

The Role of Serbian Health Sector in Multisectoral Management of Chemicals and Contaminated Sites

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Abstract

Exposure to chemicals and living and working in the vicinity of continuously contaminated industrial sites are a clear reason for the involvement of the health sector through health promotion activities, diagnosis and treatment of health consequences. In line with the recommendations of the Sixth WHO Ministerial Conference on Environment and Health (2017, Ostrava), the Health Sector of the Republic of Serbia, with Institute of Public Health of Serbia (IPHS) as an implementation agency, has led the development of two multisectoral documents: "Roadmap for multisectoral management of contaminated sites" (2018) and "Roadmap for strengthening health sector engagement in the rational management of chemicals" (2021), through multisectoral activities supported by the World Health Organization. The aim of this paper is to emphasize the importance of giving a public health dimension to these topics, through the presentation of two consecutive multisectoral projects.

Keywords: chemicals, contaminated sites, public health.

Introduction

When it comes to estimating the volume of traffic in synthetic chemicals since World War II, it varies depending on the source. The European Chemicals Agency (ECA, European Chemicals Agency) (1) estimates that there are 143,000 of them, while the US EPA estimates that number to be significantly lower, some 85,000 chemicals (2,3,4). There is strong evidence of adverse health effects of chemicals, despite the fact that relatively few chemicals have gone through a thorough evaluation process to determine potential adverse health outcomes, with limited data on human exposure to chemical mixtures (5). The risks to human health are not evenly distributed, from the aspect of age, stage of biological development of the organism, as well as due to the diversity of reactions of individuals in contact with environmental toxins, strongly affecting the individual susceptibility of the organism to react in a specific way to given chemical or group of similar compounds (6). The most sensitive population groups, when it comes to exposure to chemicals, include children of preschool and school age, women, the elderly and those professionally exposed to specific pollutants (7).

Recent studies present increasing evidence that synthetic chemicals contribute to disease and dysfunction throughout life, resulting in increased prevalence and incidence of chronic non-communicable diseases (NCDs) and conditions (8). This group of diseases includes: asthma, whose prevalence has tripled; increase in the incidence of congenital anomalies (9) and leukemia (10), as well as brain cancer (11). Ambient air pollutants have been confirmed to increase asthma symptoms (12), while exposure to benzene, some pesticides and 1,3-butadiene have been linked to the occurrence of malignancy in children (13,14,15). Studies in Europe and the USA presented strong evidence of a correlation between chemical exposure and developmental neurocognitive disorders, adding to this clear

prenatal and early postnatal exposure of the kind (16). Recently, research has focused on exposure to endocrine disrupting compounds (EDCs), such as Bisphenol-A (BPA), polychlorinated biphenyls (PCBs), and pesticides (organophosphates). Their presence in the environment and the exposure of sensitive groups according to the long-term low-level mode of exposure is associated with the occurrence of diabetes, obesity, infertility, and even hormone-dependent cancers of the breast and prostate (17).

At the end of the 1980s, European countries were the first to initiate a process to eliminate the most significant environmental health threats. Progress towards achieving this goal has been driven through a series of Ministerial Conferences on Environment and Health, coordinated by the World Health Organization (WHO) for the European Region. The goal of each of the previous seven conferences was to define Priority Goals for further activities of WHO member countries and their partners (18). Regarding policies in the area of industrially contaminated sites (hereafter ICSSs), the perspective of the development of the Priority Goals was changed between Fifth and Sixth Ministerial Conferences (19,20), with the definition of new environment & health (EH) indicators and their alignment with the key Sustainable Development Goals (SDGs). It resulted with Ostrava Declaration inclusion of the new Priority Goal: “to reduce the harmful effects of chemicals on health and the environment; prevent and eliminate harmful effects on the environment and health, as well as costs and inequalities related to management of waste and contaminated sites” (20).

Management of chemicals within the state sector according to WHO recommendations

Ministries of health have a leading role and are key to formulating policy and setting standards for service delivery and public health protection. In many countries, there are specialized public health institutions and agencies that carry out research,

laboratory monitoring and advisory functions in food, drug and chemical safety, including risk assessment, as well as functions related to public and occupational health surveillance and the sound management of chemicals (21). However, the protection of human health from chemicals is not the sole responsibility of the health sector, but the mobilization of actors from other sectors (environment, agriculture, finance, education, etc.) is critical to prevent the negative effects of chemicals on public health. Overall, the role of government institutions in chemicals management varies from the development of policies and legislation, their implementation, monitoring and evaluation to financing, raising awareness and undertaking risk reduction measures. WHO Resolution WHA 69.46 on the role of the health sector in SAICM (Strategic Approach to International Chemicals Management) contains a series of notes for WHO Member States to “proactively engage, including by strengthening the role of the health sector, in actions for the sound management of chemicals and waste to reduce the risk of adverse health effects of chemicals during their life cycle”. Resolution calls on the members to “develop and strengthen, as necessary, multisectoral cooperation at the national, regional and international level (22).

Objectives

Key objective of this paper is to present the structural and strategic elements of two documents, derived from the Ostrava Declaration and the Sustainable Development Goals, prepared with the support of the WHO in the field of sound management of chemicals and the inclusion of the health sector in this process: “Roadmap for sound multisectoral management of contaminated sites” and “National road map for enhancing health sector engagement/contribution to sound management of chemicals till 2030”.

Methodology

The basic platforms for both roadmap documents were two consecutive projects implemented by IPHS in cooperation with WHO and UNEP. In 2018, the project was implemented: “Strengthening Serbian national capacities and inter-sectorial synergies for safe management of contaminated sites and related hazardous substances to prevent negative impact on human health and the environment”, with a final document „Roadmap for sound multisectoral management of contaminated sites” including the Action Plan. Second project, “Development of the National Road Map for enhancing health sector engagement/contribution to sound management of chemicals in Serbia till 2030”, was implemented in 2021 (<https://www.who.int/publications/i/item/9789240035881>). In the case of both roadmaps, methodological recommendations and models provided by the WHO were used.

For the development of the “Roadmap for sound multisectoral management of contaminated sites”, the structure was defined in the Annex to the Ostrava Declaration (23). The key part of

this document is the Action Plan with defined activities, indicators, actors, time frame and funding sources for those activities. The specific goal of the roadmap was to integrate all relevant social capacities in order to establish a unique, adequate and operational system for monitoring the effects of industrial production in industrially contaminated sites (ICSs) on the environment and the degree of exposure and the complexity of health effects in the population living in the vicinity of the ICSs. While working on the roadmap, the focus was ultimately on the ICSs of greater public health significance, according to the definition given by the WHO (24,25). By engaging experts from the IPHS, the Ministry of Health, the Ministry of Environmental Protection, the Serbian Environment Protection Agency (SEPA), and the Institute of Mining and Metallurgy Bor, the multisectoral nature of the project activities was fully justified.

Methodology for the preparation of the document “National Road Map for enhancing health sector engagement/contribution to sound management of chemicals in Serbia till 2030”, was defined by the WHO globally accepted document model, being fully applied in this case. On May 30, 2017, the Seventieth World Health Assembly approved the *Road map to enhance health sector engagement in the strategic approach to international chemicals management towards the 2020 goal and beyond*. The road map identifies concrete actions where the health sector has either a lead or important supporting role to play in the sound management of chemicals, recognizing the need for multi-sectoral and multi-stakeholder cooperation. These actions are organized into four areas: risk reduction; knowledge and evidence; institutional capacity; and, leadership and coordination (26,27).

Results

Roadmap for sound multisectoral management of contaminated sites. The key prerequisite for the Road Map was a previous detailed analysis of the perceived shortcomings in the entire ICS management process, which served as the foundation for a rational and realistic action plan. The structure of the road map, in accordance with the defined framework, consists of four specific groups of activities (Figures 1a, 1b).

1. Expanding the knowledge base. The aim of the activities in this area is to raise knowledge, skills and awareness about ICS with an emphasis on the importance for health and the environment and the legal framework, through the connection and coordination of all relevant actors in that process; continuous education and training for different target groups and scientific projects.

2. Monitoring and Reporting. The goal of the activities in this area is to create a favorable environment for the monitoring of hazardous substances at contaminated sites in terms of strengthening regulations, reporting systems with defined indicators and publicly available data.

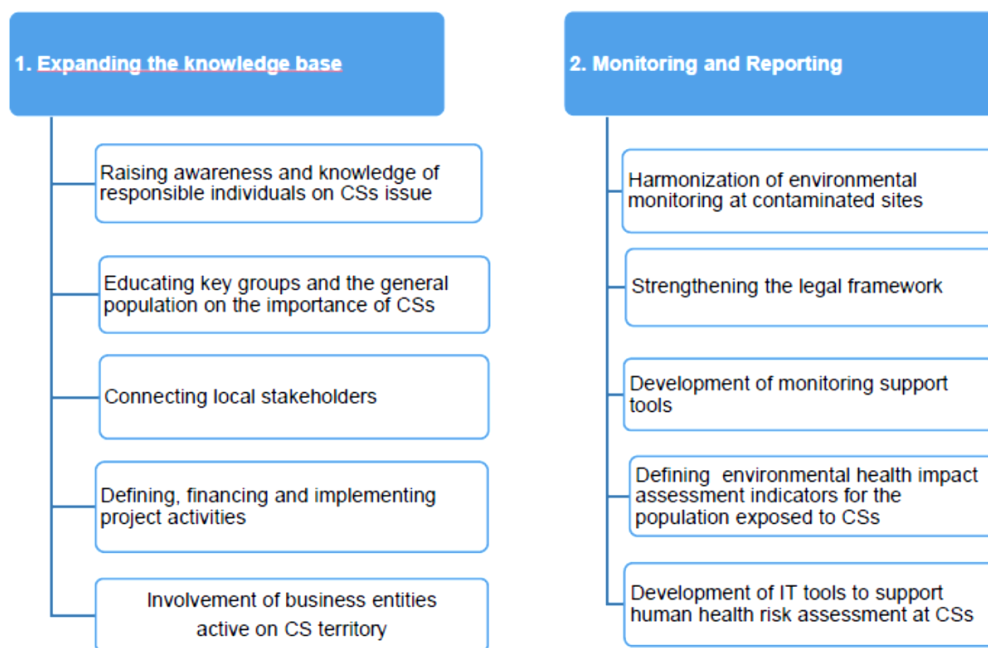


Figure 1a: Roadmap for sound multisectoral management of ICSs.

3. Leadership and Coordination. Activities in the field of leadership and coordination will be carried out with the aim of establishing mechanisms of horizontal and vertical coordination of activities for monitoring the impact of contaminated sites on the environment and the health of the population.

4. Building institutional, technical and financial capacities. The goal of activities in this area is to strengthen capacities, primarily institutional, in order to create a center of knowledge

and coordination for programmatic monitoring of the impact of ICS on the environment and the health of the population. Also, strengthening the technical and personnel capacities of institute laboratories and public health institutes creates conditions for laying the foundations of human biomonitoring, which plays a vital role in the process of assessing the population's exposure to hazardous substances.

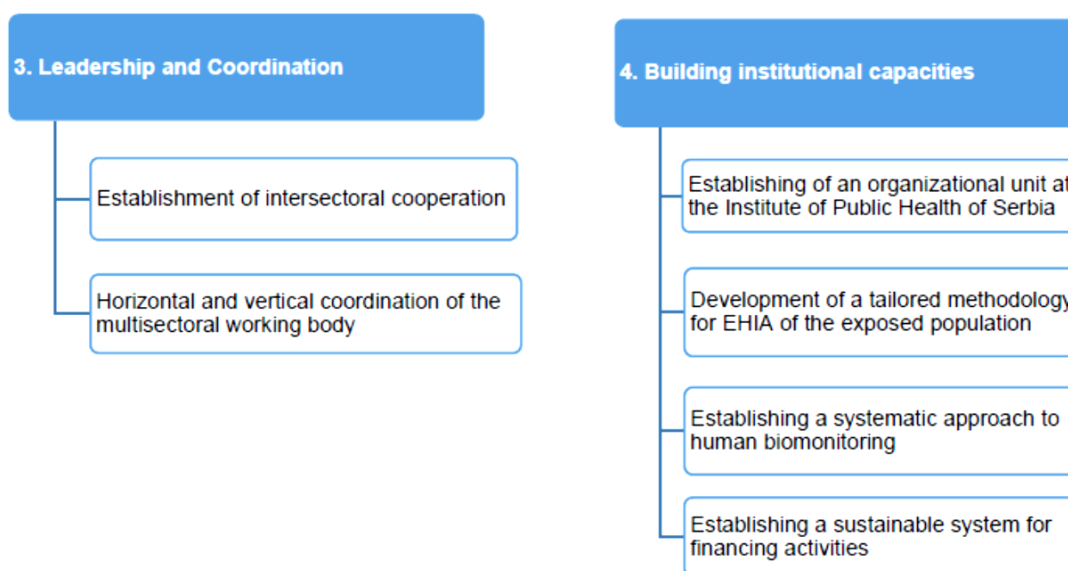


Figure 1b: Roadmap for sound multisectoral management of ICSs

"Road Map for enhancing health sector engagement/contribution to sound management of chemicals in Serbia till 2030". The main goal of the project was to create a national road map for strengthening the engagement of the health sector in contributing to the rational management of chemicals in Serbia by 2030, through multisectoral cooperation, while its specific goals were to:

- conduct a gap analysis, develop action plans, incorporating them into national planning activities in the field of chemicals management;
- identify those areas for which the health sector assumes a leading role, in cooperation with other partner sectors
- within the health sector itself, as well as in cooperation with other sectors, to clearly define the role of the health sector in the field of chemicals management.

The activities defined in the Roadmap are distributed through the following structural areas of implementation, and each area is presented through a concise cross-section of the state and observed shortcomings: Leadership and coordination; Institutional capacity; Knowledge and evidence; Risk reduction.

1. Leadership and coordination. The first and most important activity in this part is formation of the Joint Body for Chemicals and Health, i.e. a multi-sector working group that would be managed by the Ministry of Health with the involvement of nominated environment and health National Focal Points. A prerequisite for the functioning of this working group would be a signed interministerial agreement between the Ministry of Health, the Ministry of Environmental Protection and the Ministry of Agriculture, Forestry and Water Management. This activity would be financed from the budget of the Republic of Serbia. In addition to the inclusion of all relevant sectors, institutions and organizations in the field of chemicals management in the work of the Joint Body for Chemicals and Health, the formation of a functional network of experts from various fields of work is planned (chemistry, toxicology, epidemiology, hygiene and environmental health) mostly from the Network of IPHs, with the inclusion of experts from other sectors in this network. For the preparation and modification of various public policy documents, it is important to ensure the presence of all relevant persons from the field of chemicals and health.

2. Institutional capacities. Considering the expressed need to monitor public health indicators of exposure of vulnerable groups to chemicals in the future, it is necessary to form a functional unit within the IPHS for monitoring the impact of chemicals on the environment and health. In order to maintain the functioning of this unit, it is necessary to develop a new program of general interest aimed at assessing the impact on the health of the population exposed to environmental chemicals. Other coordinated activities include:

- Improve the existing regulations in areas related to the ecologically sustainable health system, in accordance with the adopted acts of the General Urban Plan; international conventions. Apart from the Ministry of Environmental Protection, which is the proposer of these acts, it is necessary to organize a multi-sector working group to draft them, in accordance with the recommendations of relevant international bodies and platforms;
- Define activities in the field of signed/ratified multilateral international documents essential for more intensive involvement of the health sector in the integrated management of chemicals;
- Establishing a coordination mechanism that would ensure improved implementation of adopted legal regulations, which would improve the exchange of data between relevant sectors, with the aim of better assessment of the impact on health and the environment;
- Enact a new regulation that clearly defines the conditions and reasons for mandatory implementation of human biomonitoring (HBM) as well as a particularly sensitive category of the general population where this method is necessary, in order to implement the Law on Public Health and the Law on Population Health Protection. Define capacities for HBM in accordance with the needs and the situation on the ground;

- Assess the needs in terms of equipment, personnel, space and finances to increase the capacity of laboratories for human biomonitoring.
- Enable the conclusions and recommendations of international institutions important for the management of chemicals (WHO, UNEP, SAICM, ILO, etc.), in the adoption of which nominated representatives of relevant ministries also participate, to be implemented through the Joint Body for Chemicals and Health, defined by the legislative framework by the executive state bodies;
- Strengthening existing capacities for chemical accident management, including institutional strengthening.
- Organize training and education in the area of risk assessment, surveillance, laboratory capacity and reporting, based on the connection between the International Health Regulations (IHR, 2005), SAICM and multilateral agreements on the environment.

3. Knowledge and evidence. Objective of this field is in improving of knowledge and strengthening comprehensive national capacities for establishing of the systematic monitoring of chemicals impact on human health. The planned group of activities are as follows:

- Engage in efforts to fill gaps in scientific knowledge, including work taking place under the Strategic Approach, (e.g. on endocrine active chemicals, nanomaterials, environmentally persistent pharmaceuticals, combined exposures to multiple chemicals, gender, links to non-communicable diseases);
 - Contribute to the development of globally harmonized methods and new tools and approaches for risk assessment (i.e. integrated approaches, multiple chemicals exposure) that take into account patterns, climate conditions, gender and country capacities, where appropriate;
 - Investigate the link between exposure to pollution and health impacts, at the community level, including exposure to ICSs;
 - Establishing of the „Priority List of Chemicals of Public Health Concern“ and the manner of their management at the national level;
 - Work towards integrated health and environment monitoring and surveillance systems for chemicals throughout their life cycle at the national, regional and international levels;
 - Further explore the relationships between climate change and chemicals and the potential health impacts;
- Measuring progress in this field is planned to be achieved through improving systems for civil registration and vital statistics and strengthening systems to document causes of hospital emissions and deaths due to chemical exposures and identifying and describing national indicators of progress in reducing the burden of disease from chemicals, aligned with globally appreciated indicators, where applicable.

4. Risk reduction. Objective is to actively engage the health sector in the sound management of chemicals in order to prevent, control and reduce harmful effects of chemicals to health, through:

- developing and implementation of health promotion and protection strategies and programs for the life cycle of high-priority chemicals, particularly for vulnerable population groups;
- active engagement in and support for the implementation of the chemicals and waste-related multilateral environmental agreements, in particularly health protective aspects; supporting ratification and implementation of the Minamata Convention on Mercury and building capacity to assess and address health

impacts of mercury exposure in line with Resolution of the WHA67.11 (2014).

- collaboration in identifying and promoting risk-reduction alternatives, taking into account the life cycle of substances and products, including waste, and promoting use of alternatives.

Specific objectives for risk reduction activities were defined to be implemented in “healthier” health care facilities, such as:

- providing guidance for health care settings to promote and facilitate the use of safer alternatives and sound management of health care waste, according to WHO recommendations, and those adopted under multilateral environmental agreements;

- developing and implementing awareness raising campaigns for health care workers on chemicals of concern and established best practices for safe chemicals management within the health sector, including occupational, patient/ community and environmental impacts in health care settings;

- developing and launching public awareness campaigns for priority health issues related to chemicals throughout their life cycle (e.g. e-waste, highly hazardous pesticides, lead, mercury and other chemicals of major public health concern), occupational hazards, chemical issue subject to international actions, and maternal and child health.

Given that key actors have been defined for this complex process at the national level (Center for Toxicology and Risk Assessment of the Faculty of Pharmacy, Institute of Public Health of Serbia and National Center for Poison Control), it would be necessary to strengthen their human, technical and financial capacities, together with their more intensive involvement in WHO CRAN (Chemicals Risk Assessment Network), WHO Poison Centers Network and GCHN (Global Chemicals and Health Network), through project activities, with funding from donor funds, as soon as possible.

Discussion and Conclusion

The broad field of environment and health is a good platform for the implementation of multisectoral cooperation, both in public policies and in expert institutional frameworks, nationally and internationally, which is the participation of various interested parties and sectors in the subject project activities from this paper, a good example. In order to highlight one specific activity that unites all actors in the process of managing chemicals from the public health aspect, who created both roadmaps, it is inevitable to single out human biomonitoring, whose affirmation in the professional and legislative sphere of work is yet to come in the Republic of Serbia, following public policies and research in the EU, as well as WHO recommendations (28,29).

The Republic of Serbia is a signatory to the Parma Declaration adopted at the Fifth Ministerial Conference on Environment and Health (2010) and adopted Children’s Environment and Health Action Plan for 2010-2019 (CEHAP). Both documents focus on environmental challenges for children’s health, citing human biomonitoring as one of the key monitoring instruments. So far, no further steps have been taken in the implementation of these international recommendations, as well as by-laws adopted at the national level (19,30). The Republic of Serbia, led by the health sector, should organize and adopt human biomonitoring as a key public health measure, especially for vulnerable population groups living close to ICSs (25). The reason for such an indispensable need to implement this type of preventive measures lies in the nature of most of the highly toxic chemicals to which vulnerable groups are continuously exposed, being easily absorbed by pregnant women, facilitating their

transplacental transfer to the fetus, leading to serious organic damage manifested immediately after birth or later (31). Considering the broad distribution of sites with continuous exposure of vulnerable population groups to hazardous chemicals, we consider this a great challenge for the public health sector in Serbia (32). The WHO platform “Partnership on Human biomonitoring” was promoted at the Seventh Ministerial Conference on Environment and Health (Budapest, 2023), after which the IPHS has officially approached it. Hopefully, it will facilitate the above-mentioned activities (33).

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The role played by each co-author to be declared: both consecutive projects were implemented by the team from the Institute of Public Health of Serbia (defined by the WHO/UNEP/Ministry of Health as an Implementing Agency) consisting of all listed co-authors, serving as a core expert team, with additional external experts forming a multisectoral working group.

Branislava Matić, M.D., PhD – project manager and team leader of both projects. Leading teamwork on producing the Road Maps and Gap Analysis, responsible for the general part of impact of contaminated sites on public health; part on human biomonitoring of the presence of heavy metals; part on air pollution effects from contaminated sites; National Focal Point of the MoH to WHO in the field of air pollution, chemicals exposure and risk assessment.

Dragana Jovanović, M.D., PhD – expert team member in both projects, National Focal Point of the MoH to WHO, for WASH (Water, Sanitation and Hygiene), responsible for parts of the Road maps and action plan, presented in the article, concerning health risk from exposure to chemicals in drinking water;

Snežana Živković Perišić, M.D., epidemiologist. –expert team member, responsible for part of policy making and concrete results in research on cancer incidence, SENTIERI epidemiological approach presented as a method of risk assessment from hazardous chemicals present in population exposed to contaminated sites. Author of National Cancer Register.

Dragan Miljuš, M.D., PhD, epidemiologist. – expert team member, responsible for part of policy making and concrete results in research on cancer incidence, SENTIERI epidemiological approach presented as a method of risk assessment from hazardous chemicals present in population exposed to contaminated sites. Author of National Cancer Register.

Snežana Dejanović, M.D., expert team member, specialized in chemicals analysis present in food, items of general use, food contamination with hazardous chemicals; worked on the part in the road maps promoting HBM as a risk assessment method

proving entering of chemicals in food chain of exposed population;

Zorica Blagojević, toxicologist, head of Ecotoxicology Lab Department; expert team member; in writing both project Road Maps, responsible for ensuring and providing knowledge in sound established laboratory methods in executing chemicals risk assessment methods, such as those within human biomonitoring processes.

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- b) project: “Development of a National road map to enhance health sector engagement/contribution to sound chemicals management in Serbia till 2030”; funded by UNEP, executive agency WHO Regional Office for Europe

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