MediLabSecure One Health Situation Analysis in Montenegro

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TABLE OF CONTENTS

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ACRONYMS AND ABBREVIATIONS

AFSVPA: Directorate for Administration of Food Safety, Veterinary, and Phytosanitary Affairs
AMR: Antibiotic-resistant
BOHN: Balkan One Health Network
DFI: Directorate for Inspections
EPA: Environmental Protection Agency of Montenegro
EU: European Union
IHR: International Health Regulation
IPH: Institute of Public Health Montenegro
ISS: Istituto Superiore di Sanità (Italian National Institute for Health)
JEE: The Joint External Evaluation
MLS: MediLabSecure
MOA: Ministry of Agriculture (Ministry of Agriculture, Forestry and Water Management)
MoH: Ministry of Health
NCDC: National Communicable Disease Center at IPH
OH JPA: One health Joint Plan of Action (2022–2026)
OH: One Health
OHCF: One Health Conceptual Framework
OHHLEP: One Health High Level Expert Panel
OHMeSA: One Health MediLabSecure Situation Analysis
PH group: Public Health working group of the MLS project
SOPs: Standard Operating Procedures
VBDs: vector-borne diseases
WNV: West Nile Virus
WHO: World Health Organization
FAO: Food and Agriculture Organization of the United Nations
WOAH: World Organization for Animal Health
UNEP: United Nations Environment Programme

1. INTRODUCTION

The past five decades have seen an unprecedented emergence of epidemic arboviral diseases, a type of vector-borne diseases (VBDs) caused by viruses transmitted to people by bites of infected arthropods.[1]

The MediLabSecure (MLS) project (https://www.medilabsecure.com/) is a European project that aims at preventing risks associated to arbovirus infections within 22 countries across the Balkan and Black Sea, Maghreb and Sahel, and Middle-East regions (Figure 1), by strengthening a structured, inclusive and institutionalized One Health (OH) approach. The project's overarching goals include establishing a framework to enhance networking activities, thereby improving integrated surveillance and monitoring of emerging arboviruses and VBDs. This involves strengthening cross-border collaborations and boosting the prevention and preparedness capacities and capabilities of the OH workforce. The Public Health working group (PH Group) of the MLS project is led by ISS and promotes early detection and integrated risk assessment of arboviruses, adopting a OH approach and involving, besides human and veterinary public health, the sectors of human and animal virology, entomology, climate, environmental and social sciences. In the context of the MLS project, the PH Group implemented the One Health MediLabSecure Situation Analysis (OHMeSA) in Montenegro in collaboration with the experts of the relevant national Institutions. The goal of the OHMeSA study was to strengthen the OH system for prevention and preparedness to arboviruses and other VBDs and zoonoses in Montenegro. The aim of this report is to provide information on the OHMeSA study in Montenegro, its methodology and its results.

[1] Chala B, Hamde F. Emerging and Re-emerging Vector-Borne Infectious Diseases and the Challenges for Control: A Review. Front Public Health. 2021;9:715759.

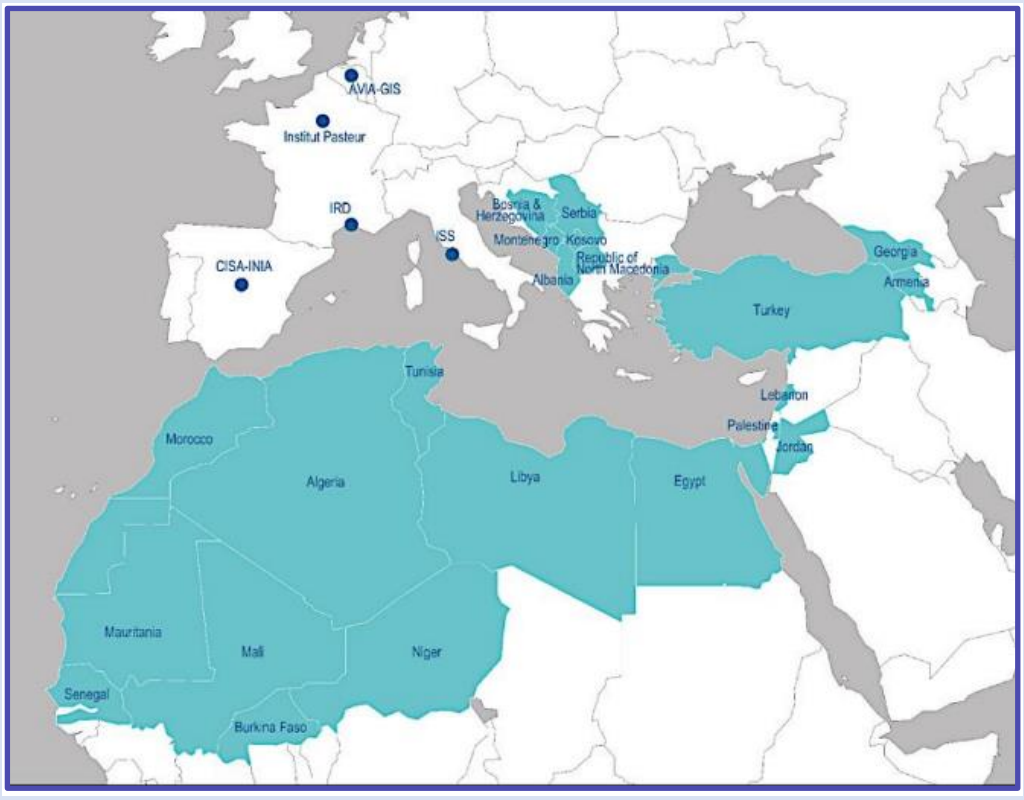

Figure 1. The countries of the MLS project.

2. BACKGROUND AND RATIONALE

The international and scientific community has been calling since many years to strengthen prevention and preparedness to VBDs and zoonotic diseases by integrating a systemic approach, such as the OH approach[2,3]. The recently established One Health High Level Expert Panel (OHHLEP) defined the OH approach as an integrated, unifying approach that aims to achieve optimal and sustainable health outcomes for people, animals, plants and the environment by mobilizing multiple sectors, disciplines and communities.[4] However, operationalization and implementation of the OH approach are challenging.[5]

The Quadripartite Organizations – the Food and Agriculture Organization of the United Nations (FAO), the United Nations Environment Programme (UNEP), the World Organisation for Animal Health (WOAH, founded as OIE), and the World Health Organization (WHO), responding to international requests to prevent future pandemics and to promote health sustainably through the OH approach, have developed the OH Joint Plan of Action (2022–2026) (OH JPA)[6] to collectively advocate and support the operationalization and implementation of OH.

Within the framework of the MLS project and with the support of Montenegrin Institutions and WHO Montenegro Country Office, the OHMeSA study was promoted to foster the development of the OH system in Montenegro and to promote its operationalization and implementation.

[2] World Health Organization, Food and Agriculture Organization of the United Nations & World Organisation for Animal Health. (2019). Taking a multisectoral, one health approach: a tripartite guide to addressing zoonotic diseases in countries. World Health Organization.

[3] Berthe, F.C.J., Bouley, T., Karesh, W.B., Le Gall, F.G., Machalaba, C.C., Plante, C.A., Seifman, R.M. (2018). Operational framework for strengthening human, animal and environmental public health systems at their interface. World Bank, Washington, DC, United States of America.

[4] One Health High-Level Expert Panel (OHHLEP), Adisasmito, W. B., Almuhairi, S., Behravesh, C. B., Bilivogui, P., Bukachi, S. A., Casas, N., Cediel Becerra, N., Charron, D. F., Chaudhary, A., Ciacci Zanella, J. R., Cunningham, A. A., Dar, O., Debnath, N., Dungu, B., Farag, E., Gao, G. F., Hayman, D. T. S., Khaitsa, M., Koopmans, M. P. G., … Zhou, L. (2022). One Health: A new definition for a sustainable and healthy future. PLoS pathogens, 18(6), e1010537.

[5] Zinsstag, J., Kaiser-Grolimund, A., Heitz-Tokpa, K., Sreedharan, R., Lubroth, J., Caya, F., Stone, M., Brown, H., Bonfoh, B., Dobell, E., Morgan, D., Homaira, N., Kock, R., Hattendorf, J., Crump, L., Mauti, S., Del Rio Vilas, V., Saikat, S., Zumla, A., Heymann, D., … de la Rocque, S. (2023). Advancing One human-animal-environment Health for global health security: what does the evidence 19 say?. Lancet (London, England), 401(10376), 591–604.

[6] FAO, UNEP, WHO, and WOAH. (2022). One Health Joint Plan of Action (2022-2026). Working together for the health of humans, animals, plants and the environment. Rome. https://doi.org/10.4060/cc2289en

Montenegro

Montenegro is an upper middle-income country in the Balkans region in Southeastern Europe. It borders with Serbia to the northeast, Kosovo* to the east, Albania to the southeast, Bosnia and Herzegovina, as well as Croatia to the northwest, and the Adriatic Sea to the west with a coastline of 293.5 km (Figure 2). Podgorica is the capital and largest city of Montenegro. The 2011 census reported 620,029 citizens.[7] Montenegro is a multiethnic state with 45% of Montenegrins, 28.7% Serbs and other minor ethnicities.

Figure 2: Map of Montenegro (Source: https://www.worldatlas.com/maps/Montenegro)

The Gini coefficient, that measures income inequality, is 0.37[8] (with 0 being perfect equality) and the Human Development Index, which measures life

[7] Monstat (2011). Census of Population, Households and dwellings in Montenegro 2011.

[8] The World Bank Data: https://data.worldbank.org/indicator/SI.POV.GINI?locations=ME

expectancy, education level and per capita income, of 0.83[9] with 1.0 being the highest possible human development.

In Montenegro tourism, industry and agriculture are the main economic activities.[10] Agricultural land covers 37% of the total land area. Even so, only 40% of that land area is used for crop cultivation. The remaining land is primarily used for animal husbandry, with a predominant focus on ruminant rearing, including cattle, sheep, and goats. Pig and poultry production has not been extensively developed, mainly due to a shortage of cereals for animal feeding.

In 2022 Montenegro switched to a fully tax-funded health insurance system.[11] Out-of-pocket payments are high, accounting for 39% of current spending on health in 2019, and almost 10% of all households experienced catastrophic health spending in 2017. The Ministry of Health is the primary administrative, regulatory and governing authority in the health sector. The Health Insurance Fund (HIF) is the single purchaser of health services. The Institute for Medicines and Medical Devices is responsible for pharmaceutical policy. Health services are provided through the network of publicly owned health facilities and contracted private facilities. The network of certified providers aims to ensure equal geographical access to health care. The Health Care Strategy 2022–2026 has these key objectives: moving towards universal health coverage (UHC), and protecting against health emergencies. Health care providers in the public sector include 18 Primary Health Care Centres and the IPH, 7 general hospitals, 3 specialized hospitals, the Clinical Centre of Montenegro, with 275 physicians per 100,000 people. The number of veterinarians per 100,000 people is 38.26[12].

In Montenegro the OH system is in the process of being built and collaboration and coordination mechanisms and procedures developed and consolidated. It is true that Montenegro is a small country and many institutional communications take place through personal contact.[13] The Joint

9 UNDP (2020). National Human Development Report 2020: Montenegro.
[10]The World Atlas: https://www.worldatlas.com/articles/what-are-the-biggest-industries-in-montenegro.html
[11] WHO Europe (2022). Health Systems in Action 2022 Edition Montenegro.
[12] Global Health Security Index (2021). Country score justifications and references Montenegro.
[13] WHO (2021). Joint External Evaluation of IHR Core Capacities of Montenegro: Mission Report, 27-31 May 2019.

External Evaluation (JEE) in 2019[7] and a WHO OH workshop held in 2022[14] highlighted the need to create regulated mechanisms of collaboration.

According to the JEE of WHO International Health Regulation (IHR) Core Capacities of Montenegro, Montenegro's legislative framework for surveillance, control and reporting of zoonotic and foodborne diseases is harmonized with European Union (EU) legislation. The management of zoonotic diseases as part of IHR implementation covers both human and animal sectors, which share responsibility for disease detection, surveillance, and reporting.

The JEE of IHR Core Capacities of Montenegro reports that the National Infectious Diseases Commission, which is currently being established by the Ministry of Health, functions as a multisectoral working group for infectious diseases, including zoonoses. Multisectoral teams and committees have been previously established for avian influenza and the flu pandemic in 2005, for Ebola in 2014, and a Commission for rabies set up in 2011.

The Law on the Protection of the Population from Infectious Diseases[15] envisages that health institutions, veterinary organizations and administrative bodies competent for food safety, veterinary, and phytosanitary services are obliged to exchange information on the occurrence and movement of infectious diseases. The IPH is obliged to monitor and study the movement of infectious diseases and informs the Ministry, other authorities and entities in the country (such as Directorate for Food Safety, Veterinary, and Phytosanitary Affairs) and abroad for the purpose of early warning and data exchange.

According to the Ordinance on Surveillance of Zoonoses and Causes of Zoonoses,[16] the Montenegro Directorate for Food Safety, Veterinary, and Phytosanitary Affairs, which is part of the Ministry of Agriculture and Rural Development, assesses the trends and sources of zoonoses, zoonotic agents, and resistance to antimicrobial agents and

[14] WHO European region (2022). National Multisectoral One Health Dialogue Podgorica, Montenegro 13-17 June 2022 (unpublished report).

[15] Parliament of Montenegro (2018). Law on the Protection of the Population from Infectious Diseases (Zakon o zaštiti stanovništva od zaraznih bolesti, Broj: 28-2/17-3/4).

[16] Directorate for Food Safety, Veterinary and Phytosanitary Affairs of Montenegro (2015). Ordinance on Surveillance of Zoonoses and Causes of Zoonoses (Pravilnik o nacinu pracenja zoonoza i uzrocnika zoonoza, Sl. CG. 7/2012).

prepares reports on these. Cooperation with the private sector in controlling or responding to zoonoses is not envisaged.

According to the JEE there is a regular exchange of information and cooperation between public health and animal health sectors, with formal and informal systems for mutual reporting on zoonosis and zoonotic agents. The IPH (human health sector) and the Ministry of Agriculture and Rural Development, the Directorate for Administration of Food Safety, Veterinary, and Phytosanitary Affairs (AFSVPA), and Specialist Veterinary Laboratory (animal health sector) share responsibility for zoonotic disease detection, surveillance, and reporting. Although informally, the relevant human health and animal health agencies collect data and submit regular reports on surveillance to each other.

The 2022 WHO-led OH workshop in Montenegro recommended the establishment of a OH steering committee with no more than two-three professionals from each of these institutions: IPH, AFSVPA, Directorate for Inspections (DfI), plus colleagues from relevant ministries. The committee should review the legislation and all actions implicated in outbreaks of foodborne diseases according to best practice. It should also develop standard operating procedures, agree on focal points and run simulation exercises, and assess how EU legislation works in the Montenegro context. Finally the committee should conduct learning needs assessments and consider involving the Ministry of Ecology and Protection of Environment to ensure that the environment aspects of OH are also considered. In 2018, Montenegro took an important step towards the ratification of the Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes.[17] This convention is being used as an instrument to strengthen national action towards reaching regional and global water and sanitation commitments, and the Ostrava declaration on Environment and Health (2017).

The "National Programme for the Control of Antibiotic-resistant (AMR) Bacteria, 2017–

[17] Ministry of Health, Montenegro, Schmoll, O., Shinee, E., Brajovic, M., Menne, B., Zambon, F., & Nemer, L. (2020). Montenegro makes important strides towards achievement of the SDGs. European journal of public health, 30(Suppl_1), i43–i44. https://doi.org/10.1093/eurpub/ckaa030

2021"[18], guidelines and laws, promotes appropriate antimicrobial use in humans and animals, as shown also by the Tripartite AMR Country Self-Assessment Survey TrACSS survey (2020/21).[19] However, no AMR training for veterinarians and veterinary paraprofessionals, farming (animal and plant), food production, food safety and the environment sectors are currently available. There is no national monitoring system for animal health, unlike human health with records of antimicrobials sales and use.[20] There is insufficient evidence that Montenegro conducts environmental detection or surveillance activities for antimicrobial residues or AMR organisms.[21]

For Montenegro, 2022 marked the start of the development of the new Country Programming Framework (CPF) cycle, which runs to 2027. In the CPF, FAO pledges partnership and cooperation with the Government of Montenegro in implementing the 2030 Agenda for Sustainable Development and achieving sustainable food systems along the entire agrifood value chain. Work to reduce AMR organisms and control zoonoses helped advance the OH programme in the country[22].

Montenegro has cross-border agreements, protocols, and memorandums of understanding (MoUs) with neighbouring countries with regard to public health emergencies. One of the agreements that is publicly available, the "Agreement between Government of Serbia and Government of Montenegro on Veterinary Affairs"[23] also includes cooperation between the states in issues related to animal health emergencies. The agreement envisages that two sides will, within 24 hours, inform the other side about the occurrence of contagious animal diseases in accordance with the method of reporting the occurrence of a disease prescribed by the WOAH. Montenegro is also part of the Balkan One Health Network

[18] Government of Montenegro, Ministry of Health (2016). National Programme for the Control of Antibiotic-resistant Bacteria 2017–2021 (Strategija za kontrolu rezistencije bakterija na antibiotike 2017-2021).

[19] WHO (2021). Antimicrobial resistance TrACSS Montenegro 2021 country profile https://www.who.int/publications/m/item/antimicrobial-resistance-tracss-mne-2021-country-profile

[20] The European Observatory on Health Systems and Policies: https://eurohealthobservatory.who.int/countries/montenegro

[21] Global Health Security Index (2021). Country score justifications and references Montenegro.

[22] FAO (2023). FAO in Europe and Central Asia 2022. Budapest. https://doi.org/10.4060/cc5252en

[23] Government of Montenegro. 2012. "Agreement between Government of Serbia and Government of Montenegro on Veterinary Affairs (Sprazum izmedju Vlade Republike Srbije i Vlade Crne Gore u oblasti veterine)".

(BOHN) and it will host the next meeting of the network in September 2023.

The relevant Institutions in Montenegro are leveraging on all these achievements that rely on multisectoral strategies to support the consolidation of the national OH system.

Montenegrin institutions involved in the OHMeSA study (see Annex 1)

i. The Institute for Public Health
ii. Administration for Food Safety, Veterinary and Phytosanitary Affairs Animal Health /Ministry of Agriculture, Forestry and Water Management
iii. Environmental Protection Agency of Montenegro
iv. Diagnostic Veterinary Laboratory
v. Biotechnical Faculty-University of Montenegro
vi. WHO Montenegro Country Office

3. AIM AND OBJECTIVES

The OHMeSA study is an action-oriented situation analysis aimed at strengthening the OH system in Montenegro by assessing the level of integration among different sectors and stakeholders for the prevention and preparedness to threats at the human-animal-environment interface, such as vector-borne diseases and zoonoses.

The specific objectives are:

- ✓ Describe sectors and stakeholders engaged in the OH system in Montenegro.
- ✓ Identify priority health threats that could benefit from the OH approach. Use the prioritized health threats as case studies to assess the integration of OH approaches in prevention and preparedness strategies.
- ✓ Enhance awareness of the stakeholders about the importance of multisectoral and multidisciplinary collaboration to face emerging threats.

- ✓ Identify opportunities to enhance the OH system and the integrated surveillance and early warning systems of the prioritised pathogens.
- ✓ Promote comprehensive capacity building for all stakeholders involved in the study.

4. THE CONCEPTUAL FRAMEWORK

The One Health Conceptual Framework (OHCF) was elaborated in the context of *The Group of Twenty* (G20) 2021 Meeting,[24] to understand to what extent the OH approach is included in national strategies against priority health threats.

The OHCF aims at strengthening OH national systems by highlighting gaps in existing prevention, preparedness and response strategies and by identifying national procedures that allow integration of OH approaches. The framework identifies five national targets areas and related priority actions which should be considered to ensure OH approach operationalisation and implementation at national level by addressing governance mechanisms, prevention and preparedness strategies, data collection systems, capacity building activities and evaluation strategies. The framework identifies also two international targets with priority actions aimed at guiding the development of national OH strategies on the basis of harmonised OH global strategies to enhance cross-border collaborations and capacity building initiatives (Figure 3).

For the scope of this study the OHCF was used to guide the situation analysis and to develop a checklist to collect information during workshops and interviews.

[24] Agrimi U., Carere M., Cubadda F., Dar O., Declich S., Dente M.G., Farina M., Ihekweazy C., Lavazza A., Mancini L., Mantovani A., Marcheggiani S., Milano A., Monaco M., Morabito S., Riccardo F., Robbiati C., Scavia G., Villa L., Villa M. (2021). One Health – based conceptual frameworks for comprehensive and coordinated prevention and preparedness plans addressing global health threats. https://www.t20italy.org/wp-content/uploads/2021/09/TF1_PB05_LM02.pdf

The ONE HEALTH CONCEPTUAL FRAMEWORK						
The present framework aims at guiding the relevant national sectors to strengthen the One Health system and implement harmonised and context-driven One Health strategies to support health security globally.						
Target areas						
National level					**International level**	
GOVERNANCE	PREVENTION AND PREPAREDNESS	DATA COLLECTION AND SHARING	NATIONAL CAPACITY BUILDING	CONSOLIDATION AND EVALUATION OF THE SYSTEM IN PLACE	CROSS-BORDER COLLABORATIONS	GLOBAL CAPACITY BUILDING
Priorities for Action						
Establishing a national multisectoral and multistakeholder team to set principles, rules and procedures to allow operationalisation of OH strategies. Assessing the opportunity and benefits of setting up a OH National Center Enacting laws and identifying resources for OH operationalisation	Connecting OH strategies to prevention and preparedness plans by establishing a multisectoral team (OH Team) in charge for development, implementation and monitoring of plans Develop inclusive strategies engaging all the actors, including communities	Identification of national priority areas to be monitored and related monitoring indicators/metrics Verifying available sources of information and data Development of integrated and interoperable database connected with early warning and surveillance systems	Development of training curricula about OH prevention and preparedness Training of the OH workforce included in national plans Piloting OH strategies and exercising about their implementation	Identifying monitoring and impact indicators Assessing level of implementation of OH indications in prevention and pandemic plans Assessing added value of OH in prevention and preparedness	Developing and updating international guidance and regulations to integrate OH strategies in prevention and preparedness plans and international early warning systems Identification of OH preparedness indicators/metrics in collaboration with National OH Teams Establishing Quadripartite collaborating Centers at National OH Centers Facilitating Networking opportunities between OH National Centers	Integration of OH principles in International trainings and in capacity assessment tools Promoting harmonised and multicounty exercises

Figure 3: The OHCF [25]

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5. STUDY DESIGN

The OHMeSA study was guided by a team of researchers from the Italian National Institute of Health (ISS), and performed with the support of WHO and in coordination with the IPH and WHO Montenegro Country Office.

The study adopted mixed-methods approach with a desk research component and a qualitative investigation component based on participatory workshops and interviews, and included a stepwise approach (Figure 4).

Steps of the OH MeSA study	Preparation and desk research (May-Jun 2023)
	Workshops and interviews (Jul 2023)
	Analysis of the information collected (Jul-Aug 2023)
	Consolidation of the study report (Sept 2023)

Figure 4: The study stepwise approach

Preparation and desk research

This phase included contact and exchange of information with IPH and WHO Montenegro, a stakeholder mapping process, collection of documentation and study protocol development. The study was presented during the MLS Balkan and Black Sea Regional Meeting in May 2023.

A desk research to retrieve information about the OH system and OH threats in Montenegro was also performed.

Workshops and interviews

A 3-day data collection step was arranged from the 10th to the 12th of July 2023 at the PHI of Montenegro and included:

Introduction and Prioritisation Workshop (1st day)

The first workshop was dedicated at introducing the study and prioritising OH threats relevant for Montenegro.

The prioritisation included two steps: the first prioritisation was aimed at selecting a priority arboviral pathogen in line with the scope of the MLS Project, while the second prioritisation focused on other VBDs and zoonotic diseases that could benefit from the OH approach in Montenegro. The threats were prioritized using the Mentimeter™ platform for managing live polls.

The criteria for the ranking of the selected pathogens were identified on the basis of the guidance of WHO[25] and CDC[26] and the objectives of the study as already piloted in the previous study performed in Armenia by ISS within the MLS project[27]. The following criteria were considered:

- emerging or re-emerging threat with changing of pattern distribution;
- emerging or re-emerging threat at the human-animal-environment interface requiring a multisectoral action (OH approach);
- available surveillance system for, or/and plan/s for, or/and recent response action to the threat.

On the basis of the above criteria the following indicators were agreed with the stakeholders for the selection of the pathogens:

[25] WHO (2006). Setting priorities in communicable disease surveillance.

[26] Rist CL, Arriola CS, Rubin C (2014) Prioritizing Zoonoses: A Proposed One Health Tool for Collaborative Decision-Making. PLoS ONE 9(10): e109986. doi:10.1371/journal.pone.0109986

[27] Milano A, Robbiati C, Declich S, Calistri P, Pediconi O, Amato L, Paronyan L, Avetisyan L, Manucharyan A, Avetisyan G, et al. Assessing the Adoption of One Health Approaches in National Plans to Combat Health Threats: The Pilot of a One Health Conceptual Framework in Armenia. Tropical Medicine and Infectious Disease. 2024; 9(1):22. https://doi.org/10.3390/tropicalmed9010022

Indicators for OH threats prioritisation
Threat detected or caused outbreaks /epidemics in the past ten years
Threat detected in a new location or population in the country or neighboring countries in the past ten years
Threat whose animal host (domestic or wild) is/are in close proximity to humans
Threat whose related vector/s' presence and abundancy are increasing due to anthropogenic, climatic, and environmental factors
Threat affecting food safety and /or food security
Threat impacting greatly socio-economic aspects in case of outbreak
Threat benefitting the most from the integration of OH in preparedness/surveillance/response
Threat for whom a OH preparedness /surveillance plan is available
Threat benefitting the most from the integration of environmental and climatic data in its / their surveillance
Threat which has activated a recent response action to contain a potential outbreak of the disease
Threat with an integrated data collection and analysis system

Table 1: Indicators for OH threats prioritisation.

Interviews (2nd day)

Using the checklist developed to assess the OH system in Montenegro and having the two prioritised threats as a case study to investigate, interviews were arranged with stakeholders from Montenegrin Institutions.

Consolidation workshop (3rd day)

A final consolidation workshop was arranged on the 3rd day to finalise and share the preliminary results of the situation analysis and to discuss actions and opportunities to produce a roadmap for OH strengthening in Montenegro.

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6. RESULTS

Preparation and desk research

A visit to Montenegro Institutions in March 2023 allowed to explore possible partnerships and seek consensus about the scope and implementation of the OHMeSA study, which was presented to Montenegrin stakeholders attending the MLS Balkan and Black Sea Regional Meeting in Petrovac in May 2023. A following phase of online meetings and information exchange allowed to finalise the study protocol and the stakeholder analysis.

A desk research and the online exchange of information with Montenegrin Institutions allowed to identify a list of OH VBDs and zoonotic priorities, either Arbovirus (focus of the MLS project) and non-Arbovirus.

Arbovirus (focus of the MLS project)	Other identified threats at national level		
Virus	Virus	Parasites	Bacteria
Crimean – Congo haemorrhagic fever Virus (CCHFV)	Hantavirus	Leishmania	Salmonella
West Nile Fever Virus (WNFV)			
Rift Valley Fever Virus (RVFV)	Avian Flu Virus		

Table 2: List of OH priority threats in Montenegro.

Workshops and interviews

i. Day 1: Introduction and Prioritisation of OH threats

After agreeing on the proposed indicators (see study design), we proceeded with the first polling to prioritise Arbovirus threats (CCHFV, RVFV, WNV).

WNV was the Arbovirus that received the highest score (28), followed by CCHFV (17) and RVFV (11).

WNV was mainly voted as a OH priority threat, since it could benefit from environmental and climatic data and the OH approach in prevention, preparedness and response actions. Also, its presence is increasing in neighbouring countries in the last 10 years.

CCHFV scored high regarding animal host in proximity to humans, and detection in new locations in the country or neighbouring countries.

In the second polling, Leishmania received the highest score (44), followed by hantavirus (39), Salmonella (37) and Avian Flu (37). Leishmania was mainly voted as a pathogen which has activated a recent response action and whose animal host is in close proximity to humans. In addition, it would benefit from the integration of environmental and climatic data and from OH approach in preparedness, surveillance and response actions.

ii. Day 2: Interviews

Six interviews with stakeholders engaged in prevention and preparedness activities to OH threats were performed.

The information gathered was analyzed according to the OHCF target areas:

GOVERNANCE

- ✓ Collaboration at the institutional level occurs on a personal basis and relies on individual initiatives; however, there are no documented procedures in place. During the implementation of projects or in emergency situation the stakeholders are forced to share information.

- ✓ Examples of formal coordination exists: an umbrella body is functioning under the Ministry of Interior for emergency situations.
- ✓ The governance structure has undergone multiple changes which have led to some challenges in reconfiguring the structure and human resources of the different Institutions.
- ✓ The control of zoonoses is based on legislation in both animal and human health based on a list of priorities. In the human health sector, the responsibility lies with the IPH at the central level, and locally with hygiene and epidemiological services. In the animal health sector, responsibilities are shared by the Ministry of Agriculture and Rural Development, Directorate for Food Safety, Veterinary and Phytosanitary Affairs and the Specialist Veterinary Laboratory.

PREVENTION & PREPAREDNESS

- ✓ The PHI, the Diagnostic Veterinary Laboratory and the University of Montenegro developed a Program for vector surveillance and control with an action plan for 2023-25 adopting a OH approach, that was recently approved by the MoH. The objective of the program is to improve the regulation on vector control, to know the prevalence of VBDs in animals and humans, to reduce introduction of invasive species, to increase allocation of government funds on vector control.
- ✓ The zoonoses national program is available, includes different institutions and allows to share data between the MoH, MoA and IPH.
- ✓ The National Health Security Plan has not yet been approved, while the Pandemic Flu Plan has not been updated yet (first plan in 2006, last updating in 2017. Updating planned each 5 years)
- ✓ The IPH is the only public institute dealing with vector control and supervising municipalities and private companies. Activities are mostly project-based. With global warming vectors are active until January, this requires more resources and a shift to continuous surveillance.
- ✓ A national blood donation surveillance plan is available

- ✓ Joint risk assessment is performed for food safety threats (guided by the MoA) or in case of outbreaks (guided by the IPH) as it was the case of Avian Flu in 2005
- ✓ IPH performs community engagement and risk communication activities, as during COVID-19 pandemic, and within project targeting vulnerable populations (Roma, migrants) together with other Ministries, international organizations and stakeholders (NGOs, medical students). Moreover, the Environmental protection Agency performs education activities for the general population together with other Ministries, Municipalities, international organizations and NGOs. They have real time information about air quality on their website and a phone number for citizens to report environmental issues.

DATA COLLECTION AND SHARING

- ✓ Human health, animal health and the environmental sectors use different electronic reporting systems
- ✓ Exchange of information between animal and human health sectors takes place regularly by email.
- ✓ Lack of institutional agreement/s on sharing surveillance data between different institutions

CAPACITY BUILDING

- ✓ VectorNet and other projects supported some research activities.
- ✓ MediLabSecure Project is important for consolidation of in-country connections.
- ✓ Staff for vector surveillance is overwhelmed and can cover only Podgorica.
- ✓ Capacities related to tick collection and surveillance are not well developed (only field works in the framework of some projects)
- ✓ Not all the Ministry staff are aware of the OH approach.

  MoH allocate a small budget for professional development of medical personnel each year, however the training doesn't include OH topics.

Animal and environmental health personnel are not targeted by these activities. Sharing equipment is a problem for property rights.

- ✓ A tabletop simulation exercise with IPH staff about rabies was organized in 2021 in the framework of IPA two-year Project

CONSOLIDATION AND EVALUATION

- ✓ WHO Joint External Evaluation in 2019
- ✓ WHO OH workshop in 2022

CROSS-BORDER COLLABORATION

- ✓ Balkan OH Network
- ✓ Interreg IPA Cross-border Cooperation Programme Croatia-Bosnia and Herzegovina-Montenegro: ERI-HEALTH–Public Health Preparedness for Cross-border Epidemics and Emergencies Project (anthropozoonoses and vector-borne diseases diagnostic and control)

CASE STUDY ABOUT WEST NILE VIRUS (WNV)

In 2012, a case of human WNV infection from Montenegro was detected in Germany.[28] It was the first case ever recorded in the country. The same year, reporting human WNV infections became mandatory in Montenegro[29] and Laboratory for molecular microbiology and Laboratory for serology and immunology at IPH are lab of reference for WNV in humans. In 2013 in Montenegro four additional human cases were notified.[30,31] Montenegro performs continuous monitoring of WNV infections among blood donors and reported its first asymptomatic case in 2013. [4] WNV sero-prevalence studies in human population are not being conducted.

In 2017, a study identified a total of 22 mosquito species, including 3 Culex species, including Cx. Modestus and Cx. pipiens, which are potential vectors of West Nile Virus (WNV) and Rift Valley Fever Virus (RVFV). These species are found throughout the South and Central regions of the state. It is interesting that this invasive species appears every year in North Region but cannot overwinter there due to the climatic characteristics. [32]

In 2022 vector season, a total of 1050 mosquitoes (493 Culex sp. and 557 Aedes sp.). were identified in different locations in a period of five months.

The mosquito samples were then examined by the RT PCR method. WNV was not detected in any of the samples. [33]

In 2020, Montenegro and Serbia have been identified as highly favourable for WNV. [34]

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[28] Gabriel, M., Emmerich, P., Frank, C., Fiedler, M., Rashidi-Alavijeh, J., Jochum, C., Günther, S., Auerhammer, K., Rupprecht, H. J., Blank, R. T., Sacher, N., Pertzborn, L., Stark, K., Schrauzer, T., & Schmidt-Chanasit, J. (2013). Increase in West Nile virus infections imported to Germany in 2012. Journal of clinical virology : the official publication of the Pan American Society for Clinical Virology, 58(3), 587–589. https://doi.org/10.1016/j.jcv.2013.08.027

[29] Di Sabatino, D., Bruno, R., Sauro, F., Danzetta, M. L., Cito, F., Iannetti, S., Narcisi, V., De Massis, F., & Calistri, P. (2014). Epidemiology of West Nile disease in Europe and in the Mediterranean Basin from 2009 to 2013. BioMed research international, 2014, 907852. https://doi.org/10.1155/2014/907852

[30] Young, J. J., Haussig, J. M., Aberle, S. W., Pervanidou, D., Riccardo, F., Sekulić, N., Bakonyi, T., & Gossner, C. M. (2021). Epidemiology of human West Nile virus infections in the European Union and European Union enlargement countries, 2010 to 2018. Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin, 26(19), 2001095. https://doi.org/10.2807/1560-7917.ES.2021.26.19.2001095

[31] Failloux, A. B., Bouattour, A., Faraj, C., Gunay, F., Haddad, N., Harrat, Z., Jancheska, E., Kanani, K., Kenawy, M. A., Kota, M., Pajovic, I., Paronyan, L., Petric, D., Sarih, M., Sawalha, S., Shaibi, T., Sherifi, K., Sulesco, T., Velo, E., Gaayeb, L., … Robert, V. (2017). Surveillance of Arthropod-Borne Viruses and Their Vectors in the Mediterranean and Black Sea Regions Within the MediLabSecure Network. Current tropical medicine reports, 4(1), 27–39. https://doi.org/10.1007/s40475-017-0101-y

[32] Pajovic, Igor & RALEVIC, Miladin & Adzic, Bojan & PAJOVIC, Ljiljana. (2019). WEST NILE VIRUS DETECTION PROGRAMME, SURVEILLANCE OF Culex sp. IN MONTENEGRO, 2019. 65. 10.17707/AgricultForest.65.4.20.

[33] Data from Veterinary Diagnostic Laboratory of Montenegro.

[34] García-Carrasco, J. M., Muñoz, A. R., & Real, R. (2021). Anticipating the locations in Europe of high-risk areas for West Nile virus outbreaks in 2021. Zoonoses and public health, 68(8), 982–986. https://doi.org/10.1111/zph.12877

Active surveillance (serology) in horses and passive surveillance in birds are performed with no cases identified.

CASE STUDY ABOUT LEISHMANIA

In Montenegro human leishmaniases are notifiable, but otherwise no specific surveillance and control is implemented.[35] Laboratory for parasitology and Laboratory for serology and immunology at IPH lab are reference laboratories for leishmaniases in humans.

An average of three annual cases between 2004 and 2008 were reported, with underreporting considered mild.[36] The country registered 65 Visceral (VL) and one cutaneous leishmaniasis (CL) in humans between 1993 and 2013.[37] The disease is reported from 11 of 21 municipalities, mostly in the coastal area. The highest incidence is recorded in Ulcinj and Bar, and 54% of cases were 0–7 years old. According to the WHO Global Health Observatory data repository (GHDR) dataset, there were 36 VL cases between 2005 and 2020 (including 20 autochthonous cases) and no CL cases during the period 2013–2020.[38] The resulting cumulative incidence per 100,000 population of visceral leishmaniasis between 2005–2020, was highest in Albania (2.15 cases), followed by Montenegro, Malta, Greece, Spain and North Macedonia (0.53– 0.42), Italy (0.16), Portugal (0.09) and lower in other endemic countries (0.07–0.002)[39].

Between 2009 and 2019, notification of leishmaniasis was mandatory in domestic animals and disease was reported to be present.[40] Leishmaniosis in dogs is mainly detected by private laboratories with rapid tests and, as reporting is not more mandatory, relevant underreporting

[35] Berriatua, E., Maia, C., Conceição, C., Özbel, Y., Töz, S., Baneth, G., Pérez-Cutillas, P., Ortuño, M., Muñoz, C., Jumakanova, Z., Pereira, A., Rocha, R., Monge-Maillo, B., Gasimov, E., Van der Stede, Y., Torres, G., & Gossner, C. M. (2021). Leishmaniases in the European Union and Neighboring Countries. *Emerging infectious diseases*, *27*(6), 1723–1727. https://doi.org/10.3201/eid2706.210239

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[37] Medenica, S., Jovanović, S., Dožić, I., Milicić, B., Lakićević, N., & Rakocević, B. (2015). Epidemiological Surveillance of Leishmaniasis in Montenegro, 1992-2013. *Srpski arhiv za celokupno lekarstvo*, *143*(11-12), 707–711. https://doi.org/10.2298/sarh1512707m

[38] WHO. Global Health Observatory data repository (GHRD), Leishmaniasis. Available at: https://apps.who.int/gho/data/node.main.NTDLEISH?lang=en

[39] Maia, C., Conceição, C., Pereira, A., Rocha, R., Ortuño, M., Muñoz, C., Jumakanova, Z., Pérez-Cutillas, P., Özbel, Y., Töz, S., Baneth, G., Monge-Maillo, B., Gasimov, E., Van der Stede, Y., Torres, G., Gossner, C. M., & Berriatua, E. (2023). The estimated distribution of autochthonous leishmaniasis by Leishmania infantum in Europe in 2005-2020. *PLoS neglected tropical diseases*, *17*(7), e0011497. https://doi.org/10.1371/journal.pntd.0011497

[40] WOAH. WAHIS Portal Animal health data: https://www.oie.int/en/animal-health-in-the-world/wahis-portal-animal-health-data/

is common. Veterinarians are almost all private, it is needed to engage them in prevention activities and to sensitize dog owners.

The Diagnostic Veterinary Laboratory is starting to test phlebotomies for Leishmania.

Human hospital discharge databases are now the most accurate source of data to estimate the incidence of human visceral leishmaniasis and should also be employed as an indirect measure to identify areas with a high incidence of animal leishmaniasis where control efforts should be upscaled.

iii. Day 3: Consolidation workshop

The final workshop allowed to share and validate the preliminary results with the stakeholders and identify opportunities and actions to strengthen the OH system in Montenegro.

Opportunities to strengthen the OH system in Montenegro			
OHCF Target areas	Strengths	Needs	Opportunities
Governance	Vector surveillance and control programme with action plan 2023-2025 approved by the MoH. The plan includes the establishment of a multisectoral committee. Umbrella body under Ministry of Interior for emergencies. WHO IHR Focal Points active.	To intensify collaboration and support between human and animal health sectors and with the Environment Protection Agency. Increase awareness of OH across Institutions. Informal communication between institutions, should be channelled into formal procedures.	Establishing a regulated OH steering committee (body) including all the relevant sectors and WHO IHR focal points, to focus on OH threats (not only VBDs). Advocacy through MoH and other Ministries to support the development of a legal framework for the committee.
Prevention and preparedness	To facilitate participation of the OH Steering Committee to the	National Plan for Health Security needs to be adopted.	Reinforce multisectoral health promotion activities involving civil society,

	development and implementation of plans. Municipality role in prevention actions. Education and awareness of communities (IPH, EPA).	Influenza Pandemic Preparedness Plan 2005, updated in 2017-18, need to be integrated with a OH approach To intensify collaboration and involvement at municipality level: Municipalities have obligation (regulated) to make a plan for vector control every year in collaboration with IPH, but it is not happening. Rule book to have private companies certified and registered under the MoH. To include OH in awareness activities, by adopting multisectoral approach. Improve sandflies/ticks' surveillance. Perform joint risk assessments.	communities and the private sector. Valorise the 2023-2025 implementation outcomes to develop a vector-borne diseases plan with a OH approach.
Data collection and sharing	Central Veterinary Information System in progress with negotiation in progress with IPH to make the system	Consider interoperability of the system to allow interconnection between other national system (at	Need to identify data to be shared for priority threats.

	interoperable for food-borne diseases. A platform creation is in progress to share data on vector surveillance and control among institutions. Environmental Protection Agency electronic system in progress. IPH NCDC electronic system not connected with laboratory system (except for Covid-19).	least for risk assessment and electronic reporting) Develop procedures for data sharing, at least for risk assessment Involvement of private structures in case reporting when relevant (e.g. leishmaniosis in dogs detected by private labs).	
Capacity building	Networking activities within MLS. Education for medical professionals.	Continuing professional education need improvement and funding and should include other professionals, than the medical ones.	Training needs assessments for different professions. Develop a OH training curriculum for professionals leveraging on the experience of MLS workshops and training initiatives.
Evaluation of OH strategies	WHO Joint External Evaluation in 2019. WHO OH workshop in 2022.	Additional multi-sectoral training, for example in emergency response, would help engage all stakeholders.	
International harmonisation and cross border collaboration	BOHN - Balkan One Health Network	BOHN meeting September 2023	Cross-border OH risk assessment should be promoted.

Figure 5: Opportunities emerged from the study

The discussion on the identified opportunities ended with the identification on three main areas to be targeted to consolidate the National One Health System:

i. The creation of a National One Health Committee,
ii. Multisectoral capacity building and awareness activities about the One Health approach,
iii. The development of procedures to facilitate data sharing among sectors.

7. DISCUSSION

The study relied on a previous study performed in Armenia and the methodology was adapted to the Montenegro context thanks to a preparatory phase aimed at developing the protocol, tools and at collecting relevant references. The three-day study visit included a prioritization exercise, interviews and discussion on the assessment results and identified opportunities.

In particular the prioritization exercise had two main positive outcomes. It reinforced the concept of "One Health" threat and of prioritization of "One Health" threats, and enhanced awareness and capacities of the stakeholders about the prioritization process and relevant indicators. Moreover, the OHCF helped in assessing the situation in terms of strengths and needs of the OH national system across the different priority areas and in identifying actions to further strengthen it. To transfer evidence that emerges from research about OH threats to actionable policy indications a multisectoral and multidisciplinary approach is pivotal as well.

The two prioritized threats of WNV and Leishmaniosis, were used as case studies to make concrete examples of available integrated surveillance plans, data collection systems, lab capacities, and the flow of information, allowing to identify pragmatic actions.

On the basis of the discussion conducted with the stakeholders it can be suggested to extend over the three days the assessment at country level to enhance the opportunity of having deeper discussion with the

stakeholders, especially on actionable opportunities to strengthen the national OH systems.

8. CONCLUSIONS

Considering that national resources are always limited, these kind of assessment exercises conducted with national stakeholders help to identify OH strategies which could address threats that can benefit from multisectoriality, from allocation of resources in agreement with roles and priorities, from multisectoral risk assessment and early warning.

Funded by the European Union

ANNEX 1– INSTITUTIONS DESCRIPTION

The Institute of Public Health (IPH) of Montenegro is a licensed scientific-research institution. The Institute conducts researches into a better understanding of health and the prevention of diseases, with focus on a wide range of public health concerns, including epidemiological and health promotion studies and activities, Social Medicine studies, scientific research and education, to enhance health status of the population of Montenegro. In addition, the IPH as a preventive-medical-health organization at tertiary level of health care system, deals with healthy life styles, quality of nutrition and nutrition habits, analysis of health quality of foods, consumer goods and drinking water.

IPH monitors, analyses and evaluates influence of environment (air, soil and noise) on population health. IPH covers: monitoring, researching and studying of population health and health culture, causes, spreading and prevention of infectious diseases, factors of risk of chronic non-infectious diseases and other diseases of high social-medical significance as well as organization, working and development of health service and proposing and caring out appropriate measures for prevention and improvement of population health.

There are 9 Centers in the IPH: Centre for Science and Education, Centre for Health Promotion, Centre for Hygiene and Health Ecology, Centre for Control and Prevention of Communicable Diseases, Centre for Control and Prevention of Chronic Diseases, Centre for Health Policy and Management, Centre for Data Evidences and Public Health Researches; Centre for Medical Microbiology; Public health Center for emergency situations. IPH employs staff experienced in project management. The Institute has its own financial management and accounting staff, employed in the Financial Department. This department has previously accounted for expenditures under different project/grant agreements. The accounting has been done in accordance with the national regulations and donor requirements.

The institute holds laboratories for performing all types of examination providing by domestic regulations in the field of environment protection, quality control of food, water and consumer goods.

IPH has participated and collaborated to different EU co-financed and international projects such as: INTERREG IPA CBC Projects: ON TIME (2020-2022); ERI HEALTH (2021-2023); IPA II; Collaborative grant scheme for innovative project ideas - EuropeAid/162457/ID/ACT/ME, "Project of fostering monitoring of growth and development in view of early detection of health disorders of children under the age of five"; Erasmus + project "Enhancement of study programs in Public Health Law, Health Management, Health Economics and Health Informatics in Montenegro" PH-ELIM; “Promote regional social development encouraging NET working of relevant public-volunteering stakeholders to boost innovation in the delivering social-health-care services for AGEing people (NETAge)” 2012-2015, IPA Adriatic Cross-border Cooperation Program 2007 – 2013; FOCUS – BALKANS Food Consumer Science in the Balkans: Frameworks, Protocols and Networks for a better knowledge of food behaviours 2008-2011, FP 7 EU; EpiSouth, network for control of health and safety risks in the Mediterranean region of South-eastern Europe, funded by EC (2007-2014); EU project MediLabSecure (2014-2017) “Prevention of vector-borne diseases in the region of Mediterranean and Black Sea by creating networks“; HERIC research project “Surveillance of invasive and native mOsquito VeCtors and pathogENs they transmit in Montenegro– LOVĆEN”; “Research on the quality of life, lifestyles and health risks of the citizens of Montenegro” - Contract CT.16.IPA5.0080.1.0, funded by EMCDDA 2017; “Monitoring and response to avian influenza and pandemic influenza in SEE countries”, SECID (Southeast European Centre for Surveillance and Control of Infectious Diseases, Albania); Strengthening the response to HIV among populations at increased risk in relation to HIV in Montenegro (2010-2015, 2020, 2021), funded by GFATM; "Comprehensive environmentally friendly management of polychlorinated biphenyls (PCBs) in Montenegro" to reduce the environmental and health risk associated with PCB waste through the establishment of environmentally safe management of PCBs (2021), funded by UNDP; “Research on water, sanitation and hygiene (WASH) in health institutions in Montenegro” 2020-2021, WHO. Also, IPH has implemented the following projects: EU-TOPIA-EAST, Call: H2020-SC1-2s020-Single-Stage-RTD. Program H2020; Strengthening technical, scientific and research capacities for Institute of Public Health laboratories for nutrition and food safety in Montenegro - 2019-2021 (IAEA); Institute provides sustainable financial and expert human resources for implementation of

projects, proved by long-term cooperation with the international donors. The accounting has been done in accordance with the national regulations and donor requirements. The Institute successfully completed its obligations in terms of implementation and financial management and received favourable auditor's opinions.

The Administration for Food Safety, Veterinary and Phytosanitary Affairs and the Diagnostic Veterinary Laboratory are the two central sources of data related to animal diseases and animal populations in Montenegro.[41] The Department for Animal Health, Welfare and Identification and Registration of Animals, within the Administration for Food Safety, Veterinary and Phytosanitary Affairs, is specifically in charge of the data on bovine, swine, and poultry populations and the establishments where live animals are kept. The data on outbreaks and on the surveillance activities on domestic and wild animals is also managed by this department whereas the data on laboratory results of animals is managed by the Diagnostic Veterinary Laboratory. In Montenegro different regional and local authorities are also participating in the collection and management of the data at primary level in order to make them available to the central authorities. The locations of both the Administration for Food Safety, Veterinary and Phytosanitary Affairs and the Diagnostic Veterinary Laboratory are in Podgorica.

The Diagnostic Veterinary Laboratory is recognized as a competent and reliable institution of public interest and of great importance for preserving the health of animals and people. It is the only veterinary laboratory in Montenegro. It is fully state-owned and performs its activities on the basis of the Law on Veterinary Medicine as activities of public interest in the epizootic area of Montenegro:

[41] EFSA (2020). Data sources on animal diseases: Country Card of Montenegro.

1) monitors and studies the epizootic situation, develops and introduces new laboratory methods for diagnosis and control, applies new veterinary medical achievements and procedures;

2) proposes measures for the prevention, detection, suppression and eradication of infectious, parasitic and breeding diseases of animals;

3) laboratory diagnostics of animal diseases in accordance with the programs adopted by the Ministry of Agriculture and Rural Development and the Administration for Food Safety, Veterinary and Phytosanitary Affairs;

4) diagnostic laboratory and pathoanatomical tests in case of suspected infectious diseases determined in accordance with the Law on Veterinary Medicine;

5) provides and performs continuous laboratory diagnostics of infectious diseases of animals for which it is necessary to determine the infectious disease or the cause of death without delay;

6) laboratory microbiological tests of food of animal origin;

7) laboratory testing of animal feed and animal feed additives in order to determine their safety and/or qualitative correctness;

8) participates in conducting trainings on basic knowledge in the field of veterinary medicine for animal keepers and other persons;

9) laboratory testing of seeds for artificial insemination of animals, ova and fertilized ova;

10) monitors and proposes measures to increase animal fertility and participates in research in the field of animal reproduction;

11) stores and distributes serum, vaccines, diagnostic tools and other products in accordance with the program of mandatory animal health protection measures, conducts research and experimental development in the natural and mathematical sciences; and

12) other jobs for which it is registered or authorized.

Diagnostic Veterinary Laboratory is an accredited laboratory since April 21, 2011. In accordance with the requirements of the MEST EN ISO/IEC 17025 standard. In addition to constant work aimed at contributing to the protection of public and animal health, DVL experts also actively participate in scientific projects. The laboratory employs 5 doctors of science, 2 masters and one

doctoral student who contribute to the development of veterinary science with their scientific activities.

The Environment Protection Agency of Montenegro (EPA Montenegro)[42] performs professional and related administrative tasks in the field of environmental protection, namely: environmental monitoring, data analysis and reporting, permit issuing, communication with relevant domestic and international authorities and organizations, as well as with the public. EPA performs other tasks established by the Law on the Environment and special regulations.

The Agency cooperates with international bodies and organizations of other countries dealing with environmental protection, especially with the European Environmental Agency, the International Atomic Energy Agency, and participates in the work of professional networks within the European Union, as well as with similar agencies in other countries.

The Biotechnical Faculty-University of Montenegro is a leading higher education and scientific research institution that educates, creates and applies new knowledge for the needs of long-term sustainable development of Montenegrin agriculture and rural areas. Around a hundred people are employed.

The mission of the Biotechnical Faculty is to:

- with the use of modern teaching methods, educate staff who are qualified for work in agricultural production, food industry and scientific research;
- creates new knowledge consistently by following contemporary scientific achievements in agricultural sciences through the realization of multi and interdisciplinary research and
- transfer knowledge and services to end users for the purpose of agricultural and rural development.

So, the mission has three aspects: education; scientific/research and expert-advisory/extension service.

The main activity of the faculty is high education. The process is organized through academic and applied study programs. The academic study programs are organized in model 3+2+3.

[42] EPA Montenegro website: https://epa.org.me/opste-informacije/

Graduate Academic Studies are conducted through two study programs: Plant production and Animal husbandry.

Postgraduate Academic Master Study programs are: Fruit growing, viticulture and oenology; Crop and vegetable farming; Plant protection and Technologies in animal production.

The graduate Applied Study programs are: Continental fruit growing (Bijelo Polje) and Mediterranean fruit production (Bar).

Postgraduate Master Applied Studies are: Continental fruit growing and medicinal plants (Bijelo Polje) and Nursery Production (Bar).

At end of the process, a PhD Study program is available.

The education process is based on research activities. Research component is organized through Departments (called Centers) for: Agroeconomic and Rural Development; Pedology and Melioration; Forestry; Crop and Vegetable farming; Animal husbandry; Fruit growing, Viticulture and Oenology; Veterinary science; Subtropical fruit cultures; Continental fruit cultures and Medicinal Plants; accredited Dairy Laboratory; Property "Lješkopolje" and Centre for Plant Protection (the Department involved in the OHMeSA study).

The Biotechnical faculty have many laboratories: Agrochemistry; Seed; Entomology; Phytopharmacy; Phytopatology; Virusology; Oenology; Molecular genetics in animal husbandry; Animal food; Microbiology; Forestry; Olive oil; Pomology; Medical plants; Plants Gene Bank. One is accredited - Dairy Laboratory; and one is involved in OHMeSA study - Laboratory for Nematology and Urban Zoology. Main achievements of Laboratory for Nematology and Urban Zoology can be found at http://project-lovcen.me, plus MRR experiments as introduction in SIT targeting mosquitoes. More on Website link: https://www.ucg.ac.me/btf.

The WHO Country Office in Montenegro[43] was established in April 2008 in Podgorica. The Office is the focal point for WHO activities in Montenegro. The role of the Office is to respond to requests to support policy-making for sustainable health development by providing guidance, building up local relationships to implement technical cooperation, making standards and

[43] WHO Europe website: https://who-sandbox.squiz.cloud/en/countries/montenegro

agreements, and ensuring that public health measures are coordinated and in place during crises. The priorities for the Country Office are set out in the biennial collaborative agreement between WHO/Europe and the host country. The Office implements the agreement in close collaboration with national institutions and international partner agencies.