



World Health
Organization

REGIONAL OFFICE FOR Europe

**CHEMICAL
SAFETY AND
PROTECTION
OF HUMAN
HEALTH:
*THE SLOVENIAN
EXPERIENCE***





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Editors:

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Abstract

The active participation of the health sector in chemicals management is critical for progress towards the 2020 goal in the Strategic Approach to International Chemicals Management of minimizing the negative impact of chemicals on human health and the environment. Although approaches to chemical safety differ significantly from country to country, sharing experience on existing practices can provide useful information for planning and taking action leading to the stronger engagement of health professionals in chemicals management. In Slovenia, the Ministry of Health hosts the Chemicals Office of the Republic of Slovenia and is responsible for the overall organization of its work. This publication provides information on how the chemicals management system in Slovenia was built and how it works now, and the opportunities and limitations of putting the chemicals authority in the public health sector.

Keywords

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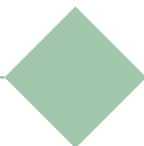
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Abbreviations



ACPDR	Administration of the Republic of Slovenia for Civil Protection and Disaster Relief
CORS	Chemicals Office of the Republic of Slovenia
EU	European Union
ICCS	Intersectoral Committee for Chemical Safety
NIPH	National Institute of Public Health
PHARE	Programme of Community Aid to the Countries of Central and Eastern Europe
PM ₁₀	particulate matter less than 10 µm in diameter
PPP	plant protection products
REACH	EU legislation on registration, evaluation, authorization and restriction of chemicals
SAICM	Strategic Approach to International Chemicals Management



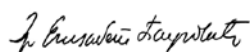
In recent decades, chemical safety and the sound management of chemicals have seen great progress at the global level. At the same time, the rapid growth in production and dissemination of both natural and synthetic chemicals has led to concerns about their impact on the natural environment and human health.

The toxicity of certain chemicals to humans and animals has been recognized since antiquity. In the light of the great advances in scientific knowledge about the toxicity of chemicals and in view of the growing numbers of exposures to chemicals, an International Conference on Chemicals Management was convened in 2006 to work out how to ensure that all activities involving chemicals should be undertaken in such a way as to ensure the safety of human health and the environment. This resulted in the adoption at the Conference of the Strategic Approach to International Chemicals Management.

The chemical industry is important in many countries of the WHO European Region. Many Member States are actively seeking to carry out the aims of the Strategic Approach, above all to deepen the involvement of their health sectors in the sound management of chemical safety so as to prevent the negative impacts of chemicals on health both directly and through the environment. The WHO European Region carries out a variety of activities to involve the health sector in the sound management of chemicals. Some of these activities have gathered valuable experience and made effective use of the advantages of previous practice. For example, many countries have well developed pesticides management systems and apply innovative solutions driven by the recommendations of their health sectors and the guiding principles of industrial chemicals management. WHO makes it a priority to share these experiences and good practices in different areas of chemicals regulation with other Member States. By publishing this critical overview, WHO would like to draw attention to the challenges and opportunities experienced by Slovenia in implementing a sound chemicals management system, with the aim of inspiring and assisting other countries and governments to analyse the situation regarding health-related aspects of chemical safety and to take action to ensure the protection of human health from the negative impact of chemicals.

In Slovenia, the health sector has been a strong player in chemical safety for decades, often in direct partnership with institutions in other sectors. This publication provides information on how the chemicals management system was built and how it works now, and the opportunities and limitations of putting the chemicals authority in the public health sector. It can be interesting for professionals and decision-makers working in the chemical safety area, especially in countries planning the building or strengthening of their chemicals management systems.

Aimed at a broad European and international audience of policy-makers, practitioners and academics, the publication is designed to provide an organizational perspective on how the chemicals safety system is organized in Slovenia and on the challenges related to chemical safety in general. The country's experience and good practice in the intense involvement of health sector institutions in achieving sound chemicals management may be useful to countries that are still facing challenges in strengthening the involvement of their health sectors in chemical safety.



Elizabet Paunovic

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The identification of opportunities for stronger involvement by the health sector in global and national chemical safety systems by the International Conference on Chemicals Management led, in 2012, to the adoption of a strategy for strengthening the involvement of the health sector in the implementation of the Strategic Approach to International Chemicals Management.

Slovenia has a long tradition of chemical safety, both nationally and through its active contribution to the development of international treaties and conventions. The government has placed special emphasis on an approach covering the entire life-cycle of chemicals, with the primary goal of protecting human health. The Ministry of Health has, therefore, been made responsible for coordinating the activities of the main authorities concerned through the Chemicals Office of the Republic of Slovenia (the main body for chemical safety). This has proved to have many advantages, above all that sustainable chemicals management is seen as a key contributor to, and can be the basis for action for, public health at all levels of society.

It has been common practice for the government to be informed of developments in relation to chemical safety, and all relevant facts and figures have been taken into account when considering the policies of the ministries concerned. Through transparent and evidence-based arguments, politicians have become more aware of and confident in dealing with the subject, which is important given the key role of political support. The country has adopted all international conventions and relevant European legislation; thus chemicals management covering the life-cycles of chemicals is a consistent element in national strategic documents and legislation. The Chemicals Office serves as a hub for other chemicals-related policies and sectors including environment, health and safety at work, public health, economy and agriculture.

The key health sector actors in chemical safety are the National Institute of Public Health, the National Laboratory for Health, Environment and Food, the Health Inspectorate, the Clinical Institute of Occupational, Traffic and Sports Medicine, and the Poison Control Centre. These bodies provide the whole spectrum of health services from research, surveillance and monitoring and risk assessment to prevention, emergency preparedness and response and treatment of poisonings.

Scientific institutions and agencies are active in connection with chemical safety primarily through obtaining scientific evidence in support of effective decision-making both to protect the environment and human health and to raise public awareness regarding the threats posed by chemicals, as well as through research and education.

Other stakeholders in the chemical safety system are nongovernmental organizations, the Association of Chemicals Industries of Slovenia within the Chamber of Commerce and Industry, and the Association of Free Trade Unions of Slovenia representing workers' associations.

The bodies established by the government to be responsible for setting priorities in chemical safety are the Intersectoral Committee for Chemicals Safety and the Interministerial Working Group for the Implementation of Commitments Adopted at the Fifth Ministerial Conference on the Environment and Health.

According to the Chemicals Law (adopted in 1999), health sector authorities and institutions are responsible for assuring the comprehensive prevention of exposures to chemicals and poisonings. Other organizations also undertake activities in this area, such as monitoring and data collection, the information system for chemicals, risk assessments, health, environment and strategic impact assessments, drinking-water safety, food safety, product safety, occupational safety, the comprehensive approach to management of contaminated sites, preparedness for and management of emergency situations and, finally, treatment of acute poisonings at the Poison Control Centre.

Emphasis is placed on awareness-raising across all the above agencies and institutions and those involved in any aspect of chemicals safety. Raising the awareness of the public is an important activity for governmental, nongovernmental and private organizations that in any way deal with the provision of chemical safety and protection of public health.

Finally, some new and emerging issues (nanotechnology, pharmaceuticals in drinking water, endocrine-disrupting chemicals, climate change) are the subject of many activities.







Introduction

More than 100 000 substances that are used for industrial and general purposes in developed countries can affect the health of humans either by themselves or in the form of compounds and preparations. Despite more than 30 years of regulation of chemicals in Europe, there remains a general lack of information and knowledge about the end uses and hazardous properties of most of the approximately 30 000 existing substances currently available in the European Union (EU). Humans are exposed to these substances directly through the daily use of numerous chemical products (such as food additives, cleaning agents, cosmetic products, biocides, colours and lacquers) and consumer products (toys, electric and electronic goods, clothes, furniture, floor and wall linings and construction materials). In their life-cycles, these substances are released into the environment, and humans are exposed to them or their breakdown products. The possible effects of the majority of these substances on health have not yet been established, as only an insignificant number of them have been tested with regard to the effect on the developing child's organism or of long-term exposures to low doses of a mix of substances. Some characteristics and effects of hazardous chemicals (such as the impact of exposure to low doses of some chemicals on the functioning of the hormone system, persistency and bio-accumulation) have been investigated and evaluated only recently as knowledge about them has increased. Studies of the cumulative and/or combined effects of simultaneous exposure to multiple substances have only recently been developed.

In addition, these substances are currently being produced and used in other forms, such as nanomaterials, which have completely different characteristics and ways of affecting living organisms. There are a lot of gaps in knowledge about the effects on human health of chemicals in nanoform.

Taken as a whole, consolidated action is required to address these challenges and to ensure the protection of human health and prevention of diseases caused by exposure to chemicals.

This publication describes how, in Slovenia, the health sector is working in the chemical safety area, and the central role played by the health sector and health care institutions in managing chemicals and the protection of human health from hazardous chemicals.





Production and use of chemicals

The chemical industry is one of the largest branches in the national manufacturing sector in both turnover and, in particular, value added. Pharmaceuticals account for 32% of industry turnover, followed by the plastics industry with 22% and rubber products with nearly 14%. The chemical industry also manufactures items such as basic chemicals, paints and varnishes, synthetic fibres, detergents and cleaning products, cosmetics and adhesives.

In 2013, the chemical industry was represented by 709 companies, 95% of which are small and medium enterprises, with a turnover of €5 billion, of which €4 billion is the turnover on foreign markets (80%), 25 500 employees and €61 000 added value per employee.

Since 2002, approximately 1900 companies and 68 000 substances and mixtures classified as dangerous according to their physical, chemical, human health and environmental properties that are produced in Slovenia or imported into Slovenia were registered in the Information System for Chemicals, supported by the Chemicals Office of the Republic of Slovenia (CORS). The total annual amounts for these chemicals are in the range of 750 000 tons of domestic production and 600 000 tons imported. Over 1850 biocide products are currently available in the country.





National strategies and legislation

Chemicals management is a consistent part of the national strategic documents, which are in line with relevant international and regional policy documents. Some of them are briefly described below.

Development strategy

The development strategy includes the aim of the Ministry of Health to create a healthy living environment as one of its fundamental objectives. Together with the strategy for remediation of degraded areas (in preparation), it aims to protect human health and ecosystems from chemical hazards.

Partnership Agreement between Slovenia and the European Commission

At the end of 2014, the Partnership Agreement between Slovenia and the European Commission was adopted as a catch-all medium-term instrument to provide the basis for the absorption of EU funds. It was also the basis for the adoption of the operational programme for the implementation of specific priority development objectives in 2014–2020. The Ministry of Health has managed to include all four regional priority objectives of the Parma Declaration on Environment and Health (1) (see below, page 4) in both instruments. A particular focus is on the remediation of degraded areas and chemical safety, with priority given to the implementation of the regulation on registration, evaluation, authorization and restriction of chemicals and a special emphasis on the substitution of dangerous chemicals.

Operational programme

The operational programme, which sets out the priority areas for investments in Slovenia over the next seven years, is in compliance with the Partnership Agreement between Slovenia and the European Commission for the period 2014–2020 and follows the Europe 2020 strategy to meet the requirements of individual EU funds and thereby ensure economic, social and territorial cohesion.

Strategy of the Republic of Slovenia for the Environmental Health of Children and Young People 2012–2020: goals in the field of chemical safety

Slovenia has been actively engaged in the European Environment and Health Process since 1989. Based on a commitment to implement the Parma Declaration, the government issued resolution No. 02401-13/2010/5 of 29 July 2010 appointing the Interministerial Working Group for the Implementation of Commitments Adopted at

the Fifth Ministerial Conference on the Environment and Health (the Parma Working Group). Priority was given to such tasks as the preparation of an action plan for the environmental health of children and an action plan for the chemical safety of children. The management of the Working Group found, however, that the similarities between these two documents meant that it would be rational to merge them; thus the Strategy of the Republic of Slovenia for the Environmental Health of Children and Young People 2012–2020 was adopted.

The Strategy includes all four regional priority goals¹ from the Parma Declaration and lays down the following priority goals in the field of chemical safety:

- determination of excessively polluted areas and establishment of remediation programmes and other measures to prevent further pollution;
- consideration of the risks to children and pregnant women in preparation of legislation in the areas of protection of the environment, protection against exposure to harmful chemical factors and protection against construction;
- awareness-raising and information for the public on the harmful effects of chemical risk factors and on self-protective behaviour;
- education and awareness-raising among providers of health care services for monitoring the health of children and adolescents and connections with environmental risk factors;
- acquisition of data on the exposure of children, pregnant women and growing fetuses to chemical risk factors in the home, occupational environment, at school and out of doors;
- stimulation of research on the impact of chemical factors on health, especially growing fetuses, transgenerational effects and the development of the nervous system;
- reduction in the number of deaths and hospitalizations of children due to unintentional food poisoning, drug and medicinal poisoning through establishment of appropriate preventive and interventional measures;
- identification of typical diseases linked to the effects of chemical risks factors on the health of children and adolescents, and establishment of their registers;
- research on the features of chemicals, their behaviour and fate in the environment, operational mechanisms and effects on health (including synergy effects);
- further development and production of healthy foodstuffs by using the minimum possible quantity of necessary food additives;
- use of ecologically produced or minimally processed food in kindergartens and schools, use of organic or less aggressive cleaning agents and uptake of other provisions of the green public procurement system in accordance with the draft Decree on Green Public Procurement with annexes (which is being harmonized again at interministerial level).

All chapters of the Commitment to Act in the Parma Declaration are included in the Strategy. For example, the requirement for a broad cross-section of stakeholders, including young people, is respected, knowledge and awareness-raising have a high priority, and some measures for protecting health and the environment from climate change are also tackled.

¹ Regional Priority Goal 1. Ensuring public health by improving access to safe water and sanitation.
Regional Priority Goal 2. Addressing obesity and injuries through safe environments, physical activity and healthy diet.
Regional Priority Goal 3. Preventing disease through improved outdoor and indoor air quality.
Regional Priority Goal 4. Preventing disease arising from chemical, biological and physical environments.

Legislation on chemicals

Legislation covers the entire life-cycle of a chemical including preliminary assessment, production, trade, transport, storage in all phases, use, management of chemical residues and packaging as well as safe removal, and prevention of and preparedness for chemical accidents.

The principal legislation governing chemicals are the EU regulations on: (i) registration, evaluation and authorization of chemicals (REACH) (2), which entered into force in June 2007, and (ii) classification, packaging and labelling of dangerous substances (3), adopted a year later. These provisions constitute the fundamental legal basis for the study and identification of the properties of chemicals so that they can be put on the market safely, and provide the basis for managing chemical risks in many other areas regulating chemicals (such as the transport of dangerous chemicals, occupational safety and environment protection). Mandatory labelling and safety data sheets establish a mechanism for sharing information on the hazardous properties of chemicals along the supply chain from manufacturer to end-user and back, and allow users of chemicals to handle them in a way that cannot endanger the environment or human health. In addition, together with the system of evaluation, authorization and prohibition of chemicals of high concern, they allow for rapid and effective action to restrict or ban their use. The implementation of these mechanisms has been coordinated by the European Chemicals Agency. In cooperation with national authorities such as CORS (the competent authority for REACH and classification, packaging and labelling in Slovenia) within the Ministry of Health, it carries out administrative and professional tasks and thus establishes a broad and integrated network for managing chemical risks at EU level.

In addition to these two basic pieces of legislation, chemicals are regulated at EU level by a series of rules that establish additional limitations and requirements for the marketing of specific groups of chemicals and for their use or specific ways of use (for example, cosmetic products, toys, detergents and biocidal products), for the use of substances in electrical and electronic equipment and motor vehicles, and to limit the marketing, export and use of precursor substances for illicit drugs, chemical weapons and explosives.

The Ministry of Health and CORS deal with chemicals governed by the REACH legislation in cosmetics, biocidal products, detergents, electrical and electronic equipment and chemicals that can be used as strategic goods (such as chemical weapons, dual-use chemicals and drug precursors). The purpose of all legislation is to protect human health and the environment.

Several ministries, including the Ministry of Health, share responsibilities in the management of chemicals through their entire life-cycle.

The Ministry of Health and CORS are responsible for the pre-marketing assessments of chemicals and decisions relating to their release on to the market. CORS also supervises the storage of chemicals according to health safety standards. All entities placing dangerous chemicals on the market are subject to the provisions of the Chemicals Act (4) and are obliged to categorize, label and pack these chemicals in accordance with the regulations. Trade in chemicals is regulated by the REACH legislation; categorization of chemicals is regulated by the regulation on classification, packaging and labelling of chemicals. Other ministries are involved in consultations when temporary bans or restrictions are supposed to be placed on chemicals according to the Chemicals Act, with the final decision taken by the government.

CORS also conducts risk assessments and risk evaluations of chemicals with the support of independent experts in gathering information necessary for scientific-based decision-making. Risk assessment of biocides is performed by an expert team, and includes toxicological, ecotoxicological, efficiency and exposure assessment.

Among its other activities, the Ministry of Labour, Family, Social Affairs and Equal Opportunities is responsible for ensuring the safety of workers in workplaces where chemicals are used or produced. It determines the limit values of chemicals in the workplace as well as implementation of protective measures to prevent harmful impacts of chemicals on human health. This also applies to conditions in production facilities and laboratories, chemicals trading companies and all other places where people can be exposed to chemicals as a consequence of their working activities.

The safety of consumer products (cosmetics, tobacco and tobacco products, toys, detergents, materials in contact with the skin) and food contact materials is regulated by specific legislation. Two main ministries share responsibility for the implementation of the relevant legislation: the Ministry of Health and the Ministry of Economic Development and Technology (through the Law on General Product Safety). Standards related to safety are developed by the Institute for Standardization.

Commercial operators are responsible for placing safe consumer products on the market. Control and sampling to ensure the safety of consumer products are, however, carried out by subordinate bodies of the Ministry of Health: the Health Inspectorate for cosmetics, tobacco and tobacco products, toys and food contact materials not yet in contact with food, and CORS for detergents and materials in contact with the skin.

Control of materials in contact with food that are already on the market is under the control of the Ministry of Agriculture, Forestry and Food.

Laboratory testing of consumer products and materials in contact with food is carried out by the National Laboratory for Health, Environment and Food, while the National Institute of Public Health is involved in risk assessment.

The following special legislative conditions have been kept to ensure the proper supervision of dangerous chemicals.

- All entities involved in the production of and trade in chemicals must have a chemicals consultant responsible for chemical safety. Such consultants are required to undergo special training to keep them informed of all the necessary regulations and the appropriate knowledge. They have to pass a test on a regular basis.
- The regulations stipulate that some chemicals can be sold only at certain sales locations and under certain conditions. At all other sales locations where less dangerous chemicals are sold, the safety of consumers must be ensured through measures such as separating chemicals from other goods, applying protective measures when placing chemicals on shelves, and placing written and image warnings on visible sites about the hazards that chemicals present which must also indicate where additional information can be found.
- The legal system requires the register of companies dealing with chemicals managed by CORS to be maintained. Only companies that fulfil the conditions relating to the qualified consultant, chemicals storage and waste management can be listed.
- The current Chemicals Act also covers products that contain chemicals in accordance with the REACH regulation. A special provision to protect users is that the national legislative provisions apply *mutatis mutandis* to all dangerous products, for which the Minister of Health, based on an expert assessment (stipulated under Article 57 of this Act), establishes that under normal use they can harm humans or the environment.

- National legislation requires that the sale of the most dangerous chemicals must be registered (and labelled as very toxic or toxic) in order to prevent the use of highly toxic chemicals.
- A special provision of the Chemicals Act regulates biomonitoring, which is coordinated by CORS. These provisions are not contrary to the provisions on monitoring in the workplace managed by the governmental body competent for labour protection.
- The possibility of application of special temporary measures was adopted by the government to prevent acute hazards as such:

If there is a justified reason for concern that a specific chemical will, due to the geographical, environmental and health characteristics of Slovenian territory, cause severe or irreversible consequences for human health or the environment, the Government of the Republic of Slovenia can temporarily limit or prohibit its production, trade or use, determine measures for managing its production, trade or use, and introduce other measures to limit or prevent these consequences to an acceptable level, before any solid and indisputable scientific evidence about the effects and functioning of this chemical is available (4).

- The Chemicals Act also stipulates that:

In the process of assessing environmental impacts, the authority competent for chemicals shall, upon the request of the ministry competent for the environment, provide an opinion on the acceptability of the intended intervention, which shall, among other matters, determine the conditions of construction and chemical management from the aspect of preventing hazards that could be caused to human health and the environment by these chemicals (4).

The Environmental Protection Act places emissions of chemicals into the environment (water, air, soil) under the jurisdiction of the Ministry of the Environment and Spatial Planning. This Ministry also regulates the collection, transport, processing and removal of waste, including management control. The Environment Agency develops legislation and regulations in the field of waste management and also manages the registers of waste processors and providers of waste removal services. Waste collection and transport are determined as waste collection implemented by public municipal services providers or entities authorized to collect waste.

The legal framework of the waste management system comprises the Environmental Protection Act and the Public Utilities Act. Some other regulations are applied for individual wastes such as medical waste, emissions of substances from waste incineration plants, waste in leather production and the leather processing industry, and waste oils. The rules on the management of special wastes that contain dangerous substances, which cover a wide area of various types of waste management, is the main document in this area.

The transport of chemicals is under the jurisdiction of the Ministry of Transport and is governed by special regulations, particularly the Transport of Dangerous Goods Act. In the area of the safe transport of chemicals, it is important for relevant companies to ensure the expertise of a qualified consultant who is both informed about the regulations and responsible for implementing them. Professional training is also stipulated for other people involved in such transport.

Slovenia is a party to four international environmental conventions dealing with chemicals: (i) the Stockholm Convention on Persistent Organic Pollutants (5), (ii) the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (6), (iii) the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (7); and (iv) the Minamata Convention on Mercury (8). Slovenia is also a signatory to the Montreal Protocol on Substances that Deplete the Ozone Layer, signed in 1987 and ratified in 1990.

From the public health perspective, chemical safety is also an important issue in legislation on the safety of drinking-water and recreational waters, food safety, products safety, emergency preparedness, occupational safety and environmental monitoring. All these areas are strictly regulated at EU level, and Slovenia respects, applies and implements all

the directives and regulations on these issues. The responsibility for implementation is shared between different government sectors. Reasonably extensive legislation is implemented and measures and action taken on a multisectoral basis to protect the population from the harmful effects of chemicals.





The development of chemical safety

With a population of two million and an important chemicals industry, the country has a long tradition of stringent attention to chemical safety and public health. This has been reflected in laws concerning the management of chemical substances. Historically, the competent public health authority has played a leadership role in the area.

Systematic monitoring of drinking-water began in 1923 with the establishment of the Hygiene Institute of Ljubljana. The Institute's activities expanded to include the monitoring of rivers and wastewater as well as food and consumer products. In 1925, a Chemistry Department was established within the Institute, with functions including medico-chemical, technical-pharmaceutical and toxicological examinations.

The Department aimed to accelerate improvements in the quality of food and to alert the population to poor and fake foodstuffs. It also advocated preventing the pollution of clean mountain rivers with industrial effluents, showing that there was already ecological awareness of one of the most important human needs: drinking-water. Public health physicians and decision-makers were aware of the need to control for foreign substances in food, especially because more and more synthetic pesticides and fertilizers were being used. Control over this and certain other food ingredients was regulated by the Law on Control of Foodstuffs.

The Department worked closely with Ljubljana municipality in supervising the market and advised other state institutions on action to take in relation to the food laws.

The Hygiene Institute later broadened its responsibilities and continued to deliver chemical hygiene activities until the 1990s. In the process of accession to the EU, however, many activities related to environmental monitoring and food safety were transferred to the ministries responsible for the environment and for agriculture, respectively, and some of the Institute's public health-related chemical safety responsibilities were transferred to the newly established CORS.

The Medical Faculty of the University of Ljubljana, the Poison Control Centre, the National Institute of Chemistry and the Jožef Stefan Institute have all played visible roles in scientific research and the education of scientists and professionals in toxicology and chemical safety.

It is common practice in chemical safety development for the government to be constantly informed on all relevant topics, facts and figures in relation to chemicals. Through transparent and evidence-based arguments, politicians have become more aware of and confident in dealing with the subject, which is important given the key role of political support. Such political support can be ensured by the permanent raising of awareness among the competent people, including politicians, followed up by well-considered and transparent operations.

In 1997, in preparation for the country's accession to the EU, consideration was given to placing the chemical safety coordination body under the jurisdiction of the Ministry of the Environment, since at EU level chemical substances came under the Directorate for the Environment while preparations were under the Directorate for Industry. However, the field of chemical safety (including substances and preparations) remains under the jurisdiction of the Ministry of Health. The Ministry of Agriculture, Forestry and Food is the competent authority for plant protection products, while the ministries of Health and the Environment are included in their registration process in accordance with their relevant competences.

At that time there was no awareness of chemicals in general. The most regulated chemicals were pesticides, which formed the main focus of the authorities and nongovernmental organizations. Chemical safety and poisons were considered mainly through the prism of pesticide safety. A wider awareness only developed later, when the Ministry of Health took over the implementation of the *acquis communautaire* in the field of chemicals. Thus pesticides were the vehicle through which chemical safety developed in Slovenia.

The authorities became familiar with the system in chemicals and the area of plant protection products through several EU projects during the process of accession to the EU. Since then, a close relationship has been built between EU and Slovenian experts.

Information on the implementation of chemical safety in Slovenia since 1991 is presented below in chronological order.

In 1991, the government incorporated the Poisons Act of the former Yugoslavia into its own legislation. This relatively advanced act focused mainly on pesticides, and contained key elements from the European directives on the classification, packaging and labelling of dangerous substances (Directive 67/548/EEC) (3) and dangerous preparations (Directive 88/379/EEC) (9). The Act contained all the key elements of these two directives referring to public health and the health of the environment, including aspects such as carcinogenesis, teratogenesis and mutagenesis. The Ministry of Agriculture, Forestry and Food was made responsible for plant protection products, although the Ministry of Health was included in the process of registering such products in relation to their categorization in groups of poisons.

In 1996, the Ministry of Health began the further development of chemical safety to include other chemicals in the framework of the pre-accession strategy of Slovenia to the EU. The negotiations for membership of the EU were adopted by the government on 21 November 1996.

A government resolution of 29 March 1996 laid the foundation for the development of chemical safety with the involvement other sectors, starting with the preparation of a harmonized scheme for monitoring the residues of plant protection products in soil, water, plants, foodstuffs and drinking-water. The government stipulated that the Ministry of Health should, by the end of 1996, establish an interministerial body for the coordination and harmonization of work in the field of dangerous substances. The government also ordered its informatics centre to prepare a proposal for an electronic system to connect all institutions supervising the use of pesticides. Since the implementation of national monitoring faced many drawbacks, the government decided on 2 October 1997 that Slovenia should avail itself of the Programme of Community aid to the countries of Central and Eastern Europe (PHARE)² within the scope of pre-accession preparations. On 18 February 1999, the regulation on the monitoring of pesticides in foodstuffs and agricultural products developed in a PHARE project was issued. However, the programme was never completely harmonized in all elements of the field of the environment, as initially planned.

In 1995 and 1996, the Ministry of Health employed the first three civil servants to develop the chemical safety law and a vision for chemical safety arrangements, including capacity-building.

The Minister of Health published a decision on 22 May 1996 prohibiting the use of atrazine and some other substances under the Poisons Act of the former Yugoslavia. The implementation of this decision was an exercise in interministerial work by the three ministries involved (Agriculture, Environment, Health and their competent inspectorates). The Ministry of Health coordinated the implementation of the decision.

² The main financial instrument of the pre-accession strategy for the central and eastern European countries when applying for membership of the EU.

On 25 July 1996, the government issued a decision that:

- established the Intersectoral Committee on the Management of Dangerous Substances led by the Ministry of Health and with the obligation of reporting to the government; its first meeting was opened by the Secretary General of the government, demonstrating high political support for the Committee;
- authorized the Ministry of Health to coordinate good laboratory practices activities;
- authorized the Ministry of Health to employ expert staff to support the competent authority (future CORS) at the Ministry: three interns specializing in toxicology, two experts in pharmacology and experimental toxicology and an expert on laboratory analytics (forensic) to support the Poison Control Centre, all at the Faculty of Medicine in Ljubljana; in addition, an internationally distinguished medical toxicologist was employed at the Public Health Institute in 1997.

The National Assembly adopted a resolution on 27 September 1996 on the remediation of the asbestos industry and the requirement for a report on the situation in the Mežica Valley, a site contaminated by lead. Following the adoption of the Chemicals Act in 1999, further measures were coordinated by the Ministry of Health via the Intersectoral Committee for Chemical Safety (the successor to the Intersectoral Committee on the Management of Dangerous Substances).

The government considered the first report of the Intersectoral Committee on the Management of Dangerous Substances on 5 February 1997. It supported the Committee's wish to attract representatives of more nongovernmental organizations for further cooperation, such as science and research organizations, trade unions, a representative of environmental nongovernmental organizations, the Consumers' Association, government informatics centre and others (if necessary). Representatives from the nongovernmental sector were not members of the Committee but had the right to discuss and propose matters on the agenda without a vote. The government ordered the Ministry of Health to provide funds for the work of the Committee.

On 5 March 1998, the decree on the prohibition of and restrictions on the production, placing on the market and use of asbestos and asbestos-based products was issued. The national asbestos management programme was also drafted.

The basic legislation on chemical safety (acts on chemicals and on chemical weapons) was adopted on 29 May 1999. The Chemicals Act set the legal basis for interministerial coordination via the Intersectoral Committee for Chemical Safety. The Committee's task was to prepare the national chemicals programme and to present the basis for the preparation of the electronic system for chemicals. The area of chemicals was regulated in accordance with all relevant EU regulations. Some specific elements were preserved (maintenance of a register of producers of and traders in dangerous chemicals; requirements for carrying out activities, including obligatory education in chemical safety; obligatory reporting to the national authority).

On 29 August 1999, CORS was established as an authority under the Ministry of Health on the basis of the Chemicals Act, its first director having been appointed on 3 June 1999. The Office started operating three months after the adoption of the Chemicals Act. The Ministry of Health harmonized its activities with other line ministries and regularly proposed activities for consideration to the Intersectoral Committee on the Management of Dangerous Substances, which operated until 2009. The need for interministerial cooperation in the entire area of chemical safety remains substantial.

In 2008, the National Chemical Safety Plan 2008–2013 was adopted as a result of cooperation among the sectors and with the EU through pre-accession mechanisms such as PHARE.

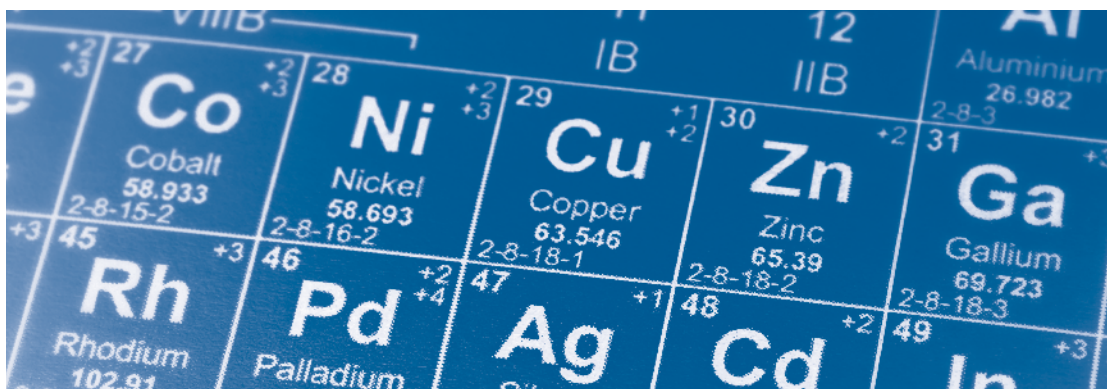


Participation in international chemical safety activities

International efforts to address chemical safety began with the 1972 United Nations Conference on the Human Environment in Stockholm, Sweden. This was followed by integrated action to streamline international and national activities resulting in the Basel (1992), Rotterdam (1998), Stockholm (2004) and Minamata (2013) conventions, which brought the whole topic of the sound management of chemicals to wider public attention. In 2006, the International Conference on Chemicals Management was convened to step up action to safeguard people and the environment from the risk posed by inadequately managed chemicals. This Conference adopted the Strategic Approach to International Chemicals Management (SAICM) at its inaugural meeting, as well as a number of other regional and global agreements aimed at protection of the air, water and soil from chemical pollution to prevent their negative impacts on health.

The SAICM is a policy framework to promote chemical safety around the world. It is unique for bringing together multiple sectors and stakeholders to address chemicals and waste issues that are not already within the scope of legally binding agreements. It has as its overall objective the achievement of the sound management of chemicals throughout their life-cycle so that, by 2020, chemicals are produced and used in ways that minimize significant adverse impacts on human health and the environment. This 2020 goal was adopted by the World Summit on Sustainable Development in 2002 as part of the Johannesburg Plan of Implementation.

In establishing the multistakeholder and multisectoral context for chemical safety, the International Conference on Chemicals Management identified opportunities for stronger involvement by the health sector. This led to a resolution at the second session of the Conference in 2009 for the development of a strategy to strengthen the engagement of the health sector in the implementation of the SAICM, in consultation with WHO. It was not by chance that the first SAICM meeting to consult on the development of a strategy for strengthening the engagement of the health sector took place in Ljubljana in February 2010: Slovenia has, since the start of chemical safety activities in the second half of the 20th century, put a special emphasis on an approach covering the entire life-cycle of chemicals, with the primary goal of protecting human health. Since the first public health toxicological activities and their consolidation with other aspects of chemical safety by the Chemicals Law in 1999, the Ministry of Health



has been made responsible for coordinating the activities of the main authorities concerned through CORS (the main body for chemical safety). This has proved to have many advantages, above all that sustainable chemicals management is seen as a key contributor to, and can be the basis for action for, public health at all levels of society.

Below are timelines for Slovenia's involvement in general international chemical safety activities.

WHO/United Nations Environment Programme

In 1994, Slovenia became a member of the new Intergovernmental Forum on Chemical Safety. A representative of the Ministry of Health presented the country's position, including on behalf of the Ministry of Agriculture, Forestry and Food, the Ministry of the Environment and Spatial Planning and the Ministry of Labour. From 2000 to 2006, Slovenia was a member of the Standing Committee of the Forum, and from 2006 to 2008 the country held the Vice-Presidency for Central and Eastern Europe of the Forum.

On 6 February 2006, the SAICM was adopted at the inaugural meeting of the International Conference on Chemicals Management. Slovenia was represented by the Minister of Health and the Minister of the Environment and Spatial Planning. Slovenia initiated, drafted and led this resolution through the administrative and political procedures up to its adoption, in close cooperation with the Czech presidency of the Council of the EU.

In 2009, Slovenia presided over the second International Conference on Chemicals Management in Geneva and remained the presiding country until the third conference in 2012.

Preparations started on 4–5 February 2010 in Slovenia for the SAICM health sector strategy, which was adopted at the third International Conference for Chemicals Management in Nairobi in 2012. Slovenia contributed the text on toxicovigilance.

On 21 May 2010, the Sixty-third World Health Assembly adopted resolution WHA63.26 on the improvement of health through the sound management of obsolete pesticides and other obsolete chemicals, in relation to the SAICM.

Between 2010 and 2012, the country presided over two meetings of the European Environment and Health Ministerial Board, the governing body of the European environment and health process, founded by the Parma Declaration.

The first meeting of the European Environment and Health Task Force (the body for implementation and monitoring of the European Environment and Health Process) took place on 11 October 2011. Slovenia initiated the procedure for preparing a joint input by the European Environment and Health Process member countries to the final document *The future we want (10)*, which was successfully included.

Slovenia is an active member of the European environment and health process, coordinated by the WHO Regional Office for Europe, which began with the European Charter on Environment and Health in 1989. The Ministry of Health places especial emphasis on the sixth principle for public policy: "The health of individuals and communities should take clear precedence over considerations of economy and trade" (11).

The country is a signatory and party to all relevant conventions in the field of chemical safety.

The initiative for ratifying the Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (the Rotterdam Convention) was adopted by the government on 7 September 1998. Slovenia was among the signatories of that Convention at a diplomatic conference in Rotterdam from 10 to 11 September 1998. The country was one of the first to ratify the Convention, and later also ratified the Stockholm Convention on persistent organic pollutants.

From the outset, Slovenia was included in the negotiations leading to the Minamata Convention on Mercury and was among the signatories of the Convention in 2013 (8).

Organisation for Economic Co-operation and Development

In 1996, Slovenia held observer status at two meetings of the Chemicals Group of the Organisation for Economic Co-operation and Development: (i) the Working party for Pesticides and Chemicals, and (ii) the Working party for Chemicals.

On 3 April 1997, the country decided to join the Working Group for Good Laboratory Practice as an observer.

On 31 July 1997, the government discussed the report on participation in the OECD Chemicals Group. This stimulated activities in the field of chemical safety. In addition to the Chemicals Act, regulations for a wide area of chemical safety were drafted (on protection against accidents involving chemicals, assessing the risk of chemicals and abandonment of the use of mercury).

In July 2010, Slovenia became a full member of the Organisation for Economic Co-operation and Development and its groups.

EU

Slovenia joined the EU on 1 May 2004 and, as a consequence, harmonized its national legislation in this field (as in others) with EU legislation. Since then it has played a role in the legal development of chemical safety. For example, it cooperated in the development of the REACH legislation and, together with Malta, contributed the Slovenian-Maltese proposal that enabled the further development of this legislation. During Slovenia's Presidency of the European Council (January–June 2008), legislation on a globally harmonized classification, labelling and packaging system for chemicals was adopted: the country led the European Council working group that concluded this major project. In the same period, Slovenia contributed to a detailed analysis of the situation regarding mercury, which was adopted by the competent European Council working group, and contributed to the start of negotiations on the Convention on Mercury. Slovenia is a member of all EU institutions, including the European Chemicals Agency and its bodies.

With its active engagement in international activities, Slovenia has contributed to the development of regional and global chemical safety agenda which, in turn, has given important leverage for national action.

Slovenian civil servants and experts are members of various EU bodies in the European Commission and European Council and are, therefore, involved in the chemicals policy for the whole EU.

Bilateral cooperation

Bilateral assistance from some countries to Slovenia played a pivotal role in establishing chemical safety. For instance, Switzerland facilitated the visit of a Slovenian delegation to competent authorities for good laboratory practices and to some laboratories that had an established system of best laboratory practices. This had a positive influence on the government's decision of 3 April 1997 on the implementation of good laboratory practices in the two laboratories. Subsequently, Slovenia has helped other countries (such as Serbia) in a twinning project to develop chemical safety.





Prevention of exposure to chemicals and poisonings: roles and responsibilities of the health sector

According to the Chemicals Act, and since CORS is an agency of the Ministry of Health, the prevention of chemical exposures and poisonings (toxicovigilance) is assured by health sector authorities and institutions. Fig. 1 presents the concept of chemical safety at national level, including the respective roles and responsibilities of several health sector institutions in providing chemical safety as well as some non-health sector actors who provide non-health data (the Environmental Agency and the Jožef Stefan Institute). The implementation of this concept has, however, been only partly realized and has now been postponed owing to the political and economic crises in Slovenia in recent years. Although most services are delivered by corresponding institutions, there is a lack of coordination for their activities at national level. It is anticipated that the national coordination body will play a more active role.

This organizational structure is designed to implement the SAICM health strategy, with clearly defined roles and responsibilities for each institution.

A national coordinator (second column) provides coordination and ensures good communication among the stakeholders at national level, and maintains insight and communication with international institutions in the area of chemical safety.

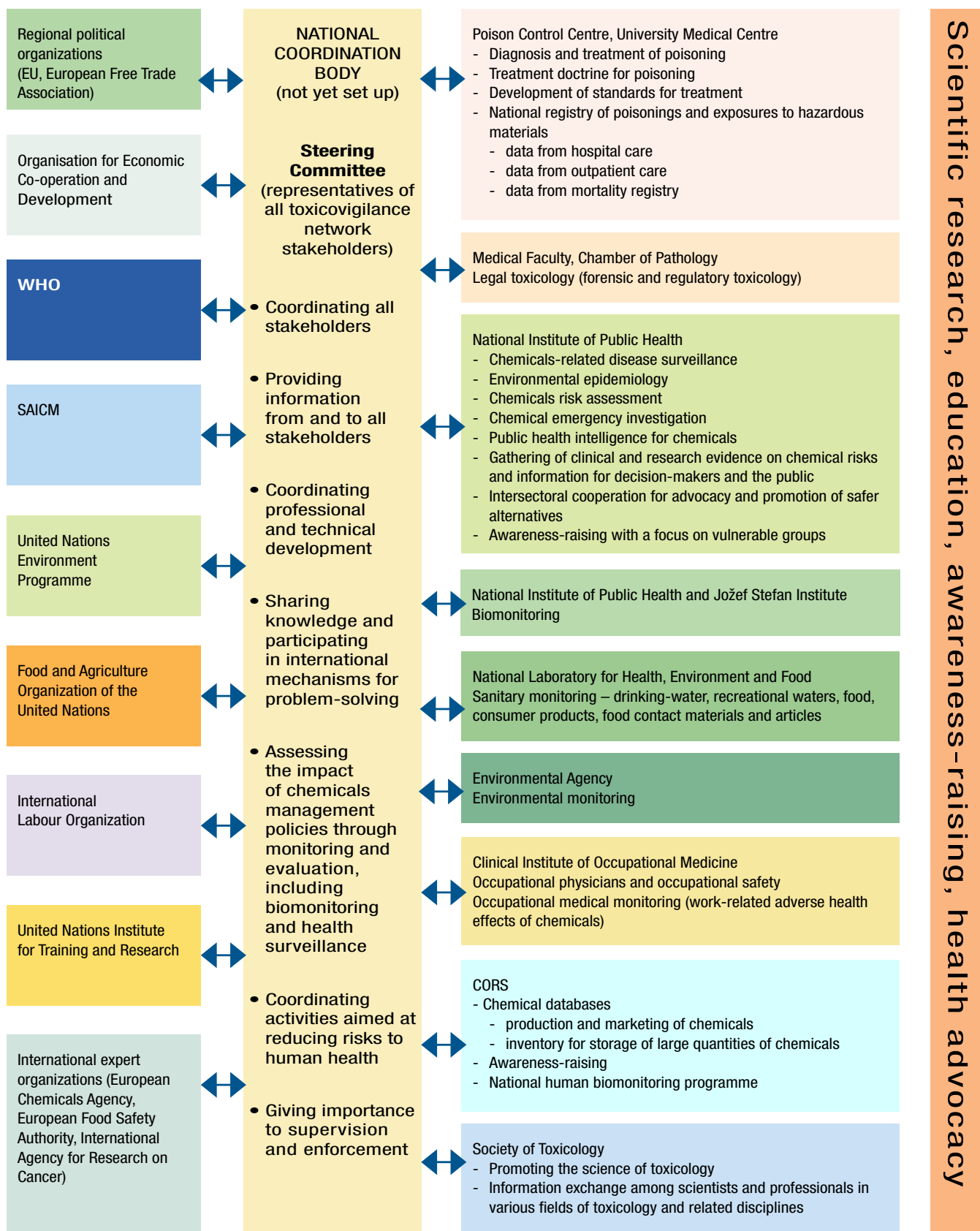
The boxes in the third column show that different data registries should exist at the national level to monitor evidence of poisonings. Surveillance of poisonings is necessary to establish links between them and chemicals. The health sector plays a key role in this area.

Useful tools for assessing human exposure to chemicals in the environment are different types of monitoring of the environment in which people live, including monitoring in the workplace, sanitary monitoring, and monitoring of food, drinking-water and products safety as well as human biomonitoring.

If required, a risk assessment is made to support the decision-making process. Since there are many different sources of exposure, the authorities should exercise extreme vigilance through the regulation of chemicals before their release on to the market and by following them throughout their whole life-cycles. The effective prevention of exposure to dangerous chemicals is ensured through both regulatory measures and health promotion activities; the latter are key to raising people's awareness regarding the threats from chemicals and how to avoid them. These activities are performed by all the agencies listed in the third column.



Fig. 1. Roles and responsibilities of the health sector in chemical safety and the prevention and management of chemical exposures and poisonings (toxicovigilance) at national and international levels





Roles and responsibilities of ministries and agencies in chemical safety

Ministry of Health

The mission of the Ministry of Health is:

- to advocate on behalf of the environment and health in all relevant legislation to ensure that the constitutional right to a healthy living environment is attained;
- to promote cooperation between relevant ministries by including health in all policies;
- to assure the conditions for good public health via the health care system and measures for disease prevention and by monitoring selected environmental factors;
- to contribute to the preservation and strengthening of public health and preventing the effects of harmful factors on health.

The international role of the Ministry of Health in chemical safety is carried out through the SAICM health strategy and a coordination role in the signing and ratification of various conventions, declarations and resolutions.

At the Ministry of Health, the responsibility for chemical safety is shared between several directorates (Fig. 2). Emergency medical services and preparedness and response to chemical emergencies according to the International Health Regulations are the responsibility of the Health Care Directorate (described in more detail on page 49). The EU Affairs and International Cooperation Service and CORS are responsible for international cooperation and liaison concerning the inclusion of chemical safety topics in regional/global political documents. The Public Health Directorate is responsible for: food safety and hygiene of food and drinking-water with a view to preventing chemical contamination; health and ecological issues relating to the environment where a direct impact on human beings is involved; issues related to drinking-water, bathing waters, air and soil; and health protection aspects of waste management.



Fig. 2a. Organizational chart of the Ministry of Health^a

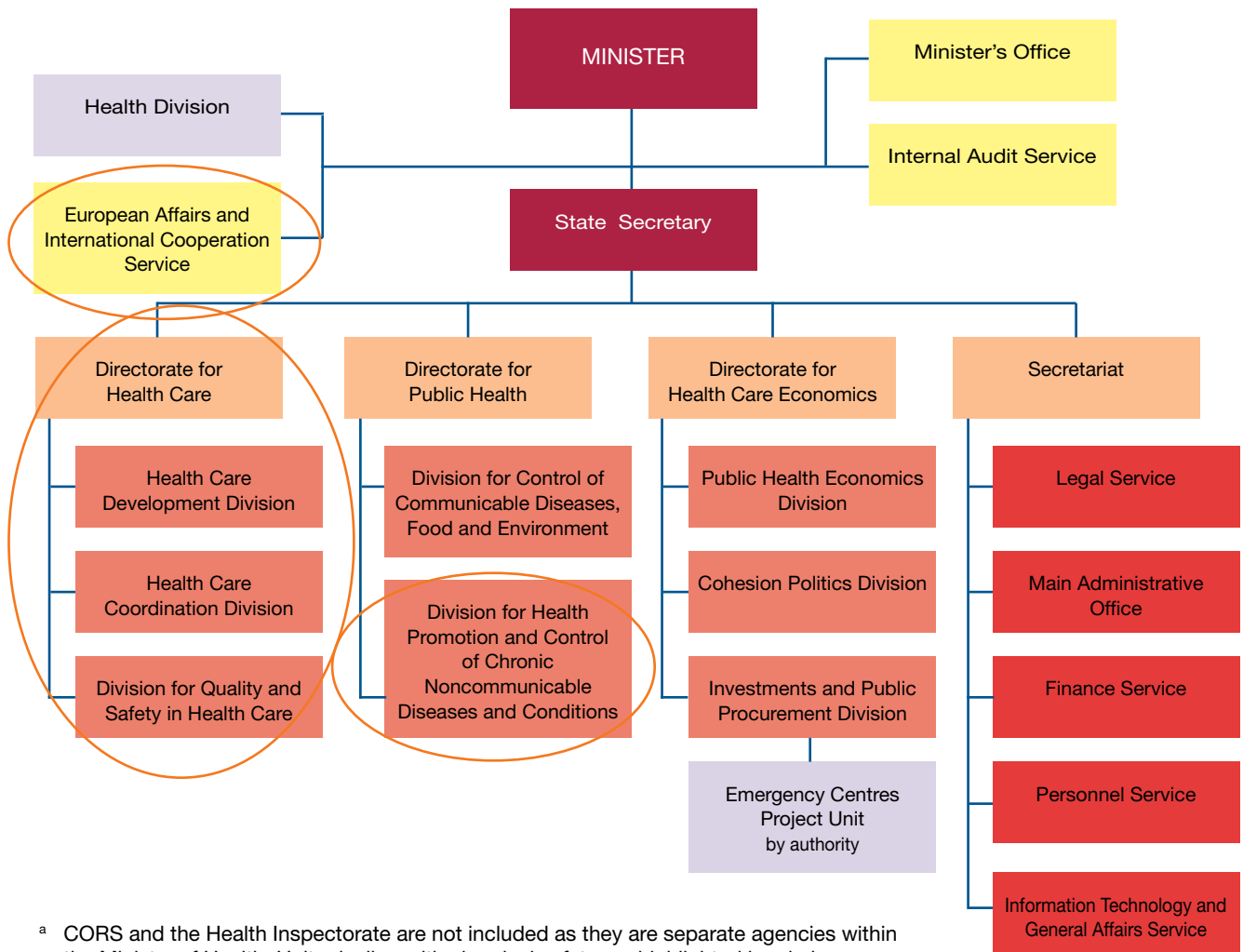
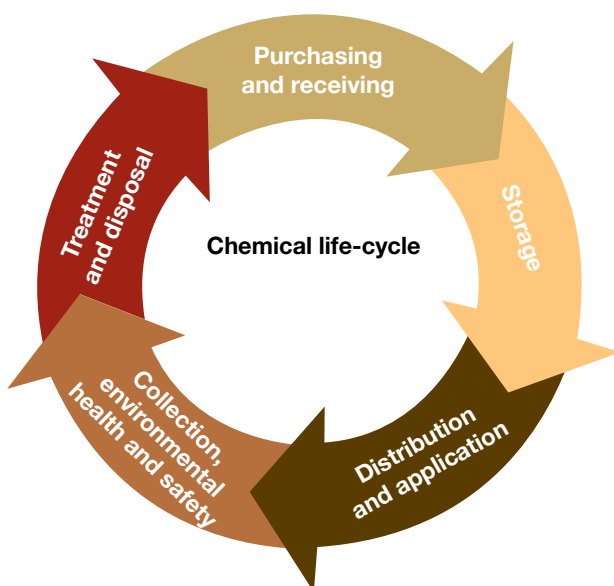


Fig. 2b. Functions of the Ministry of Health in the chemicals life-cycle



Purchasing and receiving: regulations, for which the Ministry of Health is responsible, prescribing the classification, packaging and labelling of chemicals, and the presence of an adviser for chemicals in every production and sales company responsible for chemical safety.

Storage: Ministry of Health regulation prescribing measures for the safe storage of chemicals.

Distribution and application: REACH and regulations for the classification, packaging and labelling of chemicals (both under responsibility of Ministry of Health) prescribing safe putting on the market, classification, packaging and labelling, safety data sheets and national regulations; also prescribing conditions for trade in chemicals, such as sales locations and conditions, with warnings indicating where additional information can be found.

Collection, environmental health and safety: biomonitoring, which is an indirect way of detecting chemicals in the environment and provides the scientific basis for taking preventive measures on the basis of the data.

Treatment and disposal: Ministry of Health addresses health-related aspects of chemical-containing waste management.

CORS

The core activities of CORS are the identification and assessment of hazards and risks from industrial and other chemicals, and management of these risks through risk communication and other mitigation measures. In addition, CORS is responsible for human and environmental protection in some product-specific areas (such as detergents, cosmetic products, drug precursors and biocidal products) and international chemical safety and security issues (including the Basel, Rotterdam and Stockholm conventions, Chemical Weapons Convention and dual-use chemicals). In carrying out these tasks, CORS serves as a hub for other chemicals-related policies and sectors: environment, health and safety at work, public health, economy, agriculture. These tasks are carried out through the Chemicals Inspectorate and various project groups, reporting to the Director (see the CORS website for its organization (12)).

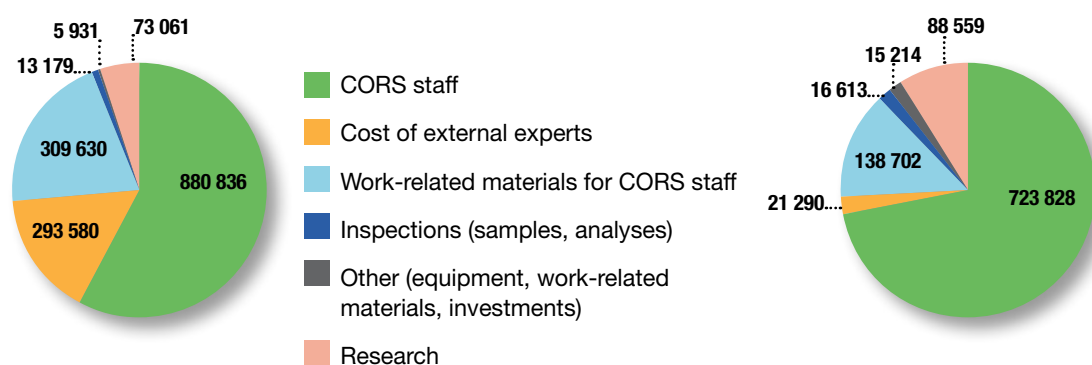
CORS experts, in cooperation with experts and competent authorities from other EU member states, exchange their expertise in risk assessment committees and socioeconomic analyses with the competent authorities for REACH and classification, labelling and packaging, the Member States Committee, Biocidal Products Committee, and other forums and expert working groups. All these forums tackle different levels and aspects of chemicals and chemical safety issues (see the European Chemicals Agency website (13)). In carrying out these tasks, CORS mainly uses in-house knowledge. For specific expertise, however, external experts are engaged. Cooperation is already established or under way with relevant national institutions (the Poisons Control Centre, National Institute for Public Health) and databases (the National Chemicals Registry, managed by CORS), as well as with the industry.

Pursuant to the Chemicals Act, CORS is also responsible for setting up and implementing the National Human Biomonitoring programme. The first round is expected to be finalized in 2015 or 2016, providing vital indicators and information for further chemical safety programmes and priorities.

CORS is financed from the national budget. Some income from taxes, fees and inspection fines flows to the integrated budget, but they are not enough to cover the costs of CORS.

CORS grew from three employees at its establishment in 1999 to 28 in 2009, after which the economic crisis led to a reduction in staff to 19 senior professional civil servants. The budget also changed over the years. Fig. 3 shows approximate figures for the financial arrangements of CORS in 2010 and 2014. They are not easy to compare owing to, on the one hand, different numbers of employees, and on the other reorganization of the work.

Fig. 3. Costs of CORS in 2010 and 2014



Health Inspectorate

The Health Inspectorate is part of the Ministry of Health. Its tasks, competences and procedures are laid down by law and are aimed at protecting health as a public interest. This is achieved through inspections to verify the implementation of laws and regulations in areas under its jurisdiction.

The Inspectorate's tasks in relation to chemical safety are implemented and inspections carried out in the following fields:

- suitability for health or safety of foodstuffs and food;
- suitability for health of drinking-water, and facilities and devices for the supply of public drinking-water;
- suitability for health and safety of materials and products that come into contact with foodstuffs;
- suitability for health and safety of cosmetic products, toys and limits on the use of tobacco and alcohol products;
- hygiene suitability of bathing waters, minimum sanitary health conditions in public health institutions that perform health-care services at bathing sites, and facilities that provide child care, education, catering, tourism, hygiene care and social services;
- status of health and hygiene in temporary residences during natural disasters and evacuations;
- management of waste produced during the provision of health-care services in facilities used for these purposes.

Inspections are carried out by inspectors in areas for which they have special authorizations and responsibilities. Staff, facilities, devices, substances, products, processes, services and activities can all be subject to inspection. In addition, the Inspectorate controls sampling for activities where sanitary and health conditions are verified or where the conformity of products or substances is verified in accordance with the regulations. These inspections are normally not announced in advance. Inspectors assess the situation on site, as well as violations of laws and regulations and whether measures have been executed. Through sampling, the inspectors assess the conformity of substances, components and products to the provisions in laws and regulations and the risk to human health. The Inspectorate receives expert support from the National Institute of Public Health and the National Laboratory for Health, the Environment and Food.

In 2013, the Health Inspectorate's budget amounted to €4 833 941, of which €4 738 366 (98%) was used.

When inspectors discover any violations or failures to carry out required measures, they are obliged to take action in proportion to the severity of the violation. The sanctions imposed by an inspector can be administrative (issue of a regulatory decision on administrative procedure or a warning under the Inspection Act) and offence-related (fine, reminder or warning under the Inspection Act).

The Health Inspectorate notifies the public on its website about all products found that do not conform to legal requirements and that pose a risk to human health. In 2013, the Inspectorate published 33 notices on hazardous products on this website. Most of these notifications referred to toys (64%), cosmetic products (18%) and foodstuffs (15%).

The Inspectorate cooperates with numerous ministries with the preparation of regulations, and with other state authorities and professional institutions in the performance of its tasks. It also cooperates with other stakeholders including members of municipalities, associations, expert organizations and the media, via requests for public information and questions addressed to its head office or to its

inspectors or employees. In 2013, the Inspectorate registered 600 matters connected with cooperation with the public.

At EU level, the Inspectorate participates in the following bodies:

- supervisory bodies controlling the internal market;
- for cosmetics, the Platform of European Market Surveillance Authorities for Cosmetics;
- for toy safety: (i) the Administrative Cooperation Group of market surveillance authorities in the framework of Directive 94/25/EC relating to Recreational Craft (14) and Toys Expert Group on Toys Safety, and (ii) the European Commission's Safety of Toys Committee (established in accordance with the new regulation on toy safety);
- the Rapid Alert System for Food and Feed for receiving rapid alerts for food and fodder;
- the Rapid Alert System for Non-Food Consumer Products for the rapid exchange of information among the supervisory bodies of member states and the European Commission on measures to prevent or limit the marketing or use of products intended for consumers which pose a health risk and endanger the safety of consumers in the EU (other than food, medicines and medical devices, for which other information exchange systems exist).

The Rapid Alert System for Food and Feed is the EU's main tool for fast responses to hazards in relation to foodstuffs and fodder. When a health hazard is found, the System quickly and efficiently advises the European Commission, the European Food Safety Agency and other authorities to monitor foodstuffs and fodder in countries included in the System. In 2013, the Inspectorate received and considered 381 notifications from the System, of which 15 referred to dangerous products that were available in Slovenia (13 relating to foodstuffs and two to materials and products that come into contact with foodstuffs).

In the Rapid Alert System for Non-Food Consumer Products, the Health Inspectorate is part of a national network that includes the Ministry of Economic Development and Technology as well as bodies competent to implement the act on the general safety of products such as the Customs Administration, CORS and the Market Inspectorate, which is also the contact point. The role of the contact point is the transmission of information to and from the European Commission. In 2013, the Inspectorate received and considered 785 notifications on products that either posed serious risks to health or were not harmonized with the valid legislation but did not present a serious risk. Inspectors identified 19 such products on the Slovenian market.

Ministry of Labour, Family, Social Affairs and Equal Opportunities

The role of the Ministry of Labour, Family, Social Affairs and Equal Opportunities is to adopt occupational health and safety legislation, to issue practical guidelines, to organize awareness-raising campaigns and to give practical advice through promotional activities to employers and employees.

Occupational health and safety is covered by the Health and Safety at Work Act (15). This Act transposes the framework Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the health and safety of workers at work (16) and Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market (17). The Act came into force in 2011 in succession to the Occupational Health and Safety Act, which had been in force since 1999.

To ensure chemical safety, the Ministry of Labour, Family, Social Affairs and Equal Opportunities has adopted the following rules based on EU directives:

- rules on the protection of workers from risks related to exposure to carcinogenic and mutagenic substances (18);
- rules on the protection of workers from the risks related to exposure to chemical substances at work (19);
- rules on the protection of workers from the risks related to exposure to asbestos at work (20);
- rules on the protection of workers from risks related to exposure to biological agents at work (21);
- rules on the protection of health of pregnant workers, workers who have recently given birth and breastfeeding workers at work (22);
- rules on the protection of the health of children, adolescents and young persons at work (23).

The Ministry cooperates daily with European institutions (European Commission, European Agency for Health and Safety at Work) and national institutions (Labour Inspectorate, Ministry of Health, trade unions, chambers of commerce). This cooperation yields the data needed for the work of the Ministry of Health.

The Ministry also helps employers and employees with other activities and publications, as follows:

- through its on-line platform, gathering and making available all information related to health and safety at work in Slovenia (by topic and by activity); the platform contains links to legislation, guidance documents and annual reports from various departments dealing with health and safety at work;
- publishing posters promoting health and safety at work;
- making risk assessments, for example on health and safety at work for small and medium enterprises (the Office of the Republic of Slovenia for Health and Safety at Work has published a booklet for employers in small and medium enterprises);
- publishing practical guidelines for safe work with and control over exposures to chemical agents;
- publishing practical guidelines for risk assessment at work with dangerous chemical agents;
- issuing an online application offering practical guidelines for risk assessments for work with dangerous chemical substances;
- publishing practical guidelines for health surveillance and biological monitoring for lead.

Ministry of the Environment and Spatial Planning

The strategically important long-term directions and goals of the Ministry of the Environment and Spatial Planning concerning environmental protection are aimed at preventing or mitigating adverse impacts that present a threat to sustainable development. The Environmental Protection Act constitutes the regulatory framework for the environment. The Resolution on the National Environmental Protection Programme focuses on four key areas: climate change, nature and biodiversity, quality of life, and waste and industrial pollution.

The Environmental Agency is responsible for chemicals management under the mandate of the Ministry of the Environment (24).

Environment Agency: environmental monitoring and environment and health indicators

The Environment Agency is a body within the Ministry of the Environment and Spatial Planning which performs technical, analytical, regulatory and administrative tasks in the field of the environment at national level (25). The main mission of the Agency is to monitor, analyse and predict natural phenomena and processes in the environment with the aim of reducing natural threats to people and property. Administrative tasks managed by the Agency contribute to the solving of environmental problems through implementation of the environmental legislation. The Agency receives fees and taxes from the public for carrying out administrative procedures (fees for water and water pollution, taxes on air pollution from carbon dioxide emissions and on waste disposal), from various stakeholders in the process of environmental assessment, and from industrial polluters for the issuance of environmental permits in the interests of limiting pollution. As a result of its involvement in different business processes, the Agency manages databases on, for example, emissions, air quality and water quality, and on monitoring related to meteorology, seismology and hydrology.

The Environment Agency is required by the Environment Protection Act to report on the state of the environment. It does this by gathering and analysing environmental and environment-related data as the basis for developing policy-relevant and up-to-date indicators, including environment and health indicators. The environment and health indicators are prepared according to the driving forces, pressures, state, impact and responses methodological framework for integrated assessment, which describes the interactions between society and the environment and was developed in cooperation with WHO and adopted by the European Environmental Agency.

Ministry of Agriculture, Forestry and Food

The Ministry of Agriculture, Forestry and Food has two main responsibilities regarding chemical safety for human health: food safety and control of the marketing and use of plant protection products.

The system for food safety is described on page 47.

Regulation and control of use of plant protection products

Slovenia has implemented the EU *acquis communautaire* in the field of plant protection products (PPP): Regulation (EC) 1107/2009 concerning placing PPP on the market, which applies directly (26), and Directive 2009/128/EC on the sustainable use of pesticides (27), which is implemented by the national Plant Protection Products Act (28).

The producers of PPP are obliged to get approvals for active substances at the EU level and authorizations for products at the national level before placing them on the market. Active substances are evaluated for their safety by member states, peer reviewed by the European Food Safety Agency and managed by the European Commission. Once active substances have been approved, the owners may ask for authorizations for products containing these substances at the level of member states. These authorizations allow member states to ensure that unsafe uses of PPP are not allowed, or that conditions for safe uses are set and respected.

The government has paid considerable attention to the levels of retail sale and use of PPP in legislation and in practice. Distributors of PPP must fulfil certain requirements and be granted a permit for distribution before they are allowed to sell them. They have to employ qualified staff, have appropriate premises and keep a record of all PPP sold. Advisers, salespersons and users of PPP have to attend courses adjusted to the level of knowledge they need to handle PPP safely and the possible risks involved in their use. Users are obliged to keep records of measures carried out relating to plant health and PPP used.

New equipment for applying PPP must fulfil the requirements of Directive 2009/127/EC (29) before being placed on the market. Equipment in use must be inspected every three years and a record kept for every piece of equipment which has gone through the inspection system.

The aerial spraying of PPP is not allowed. The use of PPP in forests is restricted to emergency situations only, after the risk has been evaluated and a permit issued for their specific use by forest and PPP authorities.

The competent authority for the implementation of EU legislation and national provisions in the field of PPP is the Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection, under the Ministry of Agriculture, Forestry and Food. The Administration cooperates with other member states, the European Food Safety Authority and the European Commission in evaluating active substances for the approval procedures, procedures for EU legislation and guidance documents, and with other member states regarding the authorization of PPP.

At national level the Administration prepares legislation and regulations, controls the retail sale and use of PPP, provides additional training for advisers, sellers and users concerning PPP and carries out inspections of PPP application equipment. It designates the bodies to be officially responsible for carrying out additional training in handling of PPP and inspection of PPP equipment.

When PPP are registered at national level, CORS is responsible for giving agreement on the basis of a risk assessment for health, impact on the environment, and the classification, packaging and labelling of chemicals used in PPP. In addition to general principles, such assessments must take account of the specific geographical, environmental and health conditions prevailing in the country as well as how it is intended to use the PPP.

Public awareness of the possible risks from using PPP is now a legal requirement, which is very important for human health and protection of the environment. Additional training is available for all users of PPP, including people who are not farmers. The Administration has placed a lot of information on the safe handling and use of PPP on its website, prepared printed material, and distributed brochures, leaflets and flyers through the retail chain and training bodies in order to reach all users. The Administration cooperates with stakeholders in information campaigns to inform the public about issues relating to PPP.

Ministry of Education, Science and Sport

Students at the Faculty of Medicine learn about chemical safety through topics included in different subjects (pharmacology and experimental toxicology, public health, pathophysiology, pathology, oncology). The Faculty of Medicine coordinates the biomedicine PhD programme, in which toxicology is one of the 12 main scientific fields.





Roles and responsibilities of institutions and associations

National Institute of Public Health

The National Institute of Public Health (NIPH) is the central institution for the practice of and research and education in public health, funded by the Ministry of Health. Its main functions are to provide research in the field of health and to implement health promotion and disease prevention programmes. Its activities cover the main areas of modern public health science: epidemiology and the prevention of communicable and noncommunicable diseases, environmental health, health promotion, research into health systems and national coordination of preventive programmes in primary health care. It also functions as the principal national health statistics authority. NIPH consists of the main office and nine regional units (in Celje, Koper, Kranj, Ljubljana, Maribor, Murska Sobota, Nova Gorica, Novo Mesto and Ravne na Koroškem) with over 400 staff, including medical doctors specializing in public health, statisticians, specialists in informatics and communication, methodologists, psychologists, biologists, sanitary engineers, nurses and others. The director is responsible to an overall board and is supported by an expert board.

NIPH proactively monitors data and vigilantly detects and responds to any threats to human health resulting from exposure to chemicals by offering expert advice, toxicological exposure and risk assessment, counselling about protective measures, and informing the public and decision-makers about the threats and how to avoid them. It plays a major role in health advocacy for other sector policies. Special attention is paid to long-term exposures to low doses of chemicals in consumer products and food contact materials and in food and drinking-water, and to emerging chemical threats (such as from endocrine-disrupting chemicals or nanoparticles).

In 2007, NIPH prepared a study design for the national human biomonitoring programme based on the initiatives and recommendations of WHO, the International Programme on Chemical Safety and the European Environment and Health Action Plan 2004–2010 (30). Regional public health institutes are the primary health institutions for implementing this programme while the Jožef Stefan Institute has been coordinating the field and laboratory activities (31).

A coordination group for public health threat detection has been established within NIPH as the national coordination point in toxicovigilance. An important mission of this group is to support the development of the national toxicovigilance information system, which has as its objectives to monitor and manage the toxic effects in humans of chemical products or substances that are available on the market or present in the environment as well as to implement measures that will have a long-lasting impact on reducing human exposure to chemicals.

To be effective in protecting the health of the population from chemical threats, health protection measures and activities frequently need to be agreed on and/or carried out by non-health care organizations or government bodies. In this connection NIPH plays an important role in providing scientific evidence for decision-makers and providing advocacy for health, sometimes in settings with conflicting interests. NIPH cooperates

with nearly all ministries and many national institutions, as well as relevant international institutions including: the Organisation for Economic Co-operation and Development (Working Group for the Safety of Novel Foods and Feeds), the European Commission (Directorate General for Health and Consumer Products, Joint Research Centre, Food and Veterinary Office, Technical Assistance and Information Exchange), the European Food Safety Authority, WHO, the European Early Warning and Response System and the Council of Europe (Committee of Experts on Packaging Materials for Food and Pharmaceutical Products). In 2014, the last-named published a technical guide on metals and alloys used in food contact materials and articles (32).

NIPH is a national contact point for serious cross-border threats to health. According to EU Decision No. 1082/2013/EU on this topic (33), these include threats of chemical origin.

The Institute acquires its basic knowledge through: (i) specialization (hygiene, public health) and training in workshops and seminars and attending professional congresses, and (ii) professional domestic and especially foreign literature such as publications by WHO and the environmental agencies and other institutions in different countries. These include the United States Environment Protection Agency, the German Federal Environment Agency and Federal Institute for Risk Assessment, the European Food Safety Authority, the International Agency for Research on Cancer, the Agency for Toxic Substances and Disease Registry, the Canadian Office for Health Hazard Assessment and the European Joint Research Centre.

NIPH exchanges information with the National Laboratory for Health, Environment and Food and the ministries of Health, Environment and Spatial Planning, Agriculture, Forestry and Food, water suppliers, local communities and epidemiologists.

As well as toxicovigilance, NIPH provides consultancy services to the regulatory authorities. It carried out toxicovigilance concerning the classical endocrine-disrupting chemicals (lead, mercury and polychlorinated biphenyls) long before they became notorious. Over the past decade this has included:

- identification and evaluation of toxic hazards for human health
- human biomonitoring
- risk assessment for human health
- recommendations for risk reduction measures
- evaluation of risk reduction measures
- education, awareness-raising and risk communication
- networking with other stakeholders.

For these activities, NIPH relies on data from several sources of environmental or exposure monitoring carried out by other institutions and agencies in the country.

To raise awareness among professionals, the Institute publishes the web journal eNBOZ, which carries articles on chemical safety issues (34–40).

National Laboratory for Health, Environment and Food

The National Laboratory for Health, Environment and Food carries out laboratory activities, the education and training of professionals, information and reporting, and research related to public health in the fields of health, the environment and food. Its experts cooperate with domestic and foreign institutions. It coordinates the National Programme of Monitoring of Drinking Water.

In addition to carrying out tasks of national importance, the Laboratory offers its services commercially. It carries out sampling, field measurements, microbiological and chemical tests, risk assessments for human health and the environment and reviews compliance with the laws. A priority is public awareness of chemical safety.

The Laboratory provides chemical safety in relation to the protection of public health through work in the following areas:

- identification of hazards
- monitoring (environmental, ecological, human)
- evaluation of results and risk assessment
- prevention, information and public awareness.

National Education Institute

The National Education Institute is responsible for the curricula and in-service training of teachers in kindergartens, primary and secondary schools. Since 2000, it has played an important role in the restructuring of the education system, devising new curriculum solutions, developing methods for the successful transfer of modifications and devising a plan for accompanying the curriculum or programmes and new elements into practice. The Institute does this in the form of seminars (for example: Chemical Safety Is Not Only for Chemists), symposiums, specialized conferences and, most of all, through workshops and study meetings of teachers and other educators. The Institute is also strengthening its activities in the international framework, where it cooperates with the European Agency for Safety and Health at Work.

The Chemistry Group of the Institute has been working on introducing chemical safety into school curricula for over 15 years. Until 2008, chemical safety was mostly represented in the syllabuses for chemistry (at grades 8 and 9 of primary school and different secondary levels), science (grades 6 and 7 of primary school), and the elective subject experiments in chemistry, including toxicology (at grades 8 or 9 of primary school). Following the modernization of the school curricula in 2008–2011, the Institute hugely increased the topic of chemical safety within the syllabuses. Some of the basic goals for the labelling and handling of dangerous chemicals are now included vertically in all primary school grades (1–9) and in secondary schools (for example, the basis of toxicology is included in chemistry).

The Institute participates in organizing the annual conference on Chemical Safety for All. It cooperates with other expert institutions including the Ministry of Health, CORS, NIPH, the Poison Control Centre of the University Clinical Centre Ljubljana, the Ministry of Labour, Family, Social Affairs and Equal Opportunities and the Slovenian Consumers Union.

The Institute's experts continuously update and improve their knowledge through self-education from sources such as the reliable official websites of suitable institutions, expert Twitter accounts and expert literature.

Jožef Stefan Institute

The Jožef Stefan Institute is the leading scientific research institute in the field of natural, technical and life sciences in Slovenia (41). It covers a broad spectrum of basic and applied research with a staff of more than 930 specializing in natural sciences, life sciences and engineering. The subjects concern production and control

technologies, communication and computer technologies, knowledge technologies, biotechnologies, new materials, environmental sciences and technologies, environment and health, chemical safety, nanotechnologies and nuclear engineering.

The mission of the Jožef Stefan Institute is the accumulation and dissemination of knowledge at the frontiers of natural science and technology to the benefit of society at large through the pursuit of education, learning, research and development of advanced technology at the highest international levels of excellence. Several research departments cover topics of relevance for chemicals management and environment and health, including the Department of Environmental Sciences, which focuses on the combination of physical, chemical and biological processes that influence the environment, people and human activities. The work is based on three main areas: development, optimization and validation of analytical methods, study of geochemical processes that influence cycling and transformations of substances and elements, and environmental impact assessments (for scientific and research purposes and for decision-making on the basis of law) which evaluate the risk that human activities present for human health and for the environment. In 2013, the Department had 58 employees (20 researchers, eight postdoctoral associates, 23 postgraduates and seven technical and administrative employees). It has the designated status of national reference laboratory for measurements of certain chemicals in the environment, is active in the European Association of National Metrology Institutes (a regional metrology organization of Europe) and the Metre Convention International Bureau of Weights and Measures Committees and is accredited to the National Accreditation Authority for the determination of trace elements in environmental and biological samples. The Department is very active in research projects related to human health (42–49), including in the preparations for the new European Human Biomonitoring Initiative, due to start in 2016.

The Department was involved in the technical support for preparations for the Minamata Convention on Mercury from 2002 until its adoption.

The laboratories include instrumentation for the characterization of organic and inorganic chemical contaminants, radionuclides and nutrients in the environment and humans.³ In 2015, new premises funded by EU structural funds were inaugurated, including a specially designed human biomonitoring biobank and new training facilities which will function as the WHO training site for human biomonitoring for trace elements in human tissues and the International Atomic Energy Agency training site for the use of trace elements.

Most of the Department's educational activities in the area of environment and health are implemented through the curricula of the Institute's Ecotechnology Programme (50).

National Institute of Chemistry

The National Institute of Chemistry is a public research institute working in the field of chemistry. It has 285 employees, of whom around 256 carry out research work in 14 laboratories and two infrastructure centres. The Institute is a leading organization in graduate-level education and training.

The Institute's researchers carry out fundamental and applied research in chemistry and related fields, paying great attention both to the science and to useful cooperation with

³ Mass spectrometry (UPLC-qTOF-MS/MS, ICP-MS, ICP-MS QQQ, LA-ICP-MS, LC-ICP-MS, GC-ICP-MS, SP-ICP-MS, GC(IT)MS, GC-MSD, LC-MS/MS); spectrophotometry (HG AFS, CV AFS, CV AFS, Raman spectroscopy); isotope ratio mass spectrometry (EA-IRMS, GC-C-IRMS, DI-IRMS, Py-IRMS, MC-ICP-MS); nuclear methods (TRIGA MARK II nuclear reactor, alpha, beta and gamma counting).

the economy. Research is oriented towards the development of new technologies and products which will help to ensure the long-term development of Slovenia and which are internationally relevant in the fields of biotechnology, environmental protection, structural and theoretical chemistry, analytical chemistry, materials research and chemical engineering. The work of the Institute is also in line with the priority thematic areas of the EU research and innovation programme Horizon 2020, which places an emphasis on genomics and biotechnology for health, nanotechnology, quality and safety of food, nutrition, sustainable development and global climate change.

Industry is an important partner in these endeavours. The Institute offers high-level research equipment, allowing researchers to engage in the most cutting-edge research challenges at world level. Some acquisitions are: a Karl Zeiss Supra 35 VP electronic microscope with energy dispersive X-ray analysis, a high resolution powder X-ray diffractometer and an 800 MHz nuclear magnetic resonance spectrometer (the only ones of their kind in Slovenia). The latter is the first of this kind of instrument to be found in the new member states of the EU and represents one of the largest investments in a freestanding piece of research equipment in the country.

Slovenian Society of Toxicology

The Slovenian Society of Toxicology was founded in 2000 (51). It joined the Federation of European Toxicologists & European Societies of Toxicology in 2000 and the International Union of Toxicology in 2001. It is an independent, voluntary, non-profit organization of professionals working in toxicology. The aims of the Society are to foster and promote the science of toxicology in Slovenia and to facilitate information exchange among various fields of toxicology and related disciplines by:

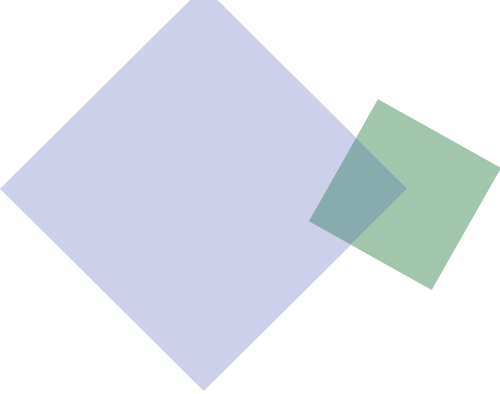
- following toxicological developments nationally and internationally
- encouraging the advancement of research in toxicology in Slovenia
- encouraging education in toxicology at all levels in Slovenia
- organizing lectures, meetings, seminars and conferences
- liaising with other relevant societies nationally and internationally
- establishing a national register, including the provision of legal expertise
- providing information and consultation to the general public
- identifying national toxicological issues and suggesting solutions.

Since February 2001, the Society has been listed in the register of the Ministry of Education, Science and Sport as nongovernmental scientific organization acting in the national public health interest.

Together with the Croatian Society of Toxicology, the Slovenian Society of Toxicology edits the Archives of Industrial Hygiene and Toxicology as their official journal.

In response to the increasing demand for toxicological expertise in industry and in public administration, the Society is making an effort to increase and apply knowledge in toxicology in all areas of modern society. In order to assure a high level of safety based on sound toxicological data, the Society supports high ethical standards in the toxicological work carried out by its members.





Roles of nongovernmental organizations in chemical safety

In 2012, around 1270 nongovernmental organizations were working in the field of health (or public health), representing 5.2% of all nongovernmental organizations. The Slovenian Coalition for Public Health, Environment and Tobacco Control has been working in public health for 12 years. The mission of this nongovernmental organization is to regularly monitor the ingredients and chemicals added to tobacco products as well as any other harmful ingredients.

EU member states are obliged to ban the sale of tobacco products containing additives which significantly or measurably increase the toxic effect or addiction or have carcinogenic, mutagenic and reprotoxic properties. They monitor the 2014 revision of the EU Tobacco Products Directive (52), which provides security protection in order to strengthen the fight against trafficking and counterfeiting.

The nongovernmental organizations are represented in the different intersectoral bodies, such as the Intersectoral Committee for Chemical Safety (former Intersectoral Committee on Dangerous Chemicals) and the Interministerial Working Group for the Implementation of Commitments Adopted at the Fifth Ministerial Conference on the Environment and Health (Parma Working Group).

The youth network No Excuse Slovenia actively works in the area of environmental health, including chemical safety. The network first got engaged in environmental health by attending the Fifth European Ministerial Conference on Environment and Health in 2010; since then, it has been advocating meaningful participation by young people in decision-making processes at the national and European levels. Through the Slovenian National Youth Council, the network has been a member of the Interministerial Body for the Implementation of the Parma Declaration since 2011/2012 and has collaborated in the drafting process of the Slovenian Strategy for the Environmental Health of Children and Young People 2012–2020. In 2012, it co-established the European Environmental and Health Youth Coalition in Florence, Italy.

Since 2011, the network has carried out three main activities:

- continuous work in public health (primarily healthy lifestyles) and sustainable development (primarily education for sustainable development) and development of initiatives on environment and health (primarily outdoor air pollution, climate change and healthy settings);
- establishment of the Southern European Youth Network YU-SEE (former YUgoslavia and South Eastern Europe) working with environmental health (primarily on the impact of different industries on the health of young people and environment);
- organization of the project Young People, Environment and Health aimed at empowering a group of young people from Slovenia in the area of environmental health, building alliances with nine other European youth networks in this field and finding out about the environmental health situation in eastern and western Europe (through study visits).

Chamber of Commerce and Industry, Association of Chemical Industries of Slovenia

The Association of Chemical Industries of Slovenia is an industrial association operating autonomously under the umbrella of the Chamber of Commerce and Industry of Slovenia. Its members are manufacturers of chemicals and chemical products, pharmaceutical raw materials and preparations, rubber products and manufacturers of plastic products – in short, the chemical industry.

The Association represents the chemical industry's interests in a dialogue with the authorities and other stakeholders and offers special services and products to member companies, including awareness-raising activities intended for companies and other related public groups. Its particular concern for the technological development of the industry and for chemical safety strongly influences its activities, which are run through several of its working groups. Of these, the groups most directly related to chemical safety are the REACH/classification, packaging and labelling group, the biocides group and the Responsible Care® group. These groups share knowledge and experience based on the industry-to-industry help principle. Regular meetings are organized between companies and the competent authorities in order to improve understanding of legislative requirements and to facilitate compliance with laws. The Association fully recognizes the importance of sustainable development, hence running the Responsible Care® programme (53) in Slovenia. It encourages chemical companies to adopt responsible business practices and operation, including through committing themselves to the Responsible Care® programme.

The Association cooperates with most of the local stakeholders in the area of health and the environment, especially CORS. It acquires its knowledge and information related to chemical safety through:

- workshops and training courses with experts from competent national and international authorities;
- European and international industrial associations of which it is a member;
- documentation and information available on the internet;
- other electronic and written sources and databases.

It also carries out activities for raising public awareness.

In the interests of developing employees' competence, the Association has, with the support of EU structural funds, established the Chemical Industry's Competence Centre. This Centre provides workshops and training courses for employees which include topics related to chemical safety.

Finally, under the supervision of the Health Insurance Institute, the Association is currently running a multi-annual project for health promotion at the workplace focusing on the chemical and metal industries. The aim of the project is to improve care for health (health promotion) at the workplace and generally in individuals' everyday lives.

Association of Free Trade Unions of Slovenia, representing workers associations

The Association of Free Trade Unions of Slovenia represents the common, economic, social and cultural interests of trade unions. It is not dependent on parliament, the government, political parties, employers' organizations or religious communities. The Association aims to: (i) improve the material, social and legal security of employees,

the unemployed, young people and retired members of trade unions; (ii) ensure that trade unions are free to organize and undertake activities for the general democratic, economic and social development of the country; and (iii) cooperate with national authorities as well as trade unions and employers' organizations or their associations. It cooperates with trade union organizations in other countries and international trade union, governmental and nongovernmental organizations and is a member of the European Trade Union Confederation.

In its 2012–2017 programme, the Association states: "In addition to fair payment for work, health and safety at work are also real workers' interests and therefore represent the goal of trade unions". For this purpose, the programme requires the Association: (i) to support the role of elected workers' representatives for health and safety at work and workers' councils by organizing training to enable them to carry out their role effectively; and (ii) to organize a network of these representatives as a forum for exchanging best practices. Chemical safety is part of the health and safety at work system.

In order to fulfil its mission in the field of ensuring health and safety at work, including chemical safety, the Association cooperates with the following stakeholders at national and EU level:

- the tripartite national Economic and Social Council, where dialogue on the proposals for regulations in the field of health and safety at work is conducted;
- the Health and Safety at Work Council, the consultative body for the Minister for Labour in the field of health and safety at work (in accordance with Article 62 of the Occupational Health and Safety Act);
- the administration of the Avgust Kuhar Foundation, which awards prizes for exceptional achievements in the field of health and safety at work;
- the network of national trade union experts for health and safety at work at the European Trade Union Institute;
- the tripartite governing board of the European Agency for Safety and Health at Work – Workers Interest Group;
- the tripartite Advisory Committee on Safety and Health at Work, Workers Interest Group; and
- the European Economic and Social Committee, the EU advisory body that professionally advises the major EU institutions (European Commission, Council of Europe and European Parliament) and for which it prepares opinions on proposed EU legislation and opinions on its own initiatives on issues which it believes should be considered.

The Association obtains information for its activities related to chemical safety in the field of health and safety at work from: (i) the European Trade Union Institute (represented in the European Chemicals Agency), the European Chemicals Agency website, the European Agency for Safety and Health at Work and CORs; (ii) its membership of the Association of Chemical Industries of Slovenia, EU Agency for Safety and Health at Work and other interest groups of workers; (iii) consultations with the Union of Associations of Safety Engineers of Slovenia; and (iv) the Clinical Institute of Occupational, Traffic and Sports Medicine.

The Association regularly carried out activities to raise awareness relating to chemical safety. All data relevant to the health and safety of workers at work are sent to its electronic network of workers' representatives for health and safety at work and are published on its website.

Such data are presented at training courses of the Association's Trade Union Academy and published in papers on health and safety at work, for example on REACH,

occupational cancer and reprotoxins. The Association has issued a pocket manual for workers' representatives for health and safety at work containing a chapter on chemical burdens in the workplace, occupational diseases caused by dangerous chemicals and personal protective gear.

The Association also manages information and awareness-raising campaigns about REACH and classification, labelling and packaging regulations in connection with chemical safety in the EU Strategic Framework on Health and Safety at Work 2014–2020 and with regard to 28 April, World Day for Safety and Health at Work.





Setting priorities in chemical safety: Intersectoral Committee for Chemical Safety and Interministerial Working Group for the Implementation of Commitments Adopted at the Fifth Ministerial Conference on the Environment and Health

On 25 July 1996, the government issued a decision establishing the first Intersectoral Committee on the Management of Dangerous Substances (now the Intersectoral Committee for Chemical Safety (ICCS)). The first committee comprised the following stakeholders: Ministry of Transport and Communications, Ministry of Health, Ministry of Defence, Ministry of the Environment and Spatial Planning, Ministry of Agriculture, Forestry and Food, Ministry of Science and Technology, Ministry of Labour, Family and Social Affairs, Ministry of the Interior, Ministry of Economic Affairs, Ministry of Foreign Affairs and the Chamber of Commerce and Industry. The task of the Committee was to harmonize the work of the competent ministries in the field of dangerous substances and to prepare national guidelines for the management of such substances.

The first Intersectoral Committee on the Management of Dangerous Substances prepared a national programme on chemical safety with action plans for the period 2006–2010, setting out the priorities agreed among all relevant sectors.

In 2010, the Parma Declaration was adopted and the National Interministerial Working Group for the Implementation of Commitments Adopted at the Fifth Ministerial Conference on the Environment and Health (Parma Working Group) was established to implement it. Since chemical safety is one of the goals of the Parma Declaration, it was decided that the ICCS would report to the Working Group. The ICCS has not, however, been active in this area since 2010.

The members of the Parma Working Group are the Ministry of Labour, Family and Social Affairs, Ministry of Economic Development and Technology, Ministry of Infrastructure and Spatial Planning, Ministry of Education, Science, Culture and Sport, Ministry of Agriculture and the Environment, Ministry of Defence, Ministry of Health and a representative of Slovenian youth proposed by the National Youth Council of Slovenia in cooperation with other youth organizations.

The Ministry of Health hosts the Parma Working Group, and CORS hosts the ICCS. The Working Group meets at least once a year. Setting priorities has been one of the most important tasks of both the ICCS and the Working Group.

The role of the Working Group is to:

- direct and supervise the implementation of tasks arising from the Parma Declaration on Environment and Health and the document *The European Environment and Health Process (2010–2016): institutional framework (54)*;
- coordinate work between various ministries and other state bodies, including local communities and the nongovernmental organizations and young people who have competence in the topics arising from those documents;
- coordinate the ministries represented, as well as other institutions within the systems of the ministries concerned.

The main directions for the Working Group are set out by the government, although its discussions can be initiated by other stakeholders such as scientific institutions, industry and nongovernmental organizations. If the proposed topic is recognized as a priority, the Working Group acts as supporting body for cooperation and coordination among different governmental sectors, with the lead taken by the relevant ministry.





Monitoring and data collection

The system for protecting human health from dangerous chemicals is based on several tiers of monitoring and data collection. The data are used to monitor the potential exposure of humans to chemicals in their environment and to provide evidence for decision-making.

The following data are routinely collected:

- environmental pollution data: air, surface waters, groundwater, soil with environment and health indicators;
- human exposure data: drinking-water, food, consumer products;
- human biomonitoring;
- human epidemiological data on the health effects of chemicals (acute and chronic poisonings, chronic and developmental diseases due to long-term exposures to low doses of chemicals);
- data for the information system for chemicals.

Environment and health indicators

The Environment Agency collects and analyses environmental and environment-related data and, based on them, develops policy-relevant and up-to-date indicators, including environment and health indicators. The indicators are prepared according to the driving forces, pressures, state, impact and responses methodological framework for integrated assessment, which describes the interactions between society and the environment and was adopted by the European Environmental Agency and developed in cooperation with WHO (55).

The set of indicators consists of 26 environment and health indicators which bring together data from different datasets from chemical and environmental to human health-related databases. Environment and health indicators take into account the health effects of determinants in the environment and environmental health such as water and sanitation, air quality, ultraviolet radiation, chemical safety, noise, human and ecosystem biomonitoring and climate change. Exposure to chemicals is clearly shown in indicators such as human exposure to particulate matter less than 10 μm in diameter (PM_{10}), drinking-water quality, human exposure to heavy metals, critical loads of nitrogen and sulfur in ecosystems, dietary intake of certain metals, dioxins in human milk, and lead in children's blood. As the indicators present a combined environment and health assessment the Environment Agency cooperates with NIPH in developing them. Human biomonitoring data are provided by CORS and by the Biotechnical Faculty of Ljubljana University, which provide data on ecosystem biomonitoring. Since environmental pollution and human health are indirectly connected to unsustainable consumption patterns, it is intended to explore in future the use of unhealthy consumer products and related exposure to chemicals in household products and appliances.

Environment and health indicators both present an input for the national report on the state of the environment and support the reporting processes for the European institutions. Some of them were included in the Slovenian part of the European state of the environment report 2010, prepared by the European Environment Agency. Environment and health indicators are also used in the national action plan for children's

environmental health in terms of monitoring progress towards the goals of the Strategy of the Government of the Republic of Slovenia for the Environmental Health of Children and Young People 2012–2020.

Environment and health indicators are published on the website of the Environment Agency (25,56). The main messages derived from the indicators are presented annually to the wider public and relevant decision-makers.

Human exposure data are monitored as follows:

- National Laboratory for Health, Environment and Food: drinking-water quality
- Ministry of Agriculture, Forestry and Food: food safety
- Health Inspectorate: consumer products safety.

National biomonitoring survey of population exposure

The national biomonitoring programme was established in 2007 and is coordinated by CORS. It includes the following chemicals: benzene, cadmium, fluoride, lead, mercury and organochlorine pesticides, and a range of polybrominated diphenyl ethers, polychlorinated dibenzodioxins, polychlorinated dibenzofurans and polychlorinated biphenyls congeners. The selection was based on national air and soil monitoring results, the toxicological hazards of chemicals, their persistence and bioaccumulation potential, the estimated size of exposed populations, analytical capacity, certain public concerns and other countries' experiences.

The results of biomonitoring will provide a solid scientific basis for assessing exposure to chemicals in the environment throughout the country. As in numerous other countries, the emergence of new and dangerous chemicals to which the public is exposed in everyday life has led to the establishment of a biobank of samples. This biobank will allow the determination of the presence of chemicals whose long-term negative consequences are unknown today, and the long-term monitoring of exposure trends.

The selection of pollutants has proved to be suitable since the majority of research studies in Europe and the world operate with data which could be compared to the results in Slovenia. In any case, it would be reasonable to add some new pollutants to the continued process of biomonitoring. Endocrine disruptors, such as phthalates and bisphenol A, are definitively among them, as are a whole series of chemicals which are used intensively in agriculture. An even better understanding and evaluation of exposure to and the potential impacts of chemicals on public health in the future will be provided by the coordinated development of human biomonitoring which is gradually being developed at the European level and in which Slovenia is participating.

CORS has regulatory and coordinating roles for both human and environmental biomonitoring, although for the time being only human biomonitoring is carried out.



CORS also plays a role in directing the preparation and confirmation of the programme, providing financial resources and designating the institutions to implement the programme. Several research and scientific institutions provide expertise and technical support to the implementation of the programme. CORS has to act on the results and, if necessary, to prepare measures in consultation with the relevant ministries.

Human epidemiological data related to exposure to chemicals

Data on health, disease and health services are collected and managed by NIPH. Mortality data and data on causes of disease are some of the most important public health statistics. Where chemical safety is concerned, data on acute poisonings and data on morbidity and mortality from diseases related to human exposures to chemicals are considered.

Poisonings by dangerous chemicals account for a very small share of all causes of death. The chronic cumulative effects of chemical factors on the health of exposed persons are thought to be much more prevalent but have only been explored to a limited extent. Two of the main reasons for this are the multiple effects of chemicals and the remote development of health outcomes, such as a reduction in sperm count in the reproductive age related to exposure to polychlorinated biphenyls early in life. In some areas where the connections between chronic exposure and the effects on health have been proved (for example, lead and neurological developmental disorders), effective measures have been taken to reduce exposure.

For an indicative overview of poisonings by chemicals, the NIPH national statistical data collection gives a brief overview of poisonings by certain groups of chemicals that required hospital treatment from 1998 to 2012 among children, teenagers and adults (Table 1). Given that, in practice, notifications of poisoning are subject to some problems (with coding, data capture, reporting discipline), these numbers are certainly an underestimate.

Table 1. Hospitalizations for poisoning by certain groups of chemicals 1998–2012 for children, teenagers and adults

Toxic effects/toxicity	Children 0–11 years	Teenagers 12–19 years	Adults 20+ years	TOTAL
Toxic effect of alcohols (excluding ethanol)	3	29	26	58
Toxic effect of petroleum products	6	0	7	13
Toxic effect of other organic solvents	9	3	15	27
Toxic effect of corrosive substances	11	2	47	60
Toxic effect of soaps and detergents	28	2	13	43
Toxic effect of metals	2	1	8	11
Toxic effect of carbon monoxide	25	30	223	278
Toxic effect of other gases	17	8	95	120
Toxic effect of pesticides	7	0	52	59
Toxicity of other chemicals	27	5	36	68
TOTAL	135	80	522	737

Information System for Chemicals

Since 2002, CORS has run the Information System for Chemicals, which is used by CORS (Chemicals Inspection), the Ministry of Environment and Spatial Planning (Environmental Agency), the Ministry of Finance (Financial Administration) and the University Medical Centre Ljubljana (Poison Control Centre).

The Information System contains the following databases:

- companies registered for the production, trade, storage or use of dangerous chemicals, including approximately 1900 companies (production and trade) with their names, addresses and types of company;
- dangerous chemical products available on the Slovenian market, including over 68 000 chemicals (substances and mixtures) classified as dangerous based on their physical, chemical, human health and environmental properties, that are produced in or imported into Slovenia (safety data sheet, partial data on composition, data on purpose of use, annual amounts) (some raw materials for medicines, oil and oil derivatives, other organic chemicals used for engine fuel or heating and ores are, however, excluded; annually, approximately 750 000 tons of these chemicals are produced domestically and 600 000 tons are imported);
- registered biocide products on the Slovenian market, including over 1850 biocide products (safety data sheet, partial data on composition and data on purpose of use).

Reporting to CORS has been by electronic means since 2014.

NevSnov database of dangerous chemical substances

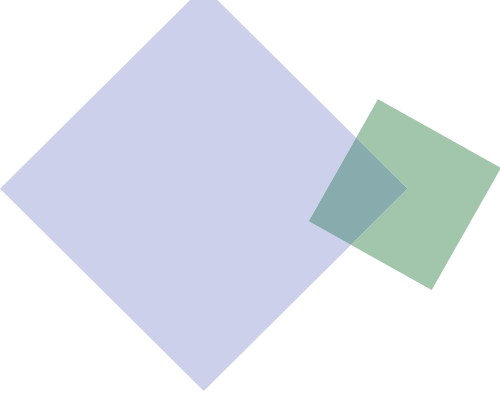
The Administration for Civil Protection and Disaster Relief of the Ministry of Defence operates the NevSnov database of dangerous chemical substances (57). This database is designed for rescue personnel, particularly for first responders during hazardous materials accidents. It contains the specific information needed for rescue services (firefighters, first aid units, policy, Poison Control Centre) and is publicly available. Currently it holds a list of 4500 substances.

The database includes four sets of information:

- basic information on chemical substances with their labelling, description of the chemical properties, symbols and pictograms according to regulation 1272/2008 of the European Agreement concerning the International Carriage of Dangerous Goods by Road 2013;
- the measures to be taken in cases of accidents with particular dangerous substances, descriptions of the hazards posed by the particular substances for the environment and public health, measures to be taken to protect the population, measures for fire control and first aid for the victims;
- technical data on chemical substances, including the hazard diamond shape, explanation of the fields of the hazardous diamond, danger for water, and standard risk and safety phrases, with explanations;
- additional information introduced or stored by users.

Owing to its specific requirements, this database is not connected with the Information System for Chemicals run by CORS.





From knowledge to action: risk assessment and health impact assessment

Health impact assessment

The first health impact assessment to be carried out in Slovenia was of agricultural policy in 2002. Since then, Slovenia has taken part in several EU research projects aiming to improve the health impact assessment methodology and promote its wider use. In the past decade a number of projects, plans and policies have been assessed using the methodology, such as wine policy, bathing water policy and regional development plans. Health impact assessments are widely used and comprehensive, and a number of experts from several disciplines, institutions and government agencies have familiarized themselves with the topic through special training courses.

A new concept of health impact assessments as part of strategic environmental impact assessments has been suggested (see below) to address the limited use of health impact assessments due to a lack of resources and, above all, the lack of legal requirements at national and regional levels. The challenge is to make health impact assessments of projects and strategic plans legally binding and to continue to promote their use.

Risk assessment

Some environmental agents can adversely affect the health of people exposed, especially vulnerable groups such as children, pregnant women and sick people. Such agents must, therefore, be recognized, characterized and managed so as to reduce the risk caused by exposure to them. Risk assessments have widely been used at NIPH for several years as tool to protect public health. The risk is characterized on the basis of the identified hazard of a certain agent, dose–response assessment and exposure estimation, and the risk assessment is conducted according to the current guidelines and internationally agreed methodology.

Risk assessments of microbiological and chemical agents are performed for foods analysed in the national monitoring programme that contain contaminants at a level above the limit value. Since 2003, risk assessments for consumers, operators, workers, bystanders and residents are routinely carried out in the national authorization process for PPP. Additionally, NIPH is involved in risk assessments for cosmetics, food contact materials and other consumer products (such as toys, textiles and furniture). An example of a risk assessment carried out in the last few years is that on buckwheat flour contaminated with alkaloids, which had an important impact on the European Food Safety Authority's scientific opinion on tropane alkaloids in food and feed (58). In recent years, significant attention has also been paid to hot spots polluted by heavy metals resulting in risk assessments for exposure to locally grown vegetables in the Celje basin and in Zasavje region (central Slovenia) (59–61).

Strategic environmental assessment and environmental impact assessment

Environmental assessments are carried out of plans and programmes that are likely to have significant effects on the environment. The purpose is to provide a high level of protection of the environment and contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes which aim to promote sustainable development. Strategic environmental assessments are used at the policy, planning and programming levels, while environmental impact assessments are used to identify the environmental and social impacts of a proposed project prior to decision-making in order to predict environmental impacts at an early stage in project planning and design.

The institution of a comprehensive environmental impact assessment was introduced with the Environmental Protection Act of 2004, on the basis of Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment (62). The implementation of comprehensive environmental impact assessments has, in many respects, changed procedures for drafting plans, programmes and spatial planning and other documents whose implementation can have a significant impact on the environment. It was expected that the procedures related to assessments would contribute to environmental protection and the implementation of sustainable development principles, but no system for verifying or monitoring the achievement of these expectations or objectives has been set up.

Accordingly, for several years, procedures have been based on normative protection and mitigation measures and have rarely contributed to the development of comprehensive and innovative solutions. The scope of environmental protection has mostly focused on requirements relating to compliance with legislation rather than the application of the as low as reasonably achievable principle. In general, the efficiency of strategic assessments and the effectiveness of comprehensive environmental impact assessment procedures have been assessed from deficient to satisfactory. Only in some cases have strategic assessments exceeded the institution of the verification procedure and the environmental suitability certificate and become an optimization activity aimed at planning activities in a way that causes the least impact on the environment. Strategic assessments are still associated with a misunderstanding of the purpose of strategic environmental assessments, leading to a number of conflict situations such as procedural complications resulting in extended time and costs, the inability to implement legitimate developmental interests, and environmentally inappropriate solutions.

There have been practically no health impact assessments, and environmental reports as a rule contain only assessments of health determinants, that is, health-related physical, chemical and microbiological environmental elements (air, water, soil, noise, electromagnetic radiation). A new concept is needed of a health impact assessment as part of a strategic environmental impact assessment that would transcend the traditional concept of the assessment of risks that environmental projects pose to human health. Such a concept would include the following key changes:

- evaluation and formal assessment of health impacts in terms of substances at the level of sectoral policies, programmes and plans;
- more intensive investigation of environmental impacts on mental and social health, not only on physical health – a shift from the biomedical model to the biopsychosocial model;

- investigation of opportunities (not just health risks) when assessing environmental impacts: examination of the processes of salutogenesis and pathogenesis;
- involvement of other stakeholders (the interested public and decision-makers) besides experts.

In the 1970s, Slovenia was one of the leading countries (pioneers) in environmental impact assessment. With the legal formalization of these activities (both EU and national), Slovenia lost its edge as it had problems with tackling environmental and development issues separately. It was only recently, when creative environmental protection (compared to conservation) became one of the main indicators of social development, that the country began to take a more prominent role in this field. The breakthrough proposals for assessing health impacts within strategic environmental assessments should be viewed in this context. Slovenia will make progress in development if it pursues optimization planning and protection while taking into account the as low as reasonably achievable principle, and lag behind if it continues to cling to normative and verification concepts.





Prevention of negative impact of chemicals on human health

Ensuring drinking-water safety

In 2013, 93% of the population was supplied with drinking-water from dedicated supply systems with the quality monitored at the point of use (the user's tap). In general, access to safe drinking-water improved slightly between 2004 and 2013. The quality of drinking-water is unknown for about 7% of the population.

Larger supply zones have adequate drinking-water quality, meaning that tap water is safe enough for drinking and preparing food. From a public health perspective, only small supply zones serving 50–1000 people (especially those serving 50–500 people, covering around 100 000 people) and supply zones with surface water (including the karst sources of drinking-water) seem to be problematic due to frequent or permanent faecal contamination. Monitoring of the drinking-water indicates occasional contamination with pesticides and nitrates. Detailed information on the distribution of substances found in drinking-water in recent years is in Annex 1.

Information on the status of drinking-water is published on the website of the Slovenian Environment Agency in the form of reports and an interactive viewer (25). Monitoring results, non-technical descriptions of data sources and the monitoring and processing methodology are published in the section on environmental indicators in Slovenia (56). Through key messages, detailed comments and graphic displays, the same system shows areas that have been declared water protection areas by municipal ordinances and government decrees in order to protect water sources (VD16 water protection areas), and analyses of drinking-water monitoring results (VD08 drinking-water quality, ZD05 access to safe drinking-water).

The requirements for the health compliance of drinking-water and the conditions to ensure it are regulated by the rules on drinking-water (63) which are harmonized with Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption (64).

Owners or operators of internal networks (such as in schools, hospitals, homes) are responsible for the supervision of drinking-water quality in the network (pipelines, equipment, devices and taps from connections to the water distribution system to the users' taps). To do this, they are obliged to perform internal water quality control based on the hazard analysis and critical control points system. If the water is not compliant, users are given expert instructions for what to do. They must be notified and informed of possible additional measures that they can carry out themselves.

The National Laboratory of Health, Environment and Food also monitors drinking-water from taps with 50 or more users. Verification of compliance of chemical parameters in drinking-water is, however, deficient in systems covering 50–500 people because testing is not carried out regularly (less than once a year or not at all).

The Laboratory also operates the database on drinking-water supply systems and drinking-water compliance. In accordance with internal supervision, an annual plan for sampling drinking-water is prepared which specifies the sampling sites, frequency of

sampling and type of testing. Health compliance and drinking-water compliance are established by testing carried out by authorized laboratories.

Most drinking-water is captured from underground karst fissured water sources. Special attention is, therefore, paid to monitoring the status of underground water bodies, which is carried out by the Environment Agency.

Ensuring food safety

A safe food supply, which does not endanger the health of consumers through chemical, biological or other types of pollutants, is the foundation of a healthy diet and an important health protection factor of public interest.

The tasks of the state are: to enforce the appropriate regulatory and supervisory measures to ensure that all entities in the food chain operate effectively; to recognize risk promptly; to manage risk responsibly and effectively and to communicate with consumers in a comprehensible and appropriate manner. It thereby ensures the protection of consumers and their basic rights to safety, the provision of information and choice.

By taking a comprehensive approach to food safety in the food chain from farm to fork, the following main areas comprise food safety in the broadest sense: plant health care, the safety of fodder, animal health care, the protection of animals and safety of foodstuffs.

The fundamental legal framework for ensuring safe food in the EU is Regulation (EC) No. 178/2002, which lays down the general principles and requirements of food law and procedures in matters of food safety and establishes the European Food Safety Authority (65).

The competent authorities for preparing legislation are the Ministry of Agriculture, Forestry and Food with an affiliated body the Administration of the Republic of Slovenia for Food Safety, Veterinary and Plant Protection, and the Ministry of Health. The Ministry of Health prepares legislation on food safety in relation to materials contacting foodstuffs, food supplements and foodstuffs for particular nutritional or health uses. The Ministry of Agriculture, Forestry and Food is responsible for preparing legislation on food and fodder hygiene, pollutants, additives, enzymes, aromas, radiated foodstuffs and fodder, radioactive and microbiological pollution of foodstuffs and fodder, new foodstuffs, genetically modified organisms, labelling of foodstuffs, enriched foodstuffs, vertical legislation, protection of agricultural products and foodstuffs, official supervision laboratories and monitoring.

The operators of food businesses are obliged to implement the requirements of food legislation at all stages of the production chain to ensure food safety and are also primarily legally responsible for ensuring food safety. They cooperate with the competent authorities, while also ensuring that all production plants under their control are registered.

Official supervision in the food chain is carried out by inspectors from the relevant competent bodies, who verify the implementation of procedures based on the hazard analysis and critical control points principles and check that food is properly labelled and its composition is in accordance with the regulations. The wholesomeness of food is regularly checked through sampling for laboratory analysis. Proper presentation or advertising is verified through the monitoring of public media.

Health inspectors conduct official control of foodstuffs in the field of food supplements, foodstuffs for particular nutritional purposes (baby formulas, cereal-based foods and baby foods for infants and young children, food intended for use in energy-restricted

diets for weight reduction, foods for special medical purposes, food intended for athletes, gluten-free foods, and food with a reduced content of sodium or salt), materials in contact with foodstuffs and drinking-water.

Competent inspectors conduct reviews directly on site, where they verify the current situation to establish whether there are potential violations of legislation or measures are not being implemented and the possible consequences for human health. In addition to inspections in food processing facilities, the competent inspector also takes samples of foodstuffs and fodder which are then analysed by official laboratories.

Official supervision consists of the following activities:

- preparation of an annual sampling programme;
- planning of sampling in branch units;
- sampling, transport and confirmation of receipt of samples of foodstuffs by official laboratories;
- preparation of samples for laboratory tests and analyses;
- assessment of conformity of samples with the regulatory framework;
- risk assessment and evaluation of safety, if necessary;
- sending of reports on the results of laboratory tests to the competent inspectors;
- determination by the inspectors of appropriate measures, if necessary.

Guaranteeing the safety of food in today's complex world is an important task that can be successful only if all sectors contribute to it, including food production companies, the government, inspectorates and consumer organizations. This is described by WHO as shared responsibility.

Occupational safety: Clinical Institute of Occupational Medicine

The health and safety of workers exposed to chemicals is regulated by the Occupational Health and Safety Act and the Regulation on Occupational Exposure Limit. Specialists in occupational medicine and safety engineers carry out risk assessments, including of measures to reduce exposure to chemicals at the workplace, and perform periodic check-ups with the aim of evaluating the possible consequences of exposure to chemicals on workers.

The Clinical Institute of Occupational Medicine at the University Medical Centre, Ljubljana, is deeply involved in occupational safety activities and works for chemical safety in the following fields:

- health promotion at the workplace, by organizing a 100-hour teaching course entitled Fit for Work which includes a module focusing on prevention of exposure to chemicals; participants mainly come from companies producing or using chemicals;
- occupational toxicology, through research and regular practice (for compliance) to check the health of workers occupationally exposed to chemical hazards, and through cooperation with the safety engineer in risk assessment analyses to assess exposures to chemicals and associations between such exposures and adverse effects on workers' health or diseases;
- occupational and environmental epidemiology, to research the consequences of past exposure to chemicals, to follow the precautionary principle and to raise public awareness of the possible consequences of exposure;

- education on chemical safety through seminars and conferences in Slovenia and abroad;
- acquisition of information about exposure to chemicals by workers and the effects on their health or diseases through interviews and medical check-ups.

To perform these activities, the Institute cooperates with: the University Medical Centre Ljubljana and Centre of Clinical Toxicology; the Faculty of Medicine of the University of Ljubljana, Institute of Biochemistry; the Institute of Oncology in Ljubljana; NIPH; and the University of Massachusetts, Lowell, United States of America.

The Institute also carries out awareness-raising activities such as:

- information for workers and management during site visits, risk assessment analyses and reports about workers' (occupational) health status after medical check-ups;
- the Fit for Work health promotion programme;
- strengthening involvement of the media;
- public campaigns about environmental exposure to substances such as asbestos;
- activities in parliament to change legislation (for example, on the free collection and storage of asbestos waste material);
- lectures for organizations such as trade unions, small and medium enterprises and chambers of commerce.

Contaminated sites

Some areas of the country are excessively polluted, which can present an unacceptable health risk. The source of pollution is in most cases previous or current industrial or mining activity, agriculture or transport. The most polluted areas include the Upper Mežica Valley (contaminated soil – lead, toxic metals), the Celje area (polluted ground – toxic metals), the Zasavje region (polluted air), the surroundings of Jesenice (polluted air, ground – toxic metals), the Idrija area (polluted ground, increased values in animals and plants – mercury), the Prekmurje region and other areas of intensive farming (pesticides and nitrates in drinking-water) as well as major cities (PM₁₀ particles in ambient air). When discussing measures in the polluted areas, other factors affecting human health besides the environment, including personal characteristics, lifestyle and social, economic and psychological factors, should be taken into consideration. Thus assessments of the risk to health of environmental risk factors should be considered within the scope of a more extensive social environment.

In one of these areas (the Upper Mežica Valley) a remediation programme is already being implemented based on strong scientific arguments of the presence of high levels of lead in children's blood. In others (Zasavje) more detailed environmental monitoring and action programmes are being prepared. There are, however, areas where either no data have been collected on environmental pollution or the pollution of foodstuffs produced in these areas, or such data are not available to the public. For some time, consideration has been given to drafting a systemic act on the remediation of excessively polluted areas which would regulate this issue and serve as the umbrella for action in all polluted areas. Currently the Environmental Protection Act, Article 24, determines the so-called degraded areas and action to be taken in such cases. The determination of polluted areas and the establishment of rehabilitation programmes and other measures to prevent further pollution is also an objective in the Strategy of the Government of the Republic of Slovenia for the

Environmental Health of Children and Young People 2012–2020, based on the Parma Declaration.

The Parma Working Group should prepare a list of polluted areas and propose a systemic approach to improving the situation in these areas, including classification with regard to health risk levels, and appropriate proposals for further measures. Such measures do not necessarily have to comprise remediation: they can merely include other methods of risk management, risk assessment preparation or additional collection of data on the status of the environment or population health.

During negotiations for the SAICM Global Plan of Action (66), Slovenia was one of the advocates for integrating activities relating to contaminated sites (activities 47, 48 and 243), including the following progress indicators.

- Contaminated site remediation plans are developed for all contaminated sites in all countries.
- Mandatory remediation of contaminated sites is included in national legislation in all countries. Contingency plans for handling accidents involving chemicals are put in place.
- Infrastructure for analysing and remediating contaminated sites is established in all countries.
- Training programmes in the rehabilitation of contaminated sites are developed and implemented in all countries. International technical and financial assistance is provided to developing countries and countries with economies in transition.



Management of chemical emergency situations

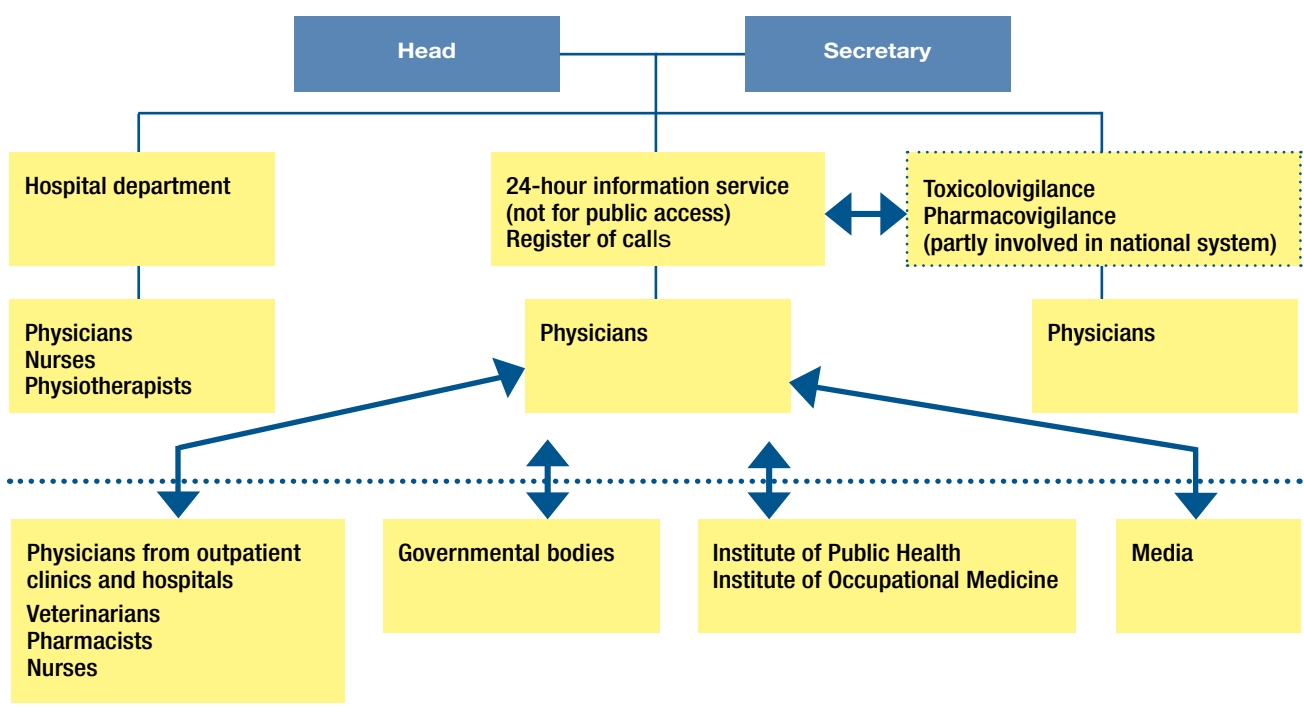
Approximately 350 000 tonnes of various hazardous materials are present in the country, 95% of which are liquids, 4% solids and only 1% are substances in the gaseous state. Inflammable substances make up some 85% and comprise primarily liquid inflammable substances (petroleum and petroleum products). Acids occur mainly as hydrochloric, sulfuric and nitric acids. Bases and alkalis most often appear in the form of sodium hydroxide. Long practical experience shows that more than 90% of hazardous materials accidents can be attributed to petroleum products. Firefighters respond annually to 600–700 accidents involving hazardous materials and environmental pollution.

Poison Control Centre

Formally established in 1973 as one of the first institutions of its kind in the Balkan region, the Poison Control Centre at the University Medical Centre Ljubljana focuses particularly on the treatment of acute poisonings and on poisoning prevention activities, corresponding to WHO recommendations.

The Poison Control Centre provides professional support to all physicians in Slovenia for the outpatient treatment of poisonings. All important data are reported daily and collected in a register of calls (Fig. 4). The crucial point in the flow of information is the 24-hour information service, which is primarily designed for medical staff. This system

Fig. 4. Structure of the Poison Control Centre



enables the staff to react quickly to warnings and to take preventive measures in cases of important acute exposure. The Centre is also included in international chains of rapid informing systems.

All poisonings with dangerous industrial chemicals, PPP, biocidal products and any other chemicals for general use, medications, alcohol, or from mushrooms and other poisonous plants and animals that take place in the central region and a great proportion of the other regions are treated in the Centre's hospital.

In order to ensure the successful treatment of poisonings in all hospitals, the Centre:

- provides a 24-hour information service;
- carries out regular training for physicians in the field of clinical toxicology;
- prepares, edits and updates policy and guidelines for the treatment of poisonings;
- prepares instructions and diagrams for the rational purchase of antidotes for the entire country;
- is actively involved in the development of modern human toxicology and provides professional support to other institutions on issues in this area;
- is active in the field of poisonings prevention; a prerequisite for the preparation and implementation of effective preventive programmes is good epidemiology of poisonings, an example being the adaptation by the relevant authorities, on the basis of the register of calls, of the selling regime for corrosives and some PPP.

The rules on reporting poisonings adopted in 2000 oblige all physicians and public health care personnel who treat poisonings to report them to the Centre (rules on reporting, collecting and arranging data on poisonings in the Republic of Slovenia).

Data are obtained from the register of calls, which is part of the 24-hour information service, and from the NIPH register. In the register of calls poisonings are classified with regard to agent in 10 main groups, plus unknown, that are detailed in up to four further levels. The NIPH register classifies poisonings according to the *International classification of diseases* (67).

The Poison Control Centre is involved in the system of chemical vigilance, which is part of toxicovigilance and a key tool in chemical safety necessary for the close monitoring of chemicals throughout their life-cycle, especially those chemicals that are in broad general use.

The Centre is actively involved in education programmes for professionals and the public, especially among the more vulnerable populations (young children, teenagers, workers and elderly people), and cooperates with the media in shaping public opinion on the impact of chemicals on human health and in propagating the importance of preventive management with dangerous chemicals.

Experts from the Centre are also involved in one of the most critical points in the health sector: medical preparedness and response to chemical incidents (Box 1). The management of individuals poisoned or exposed to dangerous chemicals requires special organizational and professional skills, because many incidents involving chemicals pose a threat to the rescuers as well as the possibility of dissemination. The main principles for rescue activities for chemical incidents are similar to those for all other types of incident, but there are some essential special requirements for the management of chemical incidents by rescue workers. Experts from the Centre have prepared guidelines and protocols for medical responses to chemical incidents (including major incidents), which are harmonized at intersectoral level to include firefighters, the police and emergency medical services.

Box 1. Training in response to emergencies

An interesting educational and training programme, which enables knowledge evaluation, has been developed by Slovenian experts. Because of its simplicity and flexibility it could be adapted to other systems.

In 2014, the Poison Control Centre started running two-day courses. The participants (physicians and nurses from pre-hospital and hospital emergency units) are introduced to the subject through lectures about hazard recognition/risk assessment, the use of personal protective equipment, the decontamination of contaminated victims and the management of toxic trauma. A presentation on the guidelines and short workshops (on personal protective equipment, decontamination, triage) are included.

A crucial part of the programme is the simulated scenario of a chemical incident (release of organophosphates or carbon monoxide), done through white magnetic board play. The core element is 200 magnetized patient cards. One side presents all patient details (general data, vital functions, signs and symptoms of poisoning or injuries, degree of contamination/proximity to the contamination source); the other shows information for instructors (poisoning severity score, trauma severity score, management-time checklist, toxicodynamics of poisoning signs and symptoms). The participants play with realistic personal numbers and material resources (the amounts of atropine and oximes at the beginning were limited). The timeframe for operating procedures is also realistic.

The crucial element is the analysis of the exercise. This starts with a short briefing from each station in the scenario: pre-hospital units (evacuation, decontamination, primary/secondary triage, transport), dispatch centre, regional command centre, hospitals. Special attention is given to analysing the cards for deceased patients in view of the potential for saving those lives. The success rate of the course is also evaluated by comparing written tests at the beginning and end. Participants in the two courses carried out in 2015 considered them advantageous and interesting, and there is great interest among emergency medical staff for further such education and training.

Role of Ministry of Health in chemical emergencies

The role of the Health Care Directorate, the Department for the Development of Health Care, at the Ministry of Health in chemical safety is mainly in ensuring disaster preparedness through providing relevant professional guidelines and instructions for health professionals, activities relating to the education of health professionals for appropriate action, equipping them to intervene in such accidents, and planning action to handle and respond to chemical emergencies, with an emphasis on emergency medical services in the pre-hospital and hospital health care. In four key areas, namely personal protective equipment, decontamination, sampling and identification of dangerous substances and treatment of toxic injuries/poisoning, the Ministry of Health collaborates with domestic institutions and experts.

In 2014, the Department for the Development of Health Care in the Ministry of Health, in cooperation with local stakeholders and experts, organized for the first time two educational training simulations for health professionals in the response to chemical accidents. These courses comprised theoretical and practical elements in a command post exercise with the aim of raising awareness especially about the above-mentioned four areas which specifically characterize chemical accidents (personal protective equipment, decontamination, identification of dangerous substances and treatment of toxic injury). The Ministry invited representatives of other departments present at chemical accidents (inspectors of health and safety at work dealing with occupational accidents with dangerous materials, fire fighters, police officers) to participate.

System for the prevention of major accidents involving dangerous substances and for the limitation of their consequences

The Ministry of the Environment and Spatial Planning and the Ministry of Defence, Administration for Civil Protection and Disaster Relief are the main national authorities for the prevention of major accidents involving dangerous substances and for the limitation of their consequences (68).

Likewise legislation covering the prevention of, preparedness for and response to major accidents falls under two headings: environmental legislation covering prevention and emergency preparedness, and civil protection legislation covering preparedness and response of the control system for major accidents. In practice, major accident hazards are managed by two control systems run by the environmental authorities and the civil protection authorities.

Environmental authorities carry out the environmental control system, which in practice means that competent authorities have established control over activities where certain dangerous substances are handled, used or produced in such quantities that a major accident could occur during their operation. This environmental control system is composed of two main elements: the permits system, which requires operators of activities with the potential for major accidents to obtain an environmental permit and to operate in line with it, and inspection controls, through which activities with a major accident potential are subject to systematic inspections.

The civil protection authorities are responsible for the system of protection from disasters under which emergency preparedness and response to industrial accidents are managed. This system is composed of three elements:

- preparation of on- and off-site emergency plans at local level, which requires operators to develop on-site emergency plans and to ensure they are coordinated with the (off-site) emergency plans of local communities;
- rescue and relief elements, under which rescue and relief teams and units are organized, equipped and trained;
- inspection controls in establishments and local communities related to the preparation, review and testing of emergency plans and to the organization, equipment and training of rescue and relief units.

In view of growing public interest in how the risks of a major accident are controlled, it is crucial for the functioning of such a system that the competent authorities cooperate with industry representatives as well as with civil society.

The role of the Administration for Civil Protection and Disaster Relief in management of chemical emergencies

The Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (ACPDR) is a constituent body of the Ministry of Defence. It carries out administrative and professional protection, rescue and relief tasks as well as other tasks regarding protection against natural and other disasters.

Disaster management system is one of the three pillars of the national security system which also encompasses protection, rescue and relief activities. The aim of the system is to reduce the number of disasters and to forestall or reduce the number of casualties and other consequences of such disasters. Natural and other disasters cost the nation on average more than 2% of gross domestic product.

The danger of environmental disasters is increasing due to urbanization and industrialization. Contemporary threats from the transport of increasing amounts of hazardous materials, outbreaks of contagious diseases and terrorism are also significant. The predominant issue is chemical safety.

In Slovenia, more than 1000 firefighters are members of 43 fire units of wider importance, equipped and trained to respond to accidents involving hazardous materials and radiological, chemical or biological threats. Permits for responding to this type of accident are granted by ACPDR.

The units are divided into three categories with various levels of equipment. Their size is based on the risks in hazardous materials and ACPDR's commitment to ensure a response within 15 minutes. Given the mountainous terrain, dispersion of the chemical industry and high density of the road network, this can be regarded as an important achievement that is envied by a number of more developed countries.

Equipment, response procedures and training are harmonized with the international system: recognize, isolate, safe, clean. Owing to the increasing quantity of chemical substances and products used, produced, transported and stored on a daily basis, there is a growing need for appropriate equipment.

Personal protective equipment includes head protection with helmets and helmet-mounted eye protection systems, respiratory protection devices, protective masks or insulated breathing apparatus, gloves, body protection with appropriate firefighter suits of the relevant category (1–4) and boots. The equipment is selected on the basis of the physical and chemical features of hazardous materials and their effects on human health. The complete outfit includes kits for the detection, identification, sealing, pumping, absorption, neutralization and clean-up of hazardous materials.

With a view to ensuring radiological, chemical and biological safety, ACPDR has established good cooperation with several domestic institutions such as the Jožef Stefan Institute; NIPH regional division Maribor; the chemical products plant TKI Hrastnik, d.d.; the University of Ljubljana Veterinary Faculty, Microbiology and Parasitology Institute; University of Ljubljana, Faculty of Medicine, Microbiology and Immunology Institute; National Institute of Biology; Institute for Health and Safety at Work; and Environment Agency. The national system for protection against natural and other disasters also involves units for radiological, chemical and biological protection in the framework of civil protection. In order to manage large-scale accidents, ACPDR has also signed cooperation agreements with various faculties, institutes and other organizations.

Internationally, ACPDR has established contacts with the North Atlantic Treaty Organization, the Organization for the Prohibition of Chemical Weapons, the International Atomic Energy Agency and the International Association of Fire and Rescue Services, and has excellent cooperation with the Swedish Civil Contingencies Agency.

The Training Centre for Civil Protection and Disaster Relief provides basic and advanced training courses for all bodies involved with chemical safety within the System of Protection against Natural and Other Disasters. The lecturers and instructors on these courses gain their knowledge from Slovenian faculties and institutes, attendance at international seminars and exchanges of experience with Swedish firefighters on the basis of bilateral cooperation with the Swedish Civil Contingencies Agency.

Information for raising public awareness and for the population during hazardous materials accidents can be found on the ACPDR website (69).

Until 2014, Slovenia was one of the few European countries without any proper definition of and system-wide regulation for the decontamination of wounded and injured persons. ACPDR has now developed a concept according to which stations designated for decontamination of wounded and injured persons are located at fire units of wider importance in Maribor, Kranj, Koper and Novo Mesto. The basic idea is that emergency medical aid ambulances are used only for the transport of pre-decontaminated persons injured in accidents involving hazardous materials, thus ensuring that all other ambulances and hospital emergency units remain uncontaminated.

During accidents involving hazardous materials and items, decontamination must be provided for both contaminated injured persons and firefighters. Fire crews have been supplied with the hand-held portable decontamination system (PSDS/10). Decontamination is carried out with the use of the universal decontamination and detoxification substance BX 24, which can be used with radiological, chemical and biological contaminants. The major advantages of such kits are their universal and simple use, size and mobility. Another important aspect is the fact that the armed forces use exactly the same decontamination kits and decontaminants, which could be very helpful during large-scale disasters where firefighter units are augmented by chemical, biological, radiological and nuclear units of the armed forces.





Activities to raise public awareness

Awareness-raising among the public is an important activity of those governmental, nongovernmental and private organizations that in any way deal with the provision of chemical safety and protection of public health. CORS and NIPH play an important role in awareness-raising among professionals and the general public.

The National Education Institute, in cooperation with CORS, organizes an annual conference entitled Chemical Safety for All which addresses different aspects of chemical safety – education, interventions, health/environment monitoring, risk assessment and decision-making.

In 2000, the project Watch Out – Use Safely was designed to teach children about the meaning of pictogram warnings on the labels of everyday hazardous household products. The activities are based on direct education and training, using a specially prepared approach for children on how to recognize a hazardous household chemical product and what to do if they encounter such products.

The NIPH website is regularly upgraded with comments and chemical safety issues from the public and other interested groups. The results of NIPH's work are also communicated with the scientific and professional community through papers, publications and presentations. Experts prepare advice related to the safety of consumer products, food contact materials and nanotechnology, articles for the web journal *eNBOZ* (34), presentations, workshops and educational and promotional materials. These experts also cooperate with journalists on television and radio and in the newspapers. The target audiences are the general public, relevant industrial concerns, importers, retailers and teachers throughout the education system.

National awareness-raising and education activities aimed at professionals and the general public include:

- publications in professional journals
- active participation in national symposia and conferences
- information published on the website
- well-established and regular communication with the media.

In the particular case of the drinking-water supply, awareness-raising among key stakeholders in decision-making is carried out through material on the website, which features instructions, recommendations, opinions and the results of expert meetings and workshops so as to influence the establishment of positions in professional and interdepartmental meetings with the aim of protecting and conserving sources of drinking-water.

Besides NIPH, the Jožef Stefan Institute raises awareness of chemical safety through lectures in secondary schools (Maribor, Celje, Ljutomer, Postojna) and faculties of the University of Ljubljana (Physics, Mechanical Engineering and Textile Technology) and at national and international meetings and conferences. The experts also give interviews with the media.

Awareness-raising activities are also carried out by CORS. The campaign *Kemijskovaren* [*Chemically Safe*] is one example of public awareness and there are many regular activities in cooperation with industry to raise awareness. The obligation on companies to have chemical consultants can be also seen as an awareness-raising activity.





Addressing new and emerging issues

Nanotechnologies

Nanomaterials present new challenges in understanding, predicting and managing potential health risks. There is no special legislation in the field of nanotechnology in Slovenia which would differ from the European legislation. Nanosafety is covered only by CORS, which launched the website Nanoportal (70) in 2014. The portal supports a basic database of researchers who are experts for individual nanomaterials.

In the field of nanosafety, the Jožef Stefan Institute is active in informing the general public and experts on the results of their own and other research in this field. The Institute has two specialized detectors for detecting nanoparticles in the air (from a total of three in Slovenia; the third one is at the Institute of Chemistry), one of which is the only one operating without a radioactive source and is suitable for measurements in indoor spaces, production premises, laboratories, schools and hospitals.

The Institute has been conducting a public dialogue in the field of nanosafety since 2007. In cooperation with CORS, it is working on the creation of the Nanoportal and, in 2009, produced the book *Nanoparticles and nanosafety* (71) and two brochures: *Nanoparticles and security* (72) and *Fireworks and other fun. Fireworks poison atmosphere* (73). A press release was also issued on this topic (74).

In 2014, experts from the Institute published a scientific article on the extensive pollution of air with barium-iron oxides and barium-aluminium oxides which are released into the atmosphere by the burning of sparklers during children's entertainments (75). They determined that as much as 10% of metals forming the active substance are released into the atmosphere. Total concentrations of nanoparticles amounted to 350 000 nanoparticles/cm³ of air.

Experts from the Institute conducted measurements during the production stage in three medium-sized companies and prepared recommendations for the improvement of air quality in the work environment. In one of the companies, the proposed improvements in the production processes contributed to an 8% reduction in technological waste, that is, there were economic benefits in addition to the cleaner air. A graduate student of the Faculty of Medicine of the University of Ljubljana participated in the measurements which took place in the laboratories of the Clinic of Stomatology in Ljubljana and received a Prešeren student award for her work in December 2014.

So far, the Institute has given presentations on the working of the nanoparticle detector at meetings of labour inspectors (2012) and safety engineers (2013), the third meeting on chemical safety (2014), a meeting of representatives of the Slovenian and Austrian metal industries at the Chamber of Commerce and Industry of Slovenia (2013), Innovation Day (2013) and an international symposium on environmental protection (2011).

Pharmaceuticals in drinking-water

Within a research project, the National Laboratory of Health, Environment and Food has identified the occurrence of pharmacologically active substances and their residues in the water cycle and water supply system of the municipality of Maribor

(groundwater, surface water, drinking-water, wastewater). Residues of such substances were found in samples from all components of the water cycle. Five pharmacologically active substances (carbamazepine, caffeine, acetaminophen, sulfamethoxazole and theophylline) have been found in samples from different parts of the water cycle. For a more accurate assessment of the current situation, more measurements at several time intervals (taking into account different water levels) should be taken, including of other pharmacologically active substances and measurements of them in sediment as well as measurements of the inlet and outlet of the water treatment plant. The survey was one of the arguments for the inclusion of pharmacologically active substances in emission monitoring in Maribor and in the Murska basin (within the Murman project). In 2015, together with the municipality of Maribor, the National Laboratory also monitored pharmacologically active substances in the wastewater (inflow and outflow) of the Maribor central wastewater treatment plant. Monitoring of such substances or their residues and assessment of the risk to human health and the environment are included in an ongoing three-year project.

Endocrine-disrupting chemicals

Responsibility for the regulatory activities concerning endocrine-disrupting chemicals is shared between the Ministry of Health and the Ministry of Agriculture, Forestry and Food. The public health aspects of endocrine-disrupting chemicals are dealt with by NIPH as one of its priority activities. The University Clinical Centre Ljubljana (Department of Human Reproduction, Institute of Medical Genetics, adult and paediatric Departments of Endocrinology, Diabetes and Metabolic Diseases and the Poisons Control Centre) takes care of the clinical aspects. Research projects involving endocrine-disrupting chemicals are carried out in various university departments and research institutes; the results of research projects are not, however, systematically used in the decision-making process. Most of the named stakeholders are also involved in teaching and communication to professionals and the general public. Nongovernmental organizations, such as the Slovenian Society of Toxicology, the Society for Toxicological and Medical Knowledge Promotion and the Consumers Association, also participate in surveillance, education and communication. NIPH experts are actively involved in international bodies dealing with endocrine-disrupting chemicals (in the EU, WHO and the Royal Society of Chemistry).

In April 2015, the Slovenian Society of Toxicology organized a two-day congress on endocrine-disrupting chemicals, from molecule to man, bringing together the Slovenian professionals from various spheres involved in this field. The results of predominantly national investigations into the endocrine-disrupting effects of these chemicals on humans and other organisms, the results of basic research, the testing methods, the legislation and the EU strategy were presented (76).

The national human biomonitoring programme includes measurements of the following endocrine-disrupting chemicals: cadmium, lead, mercury, organochlorine pesticides, and a range of polybrominated diphenyl ethers, polychlorinated dibenzodioxins, polychlorinated dibenzofurans and polychlorinated biphenyl congeners.

Climate change and chemicals

Climate change may alter human chemical exposure by changing how chemicals move and transform in the environment and by changing where and how they are used. A country's efforts to provide chemical safety and to implement chemical management decisions and pollution prevention programmes to minimize exposures could be

affected by changing environmental conditions related to extreme weather events (such as spills of stored chemicals during a flood or evaporation of chemicals during a fire caused by heat and draught) or changing patterns of chemical use (for example, changing pressure from pests can affect the use of agricultural chemicals).

The issue of the effects on health of chemicals coupled with climate change is a very complex one. Humans are exposed not just to one substance but to many of them, and to a variety of other risks to health in addition to chemicals. Climate change may magnify toxic chemical dangers.

Challenges in protecting human health resulting from a changing environment due to climate change are in the areas of:

- proactive and vigilant emergency preparedness (because more frequent natural disasters can be expected), with continuous improvement of the system for emergency response;
- ensuring that information reaches the people affected quickly and securely;
- multisectoral cooperation in identifying, mapping and cleaning out hot spots (dumps or degraded land contaminated by dangerous chemicals of industrial or rural origin) to prevent their possible release by intense rainfall, floods or mudslides in the context of intense rainfalls events being projected to increase with climate change;
- climate change mitigation and adaptation measures that will protect and promote human health, including healthier ways of living (active transport, consumption of locally produced food, sustainable and moderate use of consumers products, use of natural home cleaning products, chemical pollution);
- epidemiological surveillance, toxicological risk assessment and exposure assessment due to events related to climate change, and active involvement in planning environmental and biomonitoring of chemicals important to assess the exposure of population.

In facing these challenges, the role of the health sector is to provide scientific evidence and to advocate for human health in negotiations across governmental sectors and at international level.

From 2009 till April 2012 the Government Office of Climate Change reported directly to the government and had direct access to all relevant sectors. This Office prepared a draft of an all-inclusive national climate change strategy (Strategy for the transition of Slovenia to a low carbon society by 2050) for adoption at the beginning of 2012. The strategy has not, however, been adopted; instead, the Office was abolished at the beginning of 2012 and its responsibilities moved to the Ministry for the Environment and Spatial Planning.

Activities related to the climate change issues in the Parma Declaration are the responsibility of the Parma Working Group. The Group's duties are the planning and implementation of policies and action to reduce exposure to harmful environmental factors. This Group prepared the Slovenian Strategy for the Environmental Health of Children and Young People 2012–2020, which was adopted by the government in December 2011. This strategy contains some climate changes issues, but much more needs to be done in order to tackle this issue in a relevant way.





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Annex 1.

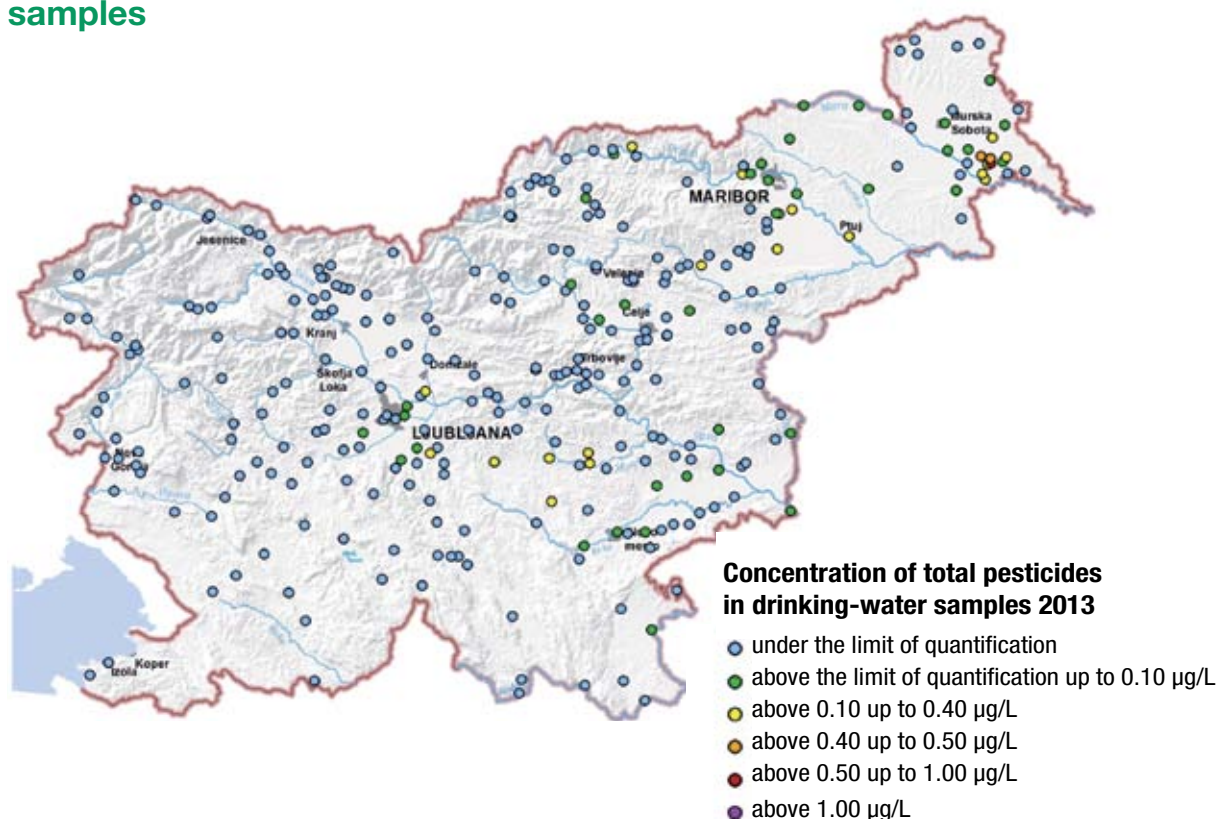
Substances found in drinking-water and groundwater

The information for the figures and maps in Annex 1 is derived from the environmental health indicators of the National Laboratory of Health, Environment and Food and the Environment Agency.

Drinking-water

Fig. 1.1 and 1.2 show the situation as regards concentrations of pesticides in drinking-water samples from 2004 to 2013. In 2013, the presence of atrazine and, above all, its metabolite desethylatrazine, was determined in addition to metholachlor, bentazone and terbuthylazine. In individual water samples metalaxyl, desetylterbuthylazin, propazine, isoproturon and 2.4 dichlorobenzamide were found. Concentrations of atrazine as well as its metabolites in groundwater and, consequently, drinking-water still tend to

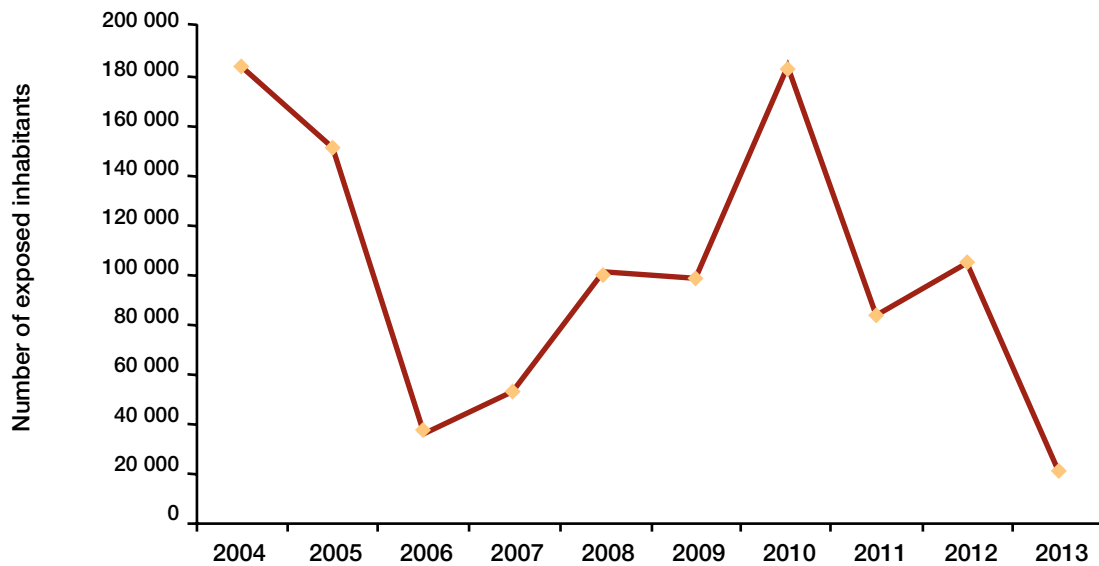
Fig. 1.1. Trends in concentrations of all pesticides in drinking-water samples



Source: NLZOH, ARSO, GURS, 2014. Authors: Ivanka Gale, Katarina Bitenc, NIJZ. Cartograph: Nika Zupan, Urška Kusar, SMS ARSO. This indicator is adapted from Environmental Indicators in Slovenia, http://kazalci.arso.gov.si/?data=home&lang_id=94

decrease. The concentrations of atrazine or desethylatrazine measured were on average (median value) below 0.05 µg/litre, but in some samples concentrations exceeded 0.1 µg/litre. This is a result of the influence of many factors such as hydrological and meteorological conditions and soil characteristics. The available data show that the use of preparations based on atrazine has not been registered in recent years.

Fig. 1.2. Population exposed to concentrations of pesticides above the legal limit in drinking-water,^a 2004–2013, Slovenia

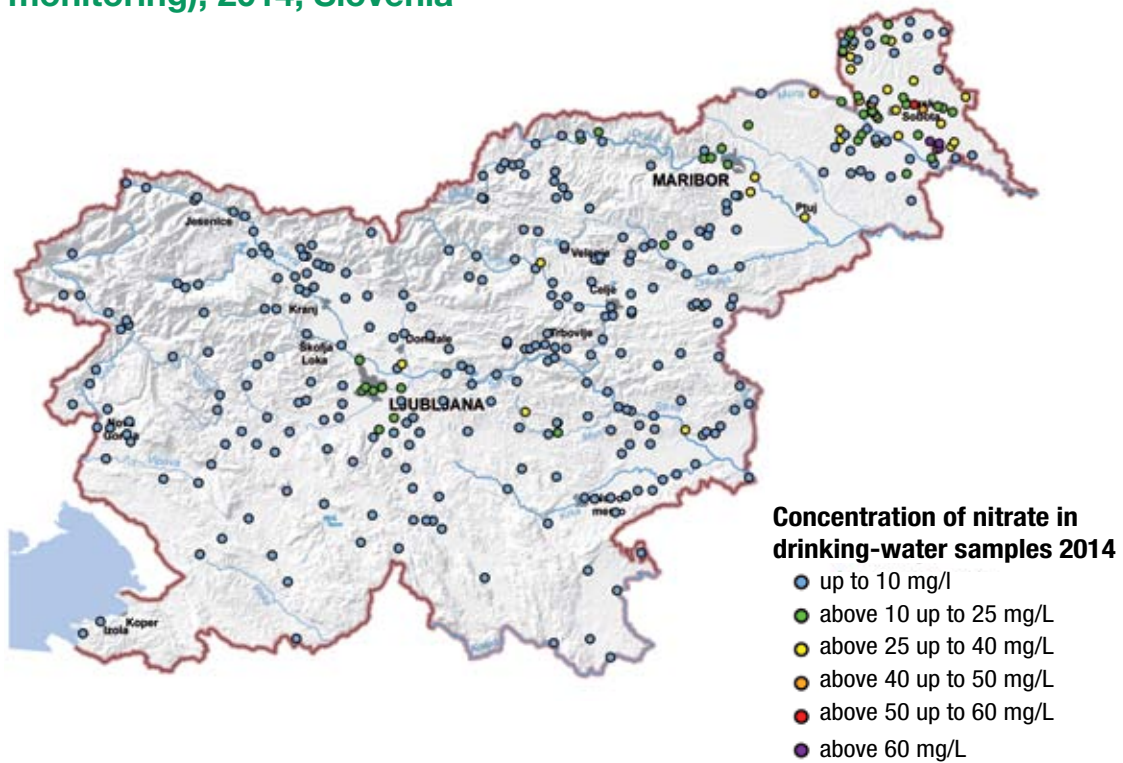


^a The limit value for pesticides in drinking-water is 0.10 µg/litre.



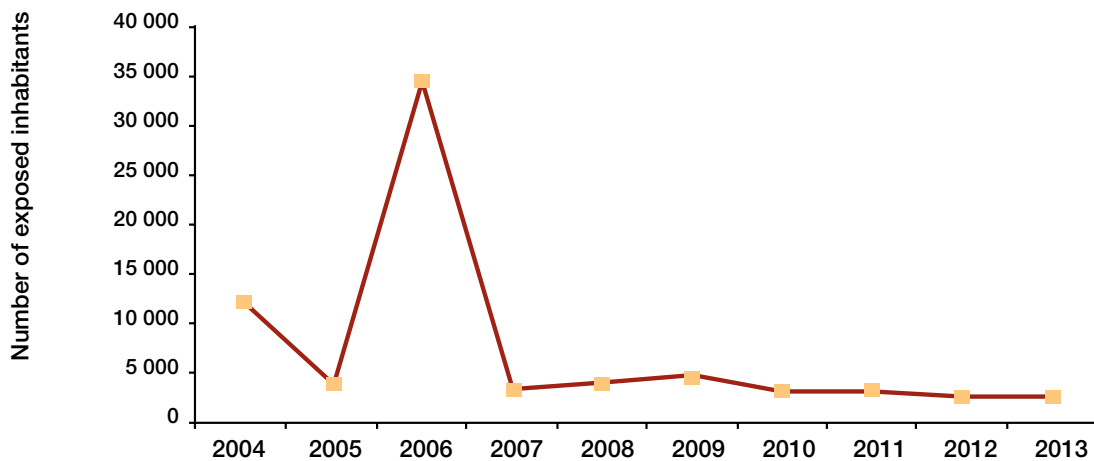
Elevated values of nitrate content in public drinking-water supply systems mainly appear in the areas of Podravje and Pomurje and, to a smaller extent, in the Spodnjeposavska and Osrednjeslovenska statistical regions (Fig. 1.3 and 1.4). Special attention is required in geographical areas with measured concentrations of over 25 mg/litre nitrate. It should be noted that the natural background of water sources in Slovenia is below 10 mg/litre nitrate.

Fig. 1.3. Concentration of nitrate in drinking-water samples (audit monitoring), 2014, Slovenia



Source: NLZOH, ARSO, GURS, 2014. Authors: Ivanka Gale, Katarina Bitenc, NIJZ. Cartograph: Nika Zupan, Urška Kusar, SMS ARSO. This indicator is adapted from Environmental Indicators in Slovenia, http://kazalci.arso.gov.si/?data=home&lang_id=94

Fig. 1.4. Population exposed to nitrate concentrations above the legal limit in drinking-water,^a 2004–2013, Slovenia

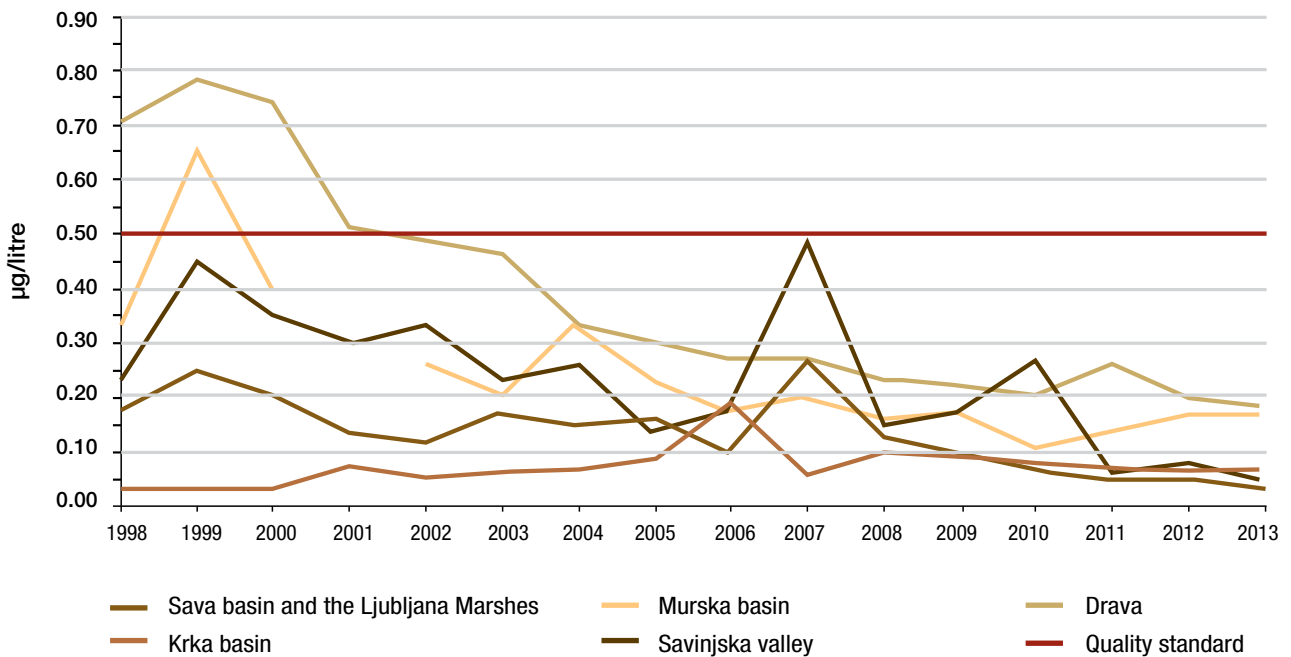


^a The limit value for nitrate in drinking-water is 50 mg/litre.



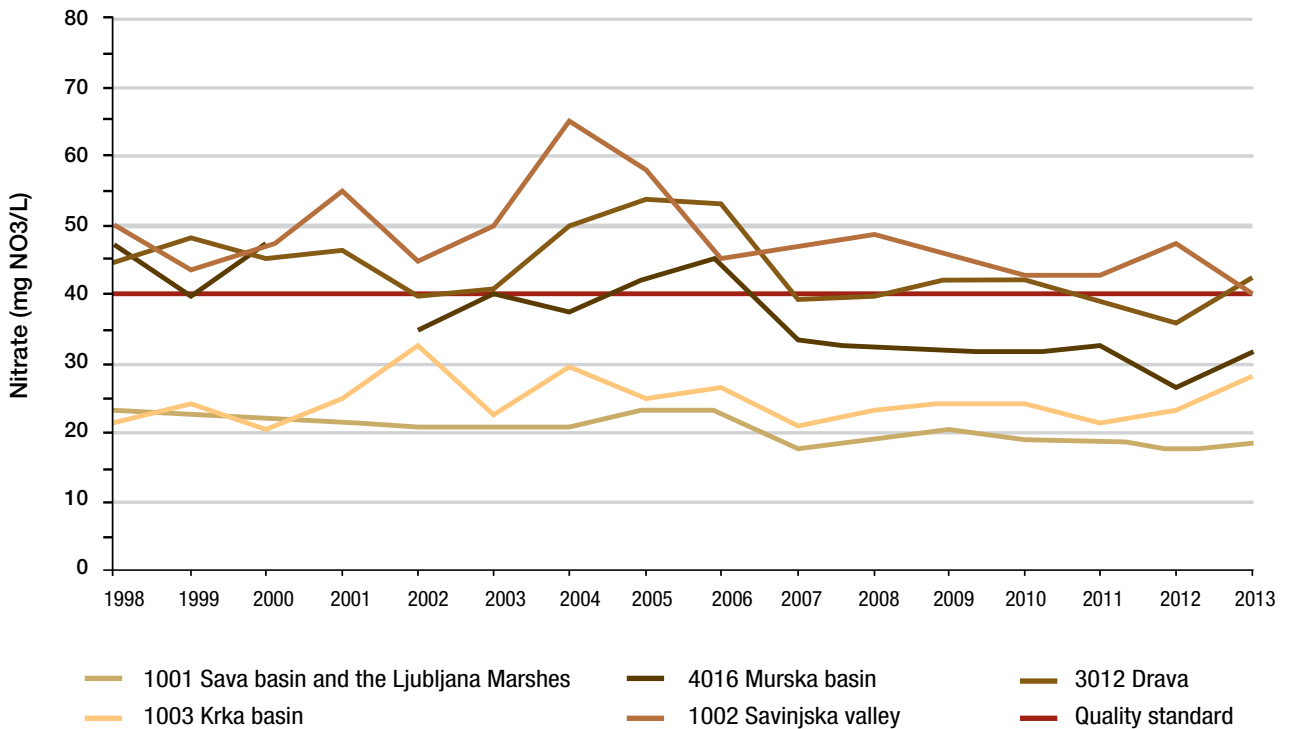
According to the latest data, levels of pesticides in groundwater have decreased (Fig. 1.6). In the flat lands of the basins of the Drava and Mura rivers, where intensive agricultural activities are typical, these levels still exceed the quality standards. Individual point sources of pollution can be a result of the unskilled use of PPP.

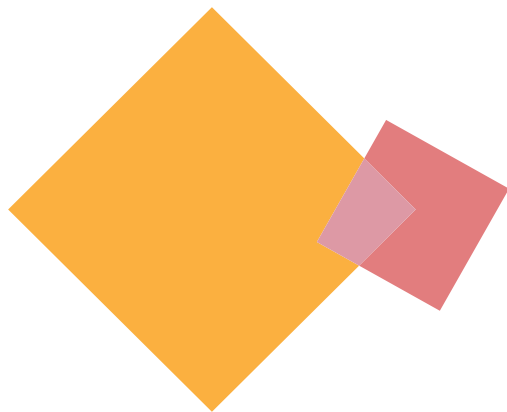
Fig. 1.6. Average annual values of pesticides in groundwater bodies with alluvial aquifers, 1998–2013, Slovenia



The groundwater bodies most polluted with nitrates are those with intergranular (alluvium) aquifers, particularly in the north-east (Fig. 1.7). The presence of groundwater in karst and fractured aquifers is due to geographical conditions, low population density and scarce agricultural land less burdened with nitrates. In the water bodies in the Mura and Savinja basins the average annual levels of nitrate showed a statistically significant downward trend from 1998 to 2012. In the other water bodies declining nitrate levels are not statistically significant.

Fig. 1.7. Average annual nitrate levels in groundwater of the more polluted water bodies, 1998–2013, Slovenia





The WHO Regional Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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