September 10, 1998,</p> <p>Providing support to the Kyrgyz Republic in international trade in certain hazardous chemicals to protect human health and the environment from potential harmful effects and promoting their environmentally sound use through the PIC procedure.</p>	<p><a href="https://cbd.minjust.gov.kg/323?refId=282358">https://cbd.minjust.gov.kg/323?refId=282358</a></p>
2.4.	<p>Convention on prohibition of development, production, accumulation and use of chemical weapon and its destruction (CPCW), ratified by the Law of the Kyrgyz Republic of April 29, 2003 N 89.</p>	<p><a href="https://cbd.minijust.gov.kg">https://cbd.minijust.gov.kg</a></p>

2.5.	Resolution of the Council of the Eurasian Economic Commission dated March 3, 2017 No. 19 TR EAEC 041/2017 "On the Safety of Chemical Products"	<a href="https://eec.EECnion.org/commission/department/deptex/reg/tr/TR_EEU_041_2017.php">https://eec.EECnion.org/commission/department/deptex/reg/tr/TR_EEU_041_2017.php</a>
3	National programs	
3.1.	Resolution of the Cabinet of Ministers of the Kyrgyz Republic dated February 10, 2023, No. 63 "On Approval of the National Control List of the Kyrgyz Republic of Controlled Products" In order to bring normative legal acts in the sphere of export control in line with international agreements in the field of non-proliferation of mass destruction weapons and to create more effective system of export control, in accordance with <u>Articles 6, 8</u> of the Law of the Kyrgyz Republic "On Export Control"	: <a href="https://mineconom.gov.kg/ru/document/105">https://mineconom.gov.kg/ru/document/105</a>
3.2.	Program on the Transition of the Kyrgyz Republic to Sustainable Development for 2013-2017 (PTSD). The Program was approved by the Resolution of the Government of the Kyrgyz Republic No. 218 dated April 30, 2013	<a href="http://cbd.minjust.gov.kg/act/view/ru-ru/53067/10?mode=tekst">http://cbd.minjust.gov.kg/act/view/ru-ru/53067/10?mode=tekst</a>
3.3.	Program of the Government of the Kyrgyz Republic on proper management of chemicals in the KR for 2015-2017 (March 2, 2015 No. 91).	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.4.	Resolution of the Government of the KR (RGCR) No. 559 of 5.08.2015 "Procedure for production and consumption waste handling";	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.5.	RGCR No. 201 dated 11.04.2016. "On approval of acts in the field of public health", namely the following hygienic standards	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.6.	Resolution of the RPC No. 885 dated 28.12.2015. "Procedure for handling used containers and packaging of chemical substances".	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.7.	Program of the Government of the Kyrgyz Republic on Introduction of the International System of Hazard Classification and Labeling of Chemicals in the Kyrgyz Republic and Action Plan for its Implementation for 2015-2017 (April 22, 2015, No. 235)	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>

3.8.	Regulations on the Hazard Classification System for Chemical Substances/Mixtures and Requirements for Elements Hazard Reporting: Labeling and Safety Data Sheet (February 9, 2015, No. 43)	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.9.	Procedure for Production and Consumption Waste Management in the Kyrgyz Republic (August 5, 2015, No. 559)	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.10.	Procedure for Hazardous Waste Management in the Kyrgyz Republic (December 28, 2015, No. 885).	<a href="http://cbd.minjust.gov.kg/">http://cbd.minjust.gov.kg/</a>
3.11.	PRESIDENT OF THE KYRGYZ REPUBLIC Decree dated February 8, 2021 PD No. 23 On urgent measures to develop the health care sector and improve the quality of life and health of the population in the Kyrgyz Republic	<a href="https://med.kg/uploads/17b41ec6-f603-4ab1-8d02-f91d5f2e337c.pdf">https://med.kg/uploads/17b41ec6-f603-4ab1-8d02-f91d5f2e337c.pdf</a> <a href="https://med.kg/ukazy">https://med.kg/ukazy</a>
4.	Orders, (RLAs) of the Ministry of Health	
4.1.	Order of the MoH KR "On Approval of Clinical Protocols and Guidelines" dated 10.03.2023 No. 259	<a href="https://med.kg/uploads/91ee0d20-863e-4de6-8c30-fecaea36e7c7-2.pdf">https://med.kg/uploads/91ee0d20-863e-4de6-8c30-fecaea36e7c7-2.pdf</a>
4.2.	Order of the MoH KR "Regulations on the organization of document management in the health care system in terms of keeping medical records in the form of electronic documents" dated 20.07.2023 No. 886	<a href="https://med.kg/uploads/6ae451dd-1707-49dd-a8f6-dabbde830109-0.pdf">https://med.kg/uploads/6ae451dd-1707-49dd-a8f6-dabbde830109-0.pdf</a>
4.3.	Order of the MoH KR "On approval of the Action Plan for 2023 within the framework of implementation of the Program on protection of public health and development of the health care system for 2019-2030 "Healthy man - prosperous country" dated 17.02.2023 #159.	<a href="https://med.kg/uploads/7212db50-6aee-4e47-aa51-dbed6fca13a6-Untitled11.PDF">https://med.kg/uploads/7212db50-6aee-4e47-aa51-dbed6fca13a6-Untitled11.PDF</a>

**Annex 5. List of laboratories included in the survey**

n/a No.	Name of laboratories	Ministry	of	Accreditation/ Unified Register of the EEC	External quality assessment/ PT
1.	Laboratory, Republican Clinical Infectious Diseases Hospital (RCID)	Ministry Health	of	Medical Accreditation Commission	+
2.	CDL, National Center for Maternal and Child Health (NCMCH)	Ministry Health	of	Medical Accreditation Commission	+
3.	CDL, National Center of Cardiology and Therapy named after Academician Mirsaid Mirrakhimov under the MoH KR, (NCCT)	Ministry Health	of	Medical Accreditation Commission	+
4.	CDU - CDL National Hospital (NH)	Ministry Health	of	Medical Accreditation Commission	+
5.	CDL NCHO, National Center for Oncology and Hematology (NCHO)	Ministry Health	of	Medical Accreditation Commission	+
6.	CDL Osh Interregional Clinical Hospital (OMOCB)	Ministry Health	of	Medical Accreditation Commission	+
7.	CDL National Surgical Center named after M.M. Mamakeev of the MoH KR (NSC)	Ministry Health	of	Medical Accreditation Commission	+

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8.	CDL Republican Diagnostic and Treatment Center of the Kyrgyz State Medical Academy (RDLC, KGMA)	Ministry of Health	Medical Accreditation Commission	+
9.	AquaLab	private	ISO 15189	+
10	Hemotest	private	ISO 9001-2015, ISO 15189	+
11	Department of Disease Prevention and State Sanitary and Epidemiologic Surveillance. Laboratory Testing Center	Ministry of Health	ISO 17025/ +	+
12	Interdistrict Kadamzhai Center for Disease Prevention and State Sanitary and Epidemiological Surveillance (ICPP&SES), Batken region.	Ministry of Health	ISO 17025/+	+
13	1. Sanitary-hygienic laboratory of the Center for Sanitary and Hygienic Epidemiology of Bazar-Korgon district, Jalal-Abad region	Ministry of Health	-	+

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14	Jalal-Abad inter-district ICPP&SES	Ministry Health	of	ISO 17025	+
15	Sanitary and hygienic laboratory, Center for Disease Prevention and State Sanitary and Epidemiological Surveillance of Kemin district	Ministry Health	of	-	+
16	Sanitary and hygienic laboratory, Center for Disease Prevention and State Sanitary and Epidemiological Surveillance of Tokmok City	Ministry Health	of	--	+
17	Sokuluk ICPP&SES Panfilov Division	Ministry Health	of	-	+
18	Sokuluk ICPP&SES Jaiyl department	Ministry Health	of	ISO17025 /+	+
19	Issyk-Ata ICPP&SES	Ministry Health	of	-	+
20	ICPP&SES of Moskovskiy district	Ministry Health	of	ISO 17025	+
21	Sokuluk Interdistrict Center for Disease Prevention and State Sanitary and Epidemiological Surveillance (ICPP&SES).	Ministry Health	of	-	+

22	Sanitary and hygienic laboratory of the Laboratory Testing Department of the Osh City Center for Disease Prevention and State Sanitary and Epidemiological Surveillance with functions of coordination of the Osh Region Service of the MoH KR	Ministry of Health	ISO 17025	+
23	Center for Environmental Medicine and Human Ecology, National Institute of Public Health under the MoH KR	Ministry of Health	-	+
24	Department of Environmental Monitoring, MNRETS of the KR	<i>Department of Environmental Monitoring, Ministry of Natural Resources, Environment and Technical Supervision (MNRETS) KR</i>	ISO 17025	+
25	Laboratories of "Stewart Essay and	private	ISO 17025	+

	Environmental Laboratories" Ltd.			
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## Annex 6. List of normative legal documents regulating the activities of laboratories

1. ISO 15189:2022. Medical laboratories. Particular requirements for quality and competence. Geneva: International Organization for Standardization.
2. ISO/IEC17025:2019. General requirements for the competence of testing and calibration laboratories. Geneva: International Organization for Standardization.
3. <https://www.iso.org/standard/42641.html>
4. *Quality management system in laboratories Manual*. WHO, 2013 <https://www.who.int/ru/publications/i/item/9789241548274>
5. [https://iris.who.int/bitstream/handle/10665/112609/9789244548271\\_rus.pdf?sequence=1](https://iris.who.int/bitstream/handle/10665/112609/9789244548271_rus.pdf?sequence=1)
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